Urban Planning and Architectural Design for Sustainable Development (UPADSD) - 9th Edition 2024

A Book of Abstracts

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Urban Planning & Architectural Design for Sustainable Development (UPADSD) - 9th Edition

A Book of Abstracts submitted to the 9th edition of the international conference on Urban Planning & Architectural Design for Sustainable Development (UPADSD) 22 - 24 October 2024

Acknowledgements

IEREK would like to express its appreciation to all members of the staff and scientific committee for their tremendous efforts and contribution to the growth of this institution and for making the ninth edition of the International Conference on Urban Planning & Architectural Design for Sustainable Development. IEREK would like to thank the conference chairperson, Professor Francesco Alberti who is a Professor at the Department of Architecture (DiDA), University of Florence, Florence Italy. Prof Alberti had a hand in making the 9th Edition of this conference what it is today by

providing scientific and logistical support throughout its organization. IEREK takes pride in being an

institution that amasses a highly qualified and competent team who restlessly worked for months to make this conference what it is today in hopes of creating a well-rounded society. Last but not least, we cannot neglect the prominent role undertaken by our Editors and Reviewers, Session Moderators and keynote speakers who made it their duty to help this institution in spreading knowledge to the masses.

Foreword

Urban planning and architectural design both play a very important role, maybe even a critical one in shaping the physical and social fabric of cities and communities. Their importance extends beyond aesthetics and functionality. They both highly impact the quality of life, ensure the sustainability of the environment, and contribute to economic growth, and social equity.

Urban planning is one of the factors that certify that cities are structured in ways that put the needs of its residents first. An example of these factors are properly designed spaces that encourage continuous social interaction, constantly provide access to essential services, and create safe, livable environments. Parks, public spaces, transportation systems, and housing are basics of urban design that support the well-being of cities' residents.

Sustainable urban planning and architectural design are more crucial than ever as people's concerns about climate change, resource depletion, and environmental degradation grow. Reducing the environmental impact of buildings and cities can be achieved by using renewable energy sources, energy-efficient designs, and green building materials. Urban planning also focuses on solid, mixed-use developments that reduce reliance on automobiles, promote public transportation, and limit urban sprawl, preserving natural landscapes.

This book provides a very brief explanation how Urban Planning and Architectural Design are needed for the Sustainable development of territories. And why it is essential that conferences like IEREK’s 9th edition of the Urban Planning & Architectural Design for Sustainable Development (UPADSD) happen regularly, at least on a yearly basis. Conferences like this encourage communication and collaboration to ensure the betterment of society, and that becomes apparent in this book of abstracts.

The abstracts in this volume represent innovative research across a massive range of topics, including sustainable urban planning, green building technologies, resilient infrastructure, public space design, and innovative approaches to environmental management. The contributions in the book explore both the theoretical foundations and practical applications of sustainability in urban development, offering much needed insights into how cities can evolve to meet the needs of future generations while preserving the balance between human activity and the natural world.

Sincere gratitude is extended to all the authors, reviewers, and participants for their valuable contributions to this event. Their work highlights the interdisciplinary nature of sustainable urban development and the diverse strategies and perspectives necessary to confront the challenges ahead.

Word from the Chairman of the Board of IEREK

It is my honor to be launching this conference on Urban Planning & Architectural Design for Sustainable Development, a truly successful and rich event, for the 9th consecutive year. The efforts exerted across the years to nurture this conference have been instrumental in fostering a vibrant and dynamic platform for the research community in the field of urban planning and architectural design to contribute meaningfully to the creation of sustainable and livable urban environments. Organizing an event in this topic, year after year, we hope, continues to bring substantial benefits to the research community and the related disciplines. First and foremost, this conference aims to provide a unique forum where experts, scholars, and practitioners from diverse backgrounds can come together to exchange ideas, share insights, and collaborate on the pressing issues of today. By doing so, it bridges the gap between academia and practice, allowing for a more holistic approach to the challenges and opportunities faced by our cities. Furthermore, the continuity of this event over nine years has enabled a cumulative knowledge base to emerge. Each year, participants build upon the research, strategies, and innovative solutions presented in previous conferences. This incremental progress is vital for advancing the state of the art in sustainable urban development, as it allows researchers to track trends, assess the effectiveness of various interventions, and refine best practices. Additionally, the conference serves as a catalyst for interdisciplinary cooperation. The issues related to urban planning and architectural design are multifaceted and require input from various fields, such as environmental science, economics, sociology, and engineering. This platform encourages cross-disciplinary dialogue, fostering a more holistic understanding of urban sustainability and a more comprehensive approach to addressing complex urban challenges. IEREK- International Experts for Research Enrichment and Knowledge Exchange - is an institution that began pursuing its goal of reaching excellence in disseminating research and knowledge across countries in 2013, and since then has been connecting the world's scholars and providing them with a platform that would advance all their endeavors. Building international relationships with prestigious universities and institutes worldwide is one of IEREK's main goals, spreading knowledge and enhancing research around the world, along the way, through collaborating with trustworthy partners who share its same vision. With that said, IEREK hopes to present the world with a conference that positively contributes to its relative field and makes way for scholars to combine their ideas for the greater goal of discovering new and innovative solutions to the issue at hand, with the aid of our scientific committee comprised of distinguished professors and researchers from a variety of international, established universities. Finally, I hope that the conference succeeds in delivering its message to the world of professionals in the various concerned disciplines in order for their work to be put into motion. I would like to extend a warm welcome to individuals spanning from undergraduate to postgraduate levels, as well as anyone poised to gain the most from this event. I eagerly anticipate the opportunity to meet and engage with all of you during this fruitful experience.

Mourad S. Amer, PhD
IEREK CEO & Founder
COEUS CEO & Founder
Series Editor, ASTI /SUCI /SLNR by Springer

WORD BY THE CONFERENCE CHAIRPERSON

It is with great pleasure that I present IEREK's ninth International Conference on "Urban Planning and Architectural Design for Sustainable Development", the fifth organized with the scientific support of the Department of Architecture of the University of Florence, Italy, and the third in person - after two editions held entirely online during the Covid 19 pandemic - in the premises of our faculty.

The topics of the papers, the abstracts of which are collected in this publication, provide a rich and varied insight into how design practices at the architectural scale (including construction techniques) and at the urban scale are changing, thanks to the efforts of researchers and practitioners from all over the world, to respond to the challenges of sustainability in its various facets, incorporating different perspectives and contributions. Among these, initiatives involving citizen participation are playing an increasingly important role, as illustrated by the examples presented in the keynote speeches by Alvaro Sosa (Berlin) and Patrizia Di Monte (Zaragoza), which will open the first two days of work.

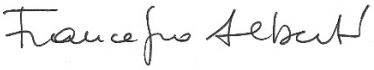
Many of these issues are at the heart of the agendas of those cities, which, albeit from different conditions and backgrounds, have actively embarked on the path of ecological transition.

Florence is one of them. In fact, it is one of the one hundred cities that have applied and been selected by the European Union to experiment with policies and projects aimed at achieving climate neutrality by 2030, ahead of the mid-century deadline set for all member countries by the European Green Deal. The actions planned are numerous and concern in particular: urban mobility (with the aim of overcoming the car-centric model still prevalent in Italy), urban forestry (to increase the contribution of greenery to CO2 sequestration and improve the urban microclimate), energy saving and clean energy production. An innovative project in this last area is the construction of small hydroelectric plants along the Arno, the river that flows through Florence and the surrounding municipalities.

But here, as elsewhere, we are in a race against time. The summer we have just had and the weather emergencies of recent weeks in Italy confirm the most worrying trends in global warming. In 2024, the threshold set by the Paris Agreement - to limit the temperature increase to 1.5°C above pre-industrial levels by the end of the century - has already been exceeded globally for 12 consecutive months.

This is also the purpose of international meetings such as ours: to keep the research community abreast of the challenges we face and to urge decision-makers to speed up the implementation of their findings. I would therefore like to thank all participants for the valuable contribution you make to this process in your respective fields, and wish you all a good conference.

Francesco Alberti



Conference Chair & Associate Professor of Urban Planning and Design at the University of Florence, Italy.

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Part I:
Making cities more liveable through sustainability

Integrating Health and Well-being into Urban Design: Microclimate, Walkability, and Walking Behaviour in Buraydah City, Saudi Arabia

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Abstract:

Amid global concerns about physical inactivity and its relationship to health, this study aims to understand the relationships between walking behaviour, neighbourhood walkability, and outdoor thermal comfort. A detailed investigation of three high-to-low walkable and comfortable neighbourhoods in Buraydah City, Saudi Arabia, forms the basis of this paper. The fieldwork included a questionnaire to survey thermal sensations and preferences, walking activities, and perceptions of walkability. Site-specific climatic data were collected for each participant from this hot-arid climatic zone during the hot summer of 2023. Data collected were collated in a GIS platform and tabulated for statistical correlation analysis. The analysis reveals a significant relationship between 1) high-to-low walkable and comfortable neighbourhoods and 2) perceived (land-use mix and intensity, street connectivity, and retail density) walkability and pedestrian behaviour, specifically regarding 1) frequency and duration of walking and 2) pedestrians estimated Physiological Equivalent Temperature (PET). By optimising microclimatic conditions through strategies such as shading, creating green spaces, and improving neighbourhood characteristics—including enhanced street connectivity and mixed, compact development—cities could potentially enhance outdoor thermal comfort and encourage walking. Findings suggest a positive association between high walkable and thermally comfortable neighbourhoods, perceived walkability, and increased walking and thermal comfort levels. This study reports that by optimising microclimatic conditions, cities can improve outdoor thermal comfort, offering a roadmap for urban planners to create walkable and, therefore, healthier, more active communities, particularly in extreme climates.

Keywords:
Outdoor Thermal Comfort; Urban Density; Urban Microclimate; Walkability; Walking Behaviour

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Inclusive Infrastructure: Advancing Sidewalk Design in Uptown New Orleans

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Abstract:

The physical constraints of modern city sidewalks are shaped mainly by the dominant construction priorities of speed and efficiency. As a result, the standardization of sidewalk assemblies and construction methodologies does not provide an equitable distribution of accessible pedestrian paths based on increasing pressure for cities to adopt federal guidelines in the United States.

New Orleans' uptown neighborhood presents a unique set of political and physical challenges requiring innovative design approaches for paved pedestrian mobility systems. Politically, the current city ordinance places the responsibility for sidewalk maintenance and safety on adjacent private property owners. However, the city is responsible for most mature live oak trees whose root systems damage sidewalks over time. As a result, despite the city ordinance that dictates sidewalk responsibility, the physical overlap of sidewalks and tree roots often disrupts the smooth surface, highlighting issues of ownership ambiguity and traditional solid concrete sidewalk systems designed for flat ground conditions. Furthermore, due to the limited range of city-accepted sidewalk construction techniques, there is no clear guidance for allowing more flexible system solutions to comply with federal accessibility guidelines more closely in these widespread areas uptown. The stagnant nature of this situation aligns with the focus area of urban obduracy within science, technology, and social studies. Obduracy refers to the slow-paced or stalled efforts of urban policy and planning to adapt large-scale infrastructure systems continuously.[1]

Digital design, physical simulation methodologies, and flexible sidewalk prototypes are proposed to help mediate geometric irregularities caused by tree roots while ensuring smooth pedestrian movement. These prototypes utilize computer numerically controlled (CNC) kerf-cutting techniques, subdividing sidewalk surfaces into smaller intervals with aggregate-filled offset cut patterns. This approach allows the system greater rigidity and adaptability to varied surface geometries, offering a more suitable and accessible solution for the unique challenges of New Orleans' Uptown neighborhood.

Keywords:
Pedestrian Accessibility, Digital Fabrication, Surface Geometry

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Can urban mobility be tailored to place? Research on indicators and thresholds for diverse Italian towns and cities

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Abstract:

The paper describes the methodology and expected results of the ongoing research project *Urget Vademecum 2030-2050*, funded by the Italian Ministry of University and Research under the Next Generation Europe instrument. The project addresses the issue of urban transition towards carbon neutrality, the linchpin of the European Green Deal, by developing an innovative assessment procedure to support sustainable urban mobility policies and planning in Italy, which is characterized by the highest car dependency rate among major European countries, following a place-based approach.

The proposed step-by-step procedure combines different analysis and evaluation methodologies, i.e. Threshold Theory, Cluster Analysis and Multi-Criteria Analysis, reinterpreted in a contemporary way, with the aim of providing structured guidance to public authorities to select, among the many available options, the most efficient and cost-effective set of measures for sustainable urban mobility, in terms of appropriate technologies, transport policies, urban planning and regulatory issues, adapted to the specificities of the place.

At the first step of the procedure, a set of indicators and related thresholds are intended to define the spatial variables which can influence mobility choices, narrowing down the number of viable transport modes, innovative technologies and services, to be subjected to subsequent evaluation steps. These include structural features of the site, among which morphological features (i.e., size, form, and structure of the urban area) and land-use related parameters (e.g., population, density, and land use) are those that most affect mobility. By developing GIS-based applications, thresholds have also been derived from the analysis of both physical (e.g. road widths) and accessibility parameters (e.g. network distances from urban attractors) that may condition the use of transport infrastructure, while microclimate indicators have been considered for their relevance in promoting or discouraging active mobility.

Keywords:
Sustainable Mobility, Carbon neutraliity, Geographic Information Systems, European Green Deal

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A Comparison between Commercial Streets and Shopping Malls. Case study in Musashi-Koyama, Tokyo

Errita Zuna[1], Alejandro Pineda[1], Jorge Almazán[1], Kazuma Watanabe[1]

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Abstract:

During recent years, social isolation has increased in highly urbanized areas. One of its main causes is the disappearance of traditional public spaces that foster social interaction and a sense of community. This study addresses social interaction in public spaces by comparing two locations, a traditional shotengai (commercial street) such as “Musashi-Koyama”, one of the largest and most active ones in Tokyo, and the adjacent newly built shopping mall “Park City Musashikoyama The Mall”.

Through social behavioral mapping and face-to-face interviews, we identified interaction patterns and analyzed their relationships with the spatial characteristics of the shotengai and the shopping mall. Our results suggest the important role of the shotengai in strengthening the sense of community and promoting interactions. Particularly, we identified a significantly higher number of spontaneous social interactions in the shotengai compared to the shopping mall, especially between the elderly and women.

In today’s society, particularly in Japan, promoting public space can be considered an important strategy for tackling social isolation. This study rediscovers the social benefits of traditional public spaces such as the shotengai in creating social interactions and suggests that their social characteristics need to be preserved in future redevelopment plans.

Keywords:

Social interaction, Behavioural observation, Sense of community, Tokyo

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Exploring mechanisms of ICT usage on perceived walkability of older adults

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Abstract:

Walkable cities help to encourage physical activities. For ageing societies, encouraging older adults to maintain daily walks is crucial for chronic disease prevention and promoting active aging. Yet central to walkability is the assumption that proximity to physical places provides motivation for active living. The ubiquitous use of Information and Communication Technology (ICT) devices to overcome physical barriers presents new dynamics in this environment-person relationship that is less studied.

Using socio-ecological framework, we contend that rise of ICT usage would act as a new dimension within social cultural and information environment, to change the interactions with physical dimension and cause an effect on perceived walkability of physical environments. This study examined the moderating effects of ICT usage between objective and perceived walkability.

Singapore, a highly connected city with smartphone usage among older adults at 89% in 2022 and a rapidly ageing population, was selected as pilot study site to investigate the influence of ICT usage on perceived walkability and physical activity levels of older adults. Primary data was collected via purposive convenience sampling within Tampines. The study includes an online survey (n=253) and walk-along interviews (n=30). Objective walkability attributes were collected through open-source data.

Results provided exploratory insights on newly observed mechanisms that influence the environment-person relationship. Use of travel apps, social communication and media tools, online fitness classes and online food delivery services had moderated the perception of access and attractiveness of physical places. Specifically, the mechanism of awareness, sense of control, curiosity and connectedness from the selective use of ICT devices suggests the changing importance of proximity and aesthetics standards for physical places. In an increasingly digitalized age, psycho-social factors like health attitudes and social environment may play a more critical role in enhancing perceived walkability than the usual built environment attributes of proximity and aesthetics.

Keywords:
Built environment; Perceived walkability; ICT usage; Older adults

Identity in the Physical Environment: Concept and Methods for Its Evaluation and Preservation through Participatory Design

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Abstract:

This article explores the concept of identity in the physical environment and its relationship with participatory design in urban and architectural planning. Through a review of the literature, it examines the methods and approaches used to identify and preserve the cultural identity of a community, emphasizing the importance of community participation. The evolution of methodologies is highlighted, from direct observation to the use of tools and the Minga in Latin America, an ancestral practice that serves as a foundation for participatory design. Finally, recommendations for community work based on expert experience are presented.

KEYWORDS:
identity in the physical environment, participatory design, community planning, Minga, participatory methodologies.

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Impact of Street Trees on Thermal Comfort and Air Quality

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6 Professor of Center for Geographical Studies, IGOT—Institute of Geography and Spatial Planning, University of Lisbon, Portugal

Abstract:

In urban environments, street trees influence air quality by altering wind flow and the dispersion of atmospheric pollutants. They also provide shade, impacting thermal comfort and the Universal Thermal Climate Index. This article investigates the influence of street trees on thermal comfort indices, focusing on the Universal Thermal Climate Index (UTCI), and the dispersion of atmospheric pollutants, specifically Nitrogen oxides (NOx) and Particulate Matter (PM10), within Brazil's cold and humid Z1 climate zone during December's hot summer conditions. Analyzes considering 5pm, coinciding with peak vehicle traffic, simulations using envi-MET software were performed under two scenarios one without street trees and another with 16-meter-high trees of average foliage density, in three wind directions. Results show that street trees improve thermal comfort, reducing UTCI by more than 0.5 K at pedestrian height. Regarding PM10 concentration, aligned wind directions (0 and 90 degrees) show slight increases in concentration in scenario with street trees, while perpendicular wind (45 degrees) increases PM10 concentration by over 0.4 μg/m³ in scenario without trees. NOx concentrations increased by more than 1.5 μg/m³ at pedestrian height with aligned wind directions, but decreased by over 3.0 μg/m³ with perpendicular wind. These findings highlight the complex impact of street trees on urban microclimates and pollutant dispersion, emphasizing the need for strategic urban planning to optimize their benefits.

Keywords:
Atmospheric Pollution, Thermal Comfort, Street Trees

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Planning The Development of Urban Parks

As Green Public Spaces in Colonial Java

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Abstract:

This paper examines the development of urban parks built in Java from the 1910s to the 1940s. For Java, the construction of urban parks is not entirely new. Traditionally, Javanese kingdoms have been building urban parks since the 17th century. These parks were constructed as spaces connecting humans with the Creator, thus creating a harmonious life on Earth. For example, in the Yogyakarta palace complex, the Taman Sari was built, while the Surakarta palace complex had the Taman Balekambang. However, unlike the parks in Javanese kingdoms, the construction of urban parks during the colonial period represented a new aspect in the tradition of creating urban parks. They were not just spaces connecting humans with the Creator but also symbolized environmental consciousness, in response to the increasing environmental degradation caused by modernization. Therefore, various parks were built considering hydrological concepts, where infiltration wells or artificial lakes were created as complements to the park. The development of parks with hydrological concepts became stronger, especially since the colonial government implemented the municipalities system (*swapraja*) in 1903, granting special authority to several cities in Java such as Batavia and Semarang to plan and manage their own regional budgets. To discuss the park planning process and the contestations that occurred, this paper utilizes various archives from *Binnenlands Bestuur*, *Burgerlijke Openbare Werken* (BOW) and *Tweede Waterstaat*, as well as contemporary newspapers and magazines.

Keywords:

Colonial Java, Public space, Indonesia planning the development, Urban park

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Pocket Parks in Florence: a strategic integration for urban green infrastructure

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2 Landscape Architect, Memoscape, Italy

Abstract:

Several studies and research indicate that in large urban centers, the lack of vegetation and soil impermeabilization contribute to intensifying the effects of climate change, with negative impacts on human health. The ability of local governments to promote models of public space regeneration focused on resilience is crucial for integrating climate adaptation goals.

This article begins by mapping some of the most significant initiatives in Europe, which involve the creation of Pocket Parks as effective strategies for mitigating climate change. It then presents a project led by the Municipality of Florence and explores how this approach could shape future regulatory models for planning and monitoring urban space transformations. The project, developed by the landscape architecture firm Memoscape, involves the design of 9 Pocket Parks within the urban area. These parks are designed to revitalize and create public green spaces, in line with Law 10/2013. The project focuses on improving existing green areas, removing pavement, and adding urban furniture to encourage social interaction within the community.

These areas, currently paved with asphalt and situated in heavily trafficked zones near major city roads, lack trees and green spaces. The interventions are guided by principles of design for connectivity, wellness, and sustainability.

In the absence of specific regulations, a project guideline was established, outlining ten points that align with the objectives of Directive 42/2001/EC (European Commission, 2001) in areas such as:

- sustainability

- increasing biodiversity and bio-retention surfaces for rainwater

- improving livability and social interaction

- reducing the urban heat island effect.

Finally, to assess the effectiveness of the proposed solutions, dynamic simulations were conducted with the support of a research team from the Department of Architecture at the University of Florence. These simulations analyzed how the integration of Pocket Parks and the reconfiguration of urban spaces would impact community comfort levels.

Keywords:
Green Infrastructure, Pocket Park, Nature Based Solutions

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Research on sustainable urban design based on small-scale and Progressive concept

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4 Master at Southeast University, China

Abstract:

In China, the trend of urbanization is significant. Cities have become the concentration of population and economy, but they also face a series of "urban diseases" such as environmental degradation, traffic problems, and soaring housing prices. Large-scale urban expansion has made problems such as damaged ecosystems, chaotic spatial structures, and traffic congestion more serious. In order to promote high-quality and sustainable urban development and accelerate the revival of modern cities, the Chinese government has proposed a "double urban repair" policy, including "ecological restoration" and "urban repair."

This paper selects the core area of Nanjing as the research object takes "urban repair and ecological restoration" as the guideline, starts from a small-scale, progressive design and combines a variety of urban design methods and concepts to propose a series of sustainable urban design strategies. These strategies aim to optimize the urban structure, improve the public transportation system, protect historical bperspective, uildings, effectively integrate green spaces with public spaces, and achieve harmonious coexistence between nature and urban life. The ultimate goal is to create a more prosperous, livable, and sustainable Nanjing and provide experience and models for other cities to learn from. This study focuses on current problems and challenges and strives to provide feasible solutions and innovative design ideas for future development.

Keywords:
Small-scale, Progressive design, Sustainable urban design, Nanjing

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Urban Design Principles for Sustainable and Well-Being Compounds in the Sultanate of Oman

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Abstract:

The increasing population and housing demand in Oman necessitate the establishment of integrated urban communities to improve residents' daily lives, provide essential services, and create a sustainable living environment. So, the Sultanate of Oman's Vision 2040 aims to revitalize its cities and achieve a high quality of life for citizens and residents. This research paper explores urban design principles for creating sustainable and well-being-focused compounds in the Dhofar Wilayat, focusing on principles such as image, scale, proportions, visual continuity, street networks, urban spaces, perception of the physical environment, urban environment use, and public health and safety. The study employs a social-scientific empirical approach to examine the theoretical background of urban design concepts embedded in traditional Omani urban design principles, as well as their relation to sustainability and people's well-being. The findings emphasize the importance of equitable distribution of green spaces, improved accessibility to public parks, and balanced urban growth considering environmental and social factors. The research aims to develop tools to assist in designing urban residential neighborhoods that contribute to a high quality of life for residents. Key recommendations include community involvement in planning, emphasizing sustainable solutions, and creating public spaces that promote social interaction. Guidelines are offered for following these concepts in upcoming compound developments around Oman.

Keywords:
Sustainable and Well-Being Compounds, Integrated urban communities, Oman's Vision 2040, Urban design theories, Urban neighborhoods.

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Local-scale Environmental Sustainability Indicators. A review

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Abstract:

Most environmental assessment studies focus on global-scale impacts and indicators such as CO2 emissions, and struggle in grasping local-scale phenomena. Through the Alpi Apuane case-study, the paper highlights the frequent neglect of local environmental repercussions of product manufacturing and the consequent need for local-scale Environmental Sustainability Indicators (ESIs) to assess these impacts. Reviewing existing ESIs and their applicability to local contexts a set of local-scale indicators is produced. The set is then confronted with the impacts generated locally in the Alpi Apuane, identifying gaps in existing indicators, particularly in measuring aesthetic, cultural, and natural heritage losses. The findings suggest that commonly used ESIs, such as those in Life Cycle Assessments (LCA), fail to fully capture the nuanced local-scale impacts of production. This underscores the need for new methodologies and indicators to assess better and address local environmental and social consequences, encouraging more comprehensive approaches to sustainability.

Keywords:

Local-scale indicators; Impact assessment; Environmental sustainability indicators

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The 'Mugnone River Contract': a green and blue infrastructure for the Florence metropolitan area

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Abstract:

The Mugnone creek is a common heritage of historical, economic, cultural and ecological significance and a resource of extraordinary value in the metropolitan area of Florence. Along its course, it connects the northern hills of Fiesole within the city of Florence, crossing a rich countryside and offering countless opportunities for recreational activities.
Lungo il Mugnone is a public engagement process that reconsiders the relationship with the creek and proposes a collective vision for the future of this crucial green and blue infrastructure between city and countryside.

Activated thanks to Le Curandaie association with the support of the Architecture Department of the University of Studies of Florence and the landscape architects of Memoscape, the bottom up participatory process envisions connecting parks and green areas through pedestrian and bicycle paths, trails along the basin with water access points in a continuous public realm 17.5 km long.

The initiative, aimed at supporting environmental protection, planning and urban land development policies, has established the 'Mugnone River Contract' that brings together the local authorities, the inhabitants and all the different stakeholders, in a pact for the rebirth of the river basin as a living environment (European Landscape Convention - 2000) and therefore as a common good to be managed in collective forms.
The future proposed steps may have effects that amplify the project's resonance in the area. The 'Mugnone River Contract' may become part of the ‘Pact for the Arno’, the "contract of contracts" of the great Tuscan river. This project aims to introduce the 'Mugnone River Contract' as a pilot project into regional, provincial and local policies.

Keywords:
Green Blue Infrastructure, Community engagement, The ‘Mugnone River Contract’

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Assessment of Green Infrastructure in the context of Urban Sustainability: A study in Northern Nicosia

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Abstract:

Urban green infrastructure is a significant feature of sustainable cities. Green infrastructure refers to the network of natural, semi-natural, public and privately owned open green and blue spaces to provide ecosystem services for the biodiversity of the cities. Northern Nicosia as a rapidly urbanizing city, is suffering from the consequences of global warming and climate change and also needs to implement and support the system of green infrastructure. Within this framework, Mehmet Akif Street and the Pedieos River along the street which is one of the most crowded commercial and public hub of the city, was chosen as the study area. The street and its surrounding as a region was analyzed and urban corridors were determined in order to make a qualitative assessment for developing a network of green infrastructure. Based on the findings, the traffic load needs to be decreased in the region. Further urban landscaping including the hardscape such as urban furniture and softscape materials such as street trees must be deployed. In addition, Pedieos River needs to be integrated with the region after the rehabilitation and design process. As concluding remarks, more scientific theoretical and evidence based approaches are required in order to integrate and evaluate the concept of urban green infrastructure within the framework of sustainable development.

Keywords:
Urban Sustainability, Green Infrastructure, Qualitative Assessment, Northern Nicosia, Cyprus

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New Design Approaches for Urban Voids:

Developing a Framework for Analysing Innovative Projects in Terrain Vague Spaces

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Abstract:

In recent years, there has been a growing interest of researchers, academics, and architects in a new type of spaces generated by the invasiveness of urbanization processes, the lack of an adequate scale of regional planning and the cycles of sprawl and shirking. Many authors have attempted to define these spaces: Terrain Vague, Vacant Land, Urban Voids, Wasteland or Brownfield, are just some of the terms used to define and describe abandoned, underdeveloped, and unutilized urban spaces outside the productive circuits of the city. In addition to the interest of the academic world, there is a growing emergence and multiplication worldwide of alternative projects, practices and activities based precisely in these in-between or terrain vague spaces, which aim to change and transform these spaces, but also to preserve and enhance some of their intrinsic characteristics. In fact, by alterative projects, we refer to projects that on the one hand act by transforming the space, but on the other hand preserve the value and potential of terrain vague spaces, and that aim to address the challenges of cities and achieve sustainable urban development. However, we think it is possible to state that there is a lack of systematic research with the aim of collecting, analysing, and categorizing these emerging projects. The aim of this paper is the creation of a theoretical framework to identify, collect and analyse alternative projects and practices emerging in the Terrain Vague context, and the development of the characteristics to analyse for conducting a future comparative analysis, to understand the differences, similarities, approaches, objectives, impacts, strategies, challenges and difficulties. To achieve that, the paper proposes: i) a brief theoretical introduction and definition of the concept of terrain vague and the ecological and social value of these spaces; ii) Introduction to the concepts and theoretical lenses chosen as criteria to select alternative, virtuous, and innovative projects, which can both enhance the values of terrain vague spaces and contribute to urban challenges (urban commons, everyday urbanism, temporary urbanism); iii) Definition of the characteristics and aspects to be analysed for conducting a comparative analysis of these innovative projects (Scale/Duration, socio- ecological aims, level of participation, Existing/Flexibility).

Keywords:
Terrain Vague; Urban Voids; Everyday Urbanism; Urban Common; Tactical Urbanism; Participatory Processes.

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Noisy Buildings: Review and Case Studies of Sound-Emitting Façades

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Abstract:

Rising challenges in cities worldwide, such as densification, contamination, and climatic events, often accelerate technological developments within the construction industry. Concepts like smart cities and autonomous buildings are gaining popularity as examples of sustainable design. However, the use of mechanical equipment and other technologies related to human activities tends to produce unwanted sounds, increasing the risk of noise pollution and potentially degrading people's experiences around certain buildings. Façades can also be involved in the production of sounds produced by geophysical or biological sources. This paper presents a preliminary classification of sound emissions by façades based on literature review, and provides three case studies of buildings that produce sounds in the city of Santa Cruz de la Sierra, Bolivia. This research provides valuable insights into the potential impact of façade design on the urban acoustic environment, which should be an essential consideration in assessing a building's sustainability.

Keywords:
Architecture; Acoustics; Soundscape; Noise; Sustainable Development

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Utility networks integration into urban Digital Twins: smart and sustainable city management

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Abstract:

The management of public service networks in cities is increasingly complex because of the numerous networks and stakeholders, the volumes of data, and the interdependencies that they all involve, requiring innovative solutions in the smart city era. Therefore, the creation of Digital Twins and the integration of all available information and tools are necessary to ensure more resilient and efficient services. Currently, a challenge arises in the collection of these data and the creation of tools in a systematic way. However, the integration of underground utility networks into these city models remains limited because of the number of operators that manage the networks and the nature of these networks, which are located underground and do not usually have high-quality public cartography. In this study, we developed a scalable and replicable methodology for creating smart Digital Twins using automated flows based on standards. A key novelty lies in our automatic workflow, streamlining of systematic data collection, and tool creation. This ensures scalability at the city level, and replicability across diverse case studies. This methodology significantly enhances the functionality of underground infrastructure and provides a comprehensive framework for sustainable city management. The model was validated in two case studies, Bilbao and Zaragoza (Spain), to test its efficacy. The results not only affirm its practical applicability but also offer valuable insights for informed municipal decision-making. The proposed methodology represents a step forward in the automatic creation of smart Digital Twins that can support the management of urban utility networks.

Keywords:
Digital twin, CityGML, Smartcity, underground utility network

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Lighting analysis experiences for cities

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Abstract:

Lighting is a relevant factor for human health and quality of life. The design of our cities and buildings condition our access to natural lighting and consequently our over exposure to artificial lighting. To address the pathway for improving cities' design in terms of lighting it is crucial to analyse and diagnose the lighting baseline of our buildings and cities. This work addresses the KPIs development for natural lighting analysis from two perspectives: from buildings configuration and from natural lighting simulations.

The definition of indicators in the building's configuration perspective considers factors linked to urban morphology such as the width of the built footprint, the orientation of the façades or the volumetric definition of the buildings, the configuration of the housing typology or the composition of the façade openings.

Natural lighting simulations provide different indicators per unit of surface (hours of direct incoming solar radiation, global radiation or total amount of incoming solar insolation) about outdoor conditions per unit of surface for winter and summer solstices and annual aggregation, and for the whole urban area of study (on streets, public spaces, building roofs, etc.).

Both perspectives had been applied to three pilot areas in Bologna, Amsterdam and Tartu cities in the frame of ENLIGHTENme European project. Obtained KPIs had been represented in a georreferenced multiscale web based platform including 3D and 2D layers of information. The objective of this multiscale platform is to provide a comprehensive analysis tool for the cities diagnosis and improvement.

Keywords:
Lighting analysis, LiDAR, GIS, Lighting simulations

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Part II:
Integrating Art and Culture in Urban and Architectural Landscapes

Climate Solutions Based on Cultural Heritage Development: The Case Study of Traditional Geometric Patterns of Mashrabiya Screens

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Abstract:

Climate change continues escalating worldwide, and people struggle with adverse weather conditions. This change necessitates developing strategies for suitable microclimates, harnessing natural energy and utilising local materials. The impact of climate change has yet to be defined, but it is evident that low-income communities often bear the brunt of global warming's effects. Studying vernacular architecture allows for understanding early forms of resilience that can evolve for innovative climate adaptation (Correia et al., 2014). Hassan Fathy's work shows how tradition evolves while maintaining and enhancing its identity. Crafts fall under these traditions, showing another form of this adaptation carrying aesthetic, functional, and social significance. Cultural heritage is an early stratification representing the evolution of tangible and intangible traditions over time. Its perseverance depends on the capacity to evolve in contemporary rituals and new social conventions. Cultural heritage is essential in this research while maintaining an identity as a key growth factor. Exploration of vernacular architecture through literature review and some exhibitions shows cultural heritage's proactive role in adapting to climate change, circular economy, inclusion, and sustainability development of urban contexts (Fathy, 1986). In particular, the contribution explores the (مشربية) 'Mashrabiya' craft, a traditional element rooted in the architecture of the Middle East, North Africa, and parts of Europe (Maspero, 1914, 12). This architectural element provides a means for exploring this intersection between heritage and contemporary design. Maintaining local memory means maintaining identity and tradition and, therefore, the heritage of practices and techniques that constitute the "know-how" of each territory and community. Sustainable development and the protection of cultural heritage must stimulate discussion, cooperation and interdisciplinary exchange between researchers, urban planners, designers, and artisans to innovate tradition and increase resilience in continuity with the cultural roots of the territories.

Keywords:

Climate Change Adaptation; Vernacular Architecture; Design Innovation; Mashrabiya Screens; Traditional Know-How

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The Innovative Concept of *Darmo* Surabaya Heritage Area based on Perspective of Urban Morphology

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Abstract:

Changes in the physical form of cities in cultural heritage areas have an impact on the regional character. The Darmo cultural heritage area in Surabaya has experienced this change. Changes in building facades, building shapes, parcels, blocks, and roads, as well as the destruction of buildings for a long time resulted in the fading of the sense of place in the historic area. There are several issues on land sales, land use conversion, and building inside a curtilage inappropriately. Threats of being inadvertently the center of Surabaya city nowadays makes the area vulnerable from the adjacent economic-flourished exposure. Nevertheless, this area is an area developed in the 20th century, and became an expansion of the City of Surabaya. Moreover, Jalan Bodri on the west-tip of Darmo estate have been hosted several houses with unique archetype which can not be found in other areas. However, preservation efforts of this area which currently exists only covers the protection of individual buildings. To restore, maintain and enhance the character of historic areas, comprehensive protection of the area is required. Morphological study of cultural heritage areas Darmo is required to formulate criteria for the preservation of the Darmo cultural heritage area. However, the edge of the Darmo area is insignificantly aware and seemingly undetached from the whole area. Therefore, it is intuitively essential to protect the ensemble from the adjacent threats by put an innovative preservation concept to promote the borders' prominent. This study uses an intersubjective approach and uses a combination of two strategy phases in the form of historical-interpretive and qualitative strategies. The data collection methods are in the form of archival studies, observations, and literature studies. The architectural data obtained is redrawn as a digital acquisition. Then, the history was analyzed to produce the significance of the object, along with the findings from the point of view of urban morphology. Criteria are formulated to develop innovative concepts to elevate the borders' rare archetype. The expected result is an innovative concept of the Darmo cultural heritage boundary to signify the characteristics of the area completely and sustainably.

Keywords:
Cultural heritage, Urban morphology, Edge preservation, Innovative concept

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Spatial identities of Sarajevo's residential neighborhoods

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Abstract:

Since the establishment of the city in the 15th century, Sarajevo has been at the crossroads of many different civilizations, cultures, and religions. The unofficial name "European Jerusalem" is well deserved due to its rich and diverse historical heritage and heterogenous confessionalism. The architectural and urban categorization of Sarajevo's residential neighborhoods is a reflection of this diverse history and heritage that had different influences leaving their mark on the very fabric of the city and has caused the creation of several spatial identities in the development of the city itself. This paper aims to give a detailed picture of the various forms of the urban heritage of the city of Sarajevo, and thus to show its different spatial identities focusing on residential neighborhoods.

This study presents a chronological cross-section of the development of the city demonstrating the creation of its urban identities, from the Ottoman period in the 15th century to the present day, including the period of very turbulent early 90s of the last century in which the country went through the war-induced destruction of the city. This article examines historical and contemporary spatial forms, typologies, and identities using examples from several case studies from different periods. By comparing them, the goal is to point out their advantages and disadvantages in terms of spatial organization and the quality of living. The graphical and textual explanations offer a concise overview that explains each of these very different urban matrices, which together create this linear city and ultimately are its architectural and urban heritage.

Keywords:
Sarajevo; Heritage; Residential neighborhoods; Spatial forms; Urban identities

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From Cultural Preservation to Cultural Tourism: Examining the Heritagization of Rijal Almaa's Vernacular Architecture within the Al Soudah Peaks Development

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Abstract:

Heritagization refers to the process of identifying, preserving, and promoting cultural heritage within a particular region or country. While this strategy yields economic advantages and promotes tourism, it requires careful scrutiny due to concerns such as excessive commercialization, cultural commodification, and potential degradation of heritage. Over the past years, countries have actively employed the heritagization of cities and villages as a tool for tourism and cultural engagement. This process involves certain vernacular architecture undergoing significant evolution, which can lead to the transformation of the cultural heritage and thus increase the appeal of cultural tourism. Therefore, the notion of "heritagization," which reframes heritage as a process rather than a fixed entity, has introduced fresh complexities that are both captivating and challenging.

The urban evolution of Rijal Almaa, a heritage village in Al Soudah Peaks Development has embraced a unique heritagization approach as this novel project is set to recreate the vernacular architecture of the site blending modern and traditional elements. Rijal Almaa is part of the Al Soudha Development project in line with Saudi Vision 2030 and is set to become one of the leading cultural tourism destinations in the region. This study employs a case study research methodology to explore the role of heritagization in the evolution of Rijal Almaa's vernacular architecture within the Al Soudah Peaks Development. The research analyzes how vernacular architecture is being highlighted, transitioning from mere preservation efforts to becoming a key element of cultural tourism. Moreover, it examines the integration of this vernacular heritage into the broader framework of Saudi Arabia's Vision 2030, positioning it as a pivotal component of the Kingdom's ambitious cultural destination initiatives. This research concludes how vernacular heritage evolves under the process of heritagization and develops recommendations for transforming cultural heritage sites into cultural tourism destinations while ensuring the balance between heritage preservation and cultural tourism. The findings and recommendations from this study will be applicable to other heritage sites currently undergoing heritagization for mass cultural tourism developments.

Keywords:

Cultural Preservation; Cultural Tourism; Heritagization; Vernacular Architecture; Rijal Almaa; Al Soudha Peaks Development

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Revitalization Strategies for Inner Areas in Italy: Constraints and Opportunities from an Analysis of Best Practices

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Abastract:

The revitalization of inner areas is a significant issue in the field of spatial and economic planning for sustainability and ecological transition. The settlement model based on the predominance of metropolitan areas has long shown its vulnerability in environmental, functional, economic, and socio-cultural terms. Strategies of revitalization and repopulation of inner areas can contribute to the construction of a better territorial arrangement because they structure a new reticular and polycentric settlement system in dynamic equilibrium with the natural resources present in the area of reference; they can be an opportunity to reorganize living according to "proximity" criteria; they can offer opportunities for maintenance of the rural territory, preserving its biodiversity and preventing hydrogeological and hydraulic risk; they contribute to the protection of essential heritage values. For some years now, a wide range of initiatives aimed at pursuing, among others, the above objectives have been activated in inner areas by institutional or bottom-up initiatives.

This paper presents the outcomes of a study conducted as part of the research project “Regenerating Cultural Landscapes of Inner Areas in a people-centered perspective”, carried out by a multidisciplinary team of the University of Florence involving researchers from the Departments of architecture, economics, and educational sciences. In particular, the paper focuses on one of the first tasks of the project, namely the critical analysis of best practices related to regeneration projects in inner areas in Italy. The article presents the original analysis methodology developed for this research that produced a matrix of meta-criteria and criteria for selecting and evaluating best practices, which can also be used in other research contexts. Next, the article focuses on a selection of four best practices that were analyzed in more depth and summarizes the main findings regarding design strategies, highlighting limitations and perspectives for better regeneration of inner areas.

Keywords:
Cultural landscape, Heritage, Sustainability

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Sustainable Urban Design and Energy Efficiency strategies to regenerate the Italian inner area. The REACT workshop experience

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Abstract:

Although they often face problems that threaten survival, villages in marginal areas are usually genuine biological and cultural diversity reserves. They have resources that remind us of the sense of integration and harmony that links places to the people living there, giving life to an inextricable whole, consolidated in a long, co-evolutionary process. At a time when we are questioning the sustainability of development models and rules of coexistence that are inadequate to contain and repair the damage caused by past and current crises o (e.g. ecological and pandemic), villages in marginal areas can be privileged places to promote innovative development models based on the centrality of the human person in their relationship with the environmental components.

In line with this consideration and the most recent policies issued by the European Parliament to promote the sustainable regeneration of the inner areas, the research REACT addresses this relevant topic according to a strongly interdisciplinary approach that, thanks to the concept of the cultural landscape, welds the different dimensions of the problem into a comprehensive vision: settlements and architectural emergencies, cultivated landscapes and natural systems, community practices and experiences. Accordingly, the research aims to enhance heritage and human resources, promoting sustainable territorial development, with active community participation as a key element in urban design.

Among the various activities developed by REACT, the three University Departments of the University of Florence involved in the research group (Architecture, Economics and Education) organised a one-of-a-kind interdisciplinary workshop between July and November 2023 finalised to develop innovative restorative strategies for historical villages and rural territories of Casentino Valley based on the integration of sustainable urban design approach and energy efficiency technologies.

The paper will show some results of the workshop and research activity focused on the design of public spaces and landscape infrastructures developed to promote the social, environmental, and economic renaissance of the Casentino area.

Keywords:
Active Learning, Interdisciplinary workshop, cultural heritage, inner areas, sustainable development

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Revival of Urban Heritage as an Engine and an Indicator of Social and Economic Recovery in Post-War City, Homs as a Case Study

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Abstract:

War in Syria has mercilessly devastated every place it has touched, particularly targeting buildings of historical and architectural significance, resulted in: abandoned neighborhoods, destructed buildings, a torn, besieged, and impoverished society with little hope for lasting peace. However, amidst this despair, cultural heritage emerges as both a driving force and a symbol of resilience, embodying people's confidence in their identity, unity, and sense of belonging.

Considering the severely damaged old part of the Syrian city of Homs as a case study, this paper documents cultural heritage impact as a concept to apply creative solutions to confront post-war challenges, revive destructed historical parts of the city.

The paper examines the revival of a cohesive network of heritage symbols in the historical part of Homs. Besides the official role that was done by city's authorities, this paper emphasizes the significance of spontaneous initiatives that were carried out by the city's residents in order to achieve this goal.

After the devastating years of war, buildings and public spaces that cater daily needs of residents played a crucial role in encouraging people and various activities to bring life back to their old city proofing its inherited ability to overcome challenges.

Keywords:
Cultural heritage, Recovery, Post-war city, Homs

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A study on the Utilization of Modernism Architecture in Kitakyushu City, Japan

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Abstract:

This research is a study of methodologies for the preservation and utilization of modernist architecture in Kitakyushu City. Kitakyushu City is still dotted with many modern buildings of diverse styles and functions, and it can be seen that changes in architectural styles can be read from the existing modern architecture. The reason for the large number and variety of modern buildings in Kitakyushu is the city's long history of prosperity as a major transportation hub and its development into an industrial city that played an important role as a trading port. In this study, we investigated which modernist buildings in Kitakyushu have been preserved and renovated, and for what purposes they are being used. As a result, it was found that there are buildings that have been preserved and renovated for their original use, buildings that are being used as new facilities, and buildings that are being used as a complex of buildings with new uses added to their original uses.

***Keywords*:**
Kitakyushu city, Modernism architecture, conservation, utilization, historical building

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Participatory heritage: reflection about the elaboration of the Atlas of Territorial Heritage of Playa, La Havana, Cuba

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Abstract:

The recognition and preservation of cultural heritage is still a challenge that involves not only public administrations and various stakeholders but also requires broad participation from the local population. This article is framed in the postcolonial approach and aims to contribute on how to overcome exogenous views in heritage recognition and preservation, especially in Global South contexts.

The development of effective methodologies for engaging settled communities in enhancing local heritage has been one of the research objectives of the LabPSM - Laboratory City and Territory in Global South at Department of Architecture of the University of Florence for years. Thanks to research experiences and international cooperation (Paloscia et al. 2017; Paloscia et al. 2021; Tarsi 2019) matured within the laboratory, community engagement strategies have been developed based on extensive literature on the subject and the many practices developed internationally, but also on the specific approach of the Territorialist School (Magnaghi 2000).

This paper presents the results of the most recent research: the development of the Atlas of Territorial Heritage of the Municipality of Playa, La Habana, Cuba, resulting from a strong community involvement in identifying and recognizing the material and immaterial values of the territory. During the initial training phase, ample space was given to the theme of inclusion and methods to ensure it; data collection and processing activities involved the participation of students and professionals involved in heritage conservation. The Atlas constitutes an important basis not only for preserving memory but also as a "living" tool in the hands of the community to define future transformations centered on the idea of territorial heritage as an essential resource.

The authors, who participated in the construction process of the Atlas, in this article present the objectives, results, and limitations of the research.

Keywords:
Tangible and intangible heritage; Participation; Conservation; International cooperation; Postcolonial studies

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Ho Chi Minh City's central area from the perspective of sustainable design

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Abstract:

The central area of Ho Chi Minh City (HCMC) is an urban area that has gone through many historical ups and downs, with thousands of old buildings built before 1975 with high cultural, historical, artistic, and commercial values, which are still being used or reused. However, due to changing usage needs and economic development pressure, many problems have arisen with these core zones of the city, such as lack of streets and urban utilities, lack of parks and public spaces, while new buildings have been built to replace or intersperse old buildings, breaking up the old urban complex. This study aims to assess the current status of these urban areas according to sustainable urban design principles. From there, we propose more sustainable solutions for this area, especially in organizing common spaces and building aesthetics. The research methods include (1) studying the history of the formation and development of the housing population in subdivision 4 of HCMC center, (2) scientific observation, measurement, and mapping the current status of the research area, and (3) evaluating the selected residential complex according to the United Nations MY Neighborhood matrix. The research results include drawings and diagrams of the current status of the residential area, the assessment matrix, and some proposals for public space and visual treatment to achieve harmony in the entire urban landscape. This topic is part of a more comprehensive study of the central areas of HCMC, which will focus on sustainable and identity-rich urban development in the future.

Keywords:
Sustainable Urban Design; Central Area; Old Buildings; Ho Chi Minh City

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From margin to urban interface: designing a network of open spaces around the heritage city walls of Siena

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The city centre of Siena, a UNESCO World Heritage site since 1995, is surrounded by 7-km-long city walls which helped to preserve large open spaces wedging into the historic town, the so-called 'green valleys'. This potential green belt is currently poorly accessible: fragmented by different uses and properties on the inside of the walls, scarcely connected to the outside, especially in terms of soft mobility. The project Connessioni Verdi Siena (ConVerSi), developed by the design practice and spin-off company of the University of Florence Urban LIFE, on behalf of the Municipality of Siena, networked this mosaic of diverse spaces - which include two botanical gardens, areas used by the local communities of the *contrade* (historical quarters of Siena), agricultural spaces and various public or private areas - to form a park along the city walls. The park is conceived as an interface between the heritage centre and the districts outside the walled city and as a circular green infrastructure connecting the city with its territory. The project, developed also through participatory activities with citizens, resulted in a masterplan for the park of the city walls which identifies a network of internal-external connections and finally makes the green valleys accessible, bringing together existing and new elements of historical, cultural and environmental value.

Keywords:
Green Belt, Public Space, Accessibility, Historical Landscapes

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The medieval aqueduct of Perugia.

From abandonment to reuse as a pedestrian path

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Abstract:

The contribution analyses the case study of the medieval aqueduct of Perugia and its reuse as a pedestrian path. The study deals with the final section of the ancient aqueduct which is identified with the arches that stand in the historic center of the city in the area known as the "Conca". The remains of the aqueduct, which have survived the passage of time and have been preserved in their new urban use, testify to the bond of interdependence between the water infrastructure and the city of Perugia, which has never failed over seven centuries.

The aqueduct, approximately 4 km long, dates back to the mid-9th century and was built to conduct water from Mount Pacciano to the Fontana Maggiore, in the heart of Perugia's historic center. The extraordinarily daring hydraulic work had a troubled life due to the frequent repairs that the City had to support and the commitment it put into asking for opinions and solutions from the various experts of the time. Due to continuous functional and maintenance problems, the aqueduct was decommissioned in 1835 and replaced by a new one coming from Bagnara di Nocera Umbra and directed to the Monteripido reservoir.

Today, the arches of the Conca are a hanging pedestrian street, via dell'Acquedotto, connecting the via Appia, which joins the historic center with the Conca area, with Borgo Sant'Angelo, an appendix of the city's medieval expansion towards the north.

Despite the city's growth, the aqueduct has been preserved as a pedestrian connection axis and still constitutes a persistent sign in Perugia's urban fabric. Its importance as an identity element for the city and its position constitute an interesting design opportunity to define future urban scenarios that could improve accessibility to the historic center through the valorization and expanded use of the medieval infrastructure.

Keywords:
Cultural Heritage, Reuse, City identity, Accessibility, Conservation

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Knowledge and valorisation of sepulchral cavities in the Neapolitan underground

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Abstract:

The Neapolitan territory is characterised by a network of underground cavities consisting of tunnels and chambers built since the Greco-Roman era and destined to different uses. Many of them contain architectural elements of great historical and artistic value, traces of the eras and styles that have succeeded one another over time. Among these, of great interest are those created for sepulchral use, the spread of which began as early as the Hellenistic period. The first were concentrated mainly in the area north of the historic city, between Via Foria and Capodimonte. Later, from the 3rd century until late medieval antiquity, the Christian cult also resorted to the use of sepulchral cavities, the catacombs, assigning them a dual function, i.e. a cemetery area but also a place of devotion dedicated to the liturgy.

Between the 16th and 19th centuries, the death is recognised in popular belief as an important phase of the life cycle and, in particular, as a laborious process of gradual transition, marked by cadaveric transformation. This led to the conception and development of a sepulchral architecture conceived to divide the phases relating to the treatment of the corpse into distinct times and spaces. Thus, *terresante* and *colatoi*, which constituted a self-sufficient funerary system capable of satisfying the sepulture needs of a densely populated city like Naples, found wide diffusion, especially below the churches of the ancient centre. The widespread diffusion of this architecture, adopted by numerous laic and ecclesiastical communities, whose spatial organisation is repeated without significant variations throughout the *Mezzogiorno*, corresponds to a consolidated model in both Campania and Sicily. In this context, the paper proposes to employ digital information tools and, specifically, GIS, to map the phenomenon in the Neapolitan territory, documenting its common and/or specific characteristics, in order to understand the evolution of urban sepulchres and their typological choices, and to support, through a knowledge system, new forms of valorisation of these often unknown environments.

Keywords:
Terresante; Survey; Historical maps; Sepulchral architecture; Crypts; Churches

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Alternative Planning: The Mondeggi Experience

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Abstract:

The theory of popular planning has been widely applied in the Global South due to the diversity of experiences that are not linked to institutional planning. However, the Global North can also reveal successful cases in this field. In order to explore this gap, this research aims to relate the case of Mondeggi Fattoria Senza Padroni to the currents of radical and insurgent planning.

The literature review and the systematization of the case study revealed that Mondeggi arose in an unproductive agricultural region belonging to the municipality of Florence, which was put up for sale. This action would perpetuate a model of occupation that has resulted in the abandonment of rural land, centralizing land ownership, promoting gentrification and using polluting agricultural techniques.

In contrast, the Terre Bene Comune group proposed the collective appropriation of space through small-scale peasant farming, the construction of territorial communities and support for access to land. This conflict culminated in the drafting of the Dichiarazione di Gestione Civica di un Bene Comune, which presents an alternative radical planning proposal for the area that questions the social function of unproductive land.

The Mondeggi Bene Comune is an example of radical planning, as it advances the idea of collective ownership by donating plots of land for production, benefiting around 300 people. Through the establishment of solidarity networks, the Mondeggi community is moving closer to insurgent planning practices. Similar experiences in Naples and Palermo, as well as the connection with other groups during the Public Assembly at the Faculty of Agronomy and the National Meeting on Common Goods, can be considered invented spaces.

Given this context, it is clear that the Mondeggi experience breaks with institutional planning by proposing a new model for occupying the territory and represents a valuable experience of alternative planning in the Global North.

Keywords:
Insurgent planning, Radical planning, Popular planning, Urban sustainability.

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Missing teeth and sticky parts in urban masterplans: The case of Patrick Geddes' Tel Aviv

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Abstract:

This paper is focused on the rise, development, and current state of the built environment of Tel Aviv, specifically looking at: (1) the initial built world ideals established by Patrick Geddes' early 1920s masterplan for the city; (2) how the city's built environment mutated as varying pressures began to push and pull at its seams in the decades that followed; (3) what parts of the initial masterplan maintained their tenacity within the built environment to the current day, and what parts were absorbed by the aforementioned pressures; and (4) what unexpected architectural typologies have emerged within the current built environment of Tel Aviv, as a byproduct of the prior three points. This final fourth point is given a particular emphasis across the piece, as the side-lot setbacks initially established by Patrick Geddes' masterplan for Tel Aviv have unexpectedly allowed for the emergence of an infill micro-architecture that can be observed throughout the city. It is argued that this micro-architecture can potentially be leveraged to accommodate micro-scale social and economic functions that the broader footprint of the city would have more difficulty in supporting.

Keywords:

Tel Aviv; Patrick Geddes; masterplan; architecture; inclusivity.

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Urban form and housing evolution: The Sha'abiat model in Al-Ain, UAE

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Abstract:

Urban form serves as physical a representation of governance decisions, housing policies, and cultural heritage preservation, all of which shape the fabric of cities. The form is influenced by factors such as density, compactness, and the interconnectedness of housing within urban areas. These factors affect not only the physical layout of neighborhoods but also their social, economic, and environmental attributes. As cities expand and evolve, housing models transform in response to urban development, contributing to shifts in urban form. Therefore, understanding urban form, including cities' spatial organization, layout, and morphology, is paramount for adopting sustainable residential development. In the UAE, local housing policies have undergone significant transformation since the establishment of the first national Emirati housing project (Sha'abiat) across the Emirates in the 60s. The Emirati housing model has now largely shifted towards private villas. This study provides a physical analysis of the Sha'abiat model, focusing on different attributes such as block sizes, plot layouts, and development patterns, and overlays these with housing policies. This analysis highlights both opportunities and challenges within Sha'abiat neighborhoods. Using Al-Ain City Sha'abiat as a case study, this research employs a qualitative approach, starting with the physical mapping of Sha'abiat neighborhoods to assess their overall morphology and spatial organization. This paper serves as the foundation for a broader study exploring how the physical attributes of Sha'abiat neighborhoods, combined with residents' lived experiences, can shape a holistic urban housing model. The goal is to provide strategic insights for stakeholders involved in the revitalization and sustainable development of these neighborhoods and the wider city context. The broader research adopts an intersectional approach, analyzing the interplay between governance, housing, and cultural heritage in urban planning to identify critical factors that influence sustainable development within Sha'abiat neighborhoods. It seeks to assess the increasing governmental focus on sustainable urban development and derive lessons for shaping future urban housing models.

Keywords:

Emirati Housing Models; Urban Form; Sustainable development; Sha'abiat; United Arab Emirates (UAE); Al-Ain

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Part III:
Innovations in Architectural Design Methods and Technologies

More than heat islands: vertical gardens as thermal radiation shields

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Abstract:

Research on vertical gardens tends to center on the various roles they have to play in the fields of the urban heat island effect, wellbeing and urban biodiversity (amongst others). Nevertheless, there remains a gap in the knowledge of the specific properties of reflectivity for endemic plants seeded in vertical gardens. This study builds on previous research, with a focus on endemic plants found in Ecuador, one of the most biodiverse countries in the world. Optical measurements were made using diffuse reflectance spectroscopy (both ultraviolet-visible and near-infrared) to quantify the reflectance properties of leaves from 10 different endemic plants that could be found in vertical gardens in the capital of Ecuador, Quito. The studied spectral range was from 300 nm to 2100 nm. For tests in the wavelength range from 300 to 1100 nm, a xenon lamp was used as the light source, while for the wavelength range from 1200 to 2100 nm, an incandescent tungsten lamp was used. Through those tests it was possible to observe, besides the proper optical profile of the color of each plant, and the characteristic chlorophyll edge, that leaves exhibit reflectances between 30 % and 60 % for the near-infrared region of the spectrum. This infrared reflectance enables the plant to serve as an effective heat shield against solar thermal radiation, reducing thermal gains for the surface behind the vertical garden. This is especially pertinent for buildings that are located in an area where high solar radiation is prevalent, which therefore needs an effective protection against excessive heat loads from the exterior. The impact of the research was to highlight the role endemic plants have in bioclimatic and passive design, in addition to the importance they play in increasing urban biodiversity.

Keywords:
Vertical Gardens, Diffuse Reflectance Spectroscopy, Thermal Radiation, Urban Heat Island Effect.

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Energy performance of green facades: The case study of Parma University Campus

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Abstract:

Green facades have become an important element in our urban scenario. Thanks to the benefits they bring in terms of the environment and aesthetics, they can be a valid solution to counteract the environmental effects related to urbanisation and climate change. In addition, using vegetation on the facade represents an excellent natural insulator for reducing the heat absorbed by buildings in the summer. This helps maintain a cooler temperature inside and improves the well-being of the inhabitants. This research aims to demonstrate how green facades can affect nearby air temperature and air quality, with a valuable effect on human thermal comfort perception, and assess how this system responds to overheating due to climate change. This work, divided into several phases, analyzes the case study of the Engineering Headquarters at the University of Parma, where seismic and environmental improvement works are in progress through the adoption of bioclimatic technologies, including the construction of a green facade.

The first phase consists of gathering information about the case study building technologies, followed by an overview of the main types of green facades, with a focus on the facade that supports climbing plants. Then, the role of the green system in mitigating the heat island effect is assessed, along with thermal comfort perception via the UTCI index. The numerical assessment was conducted using ENVI-met to evaluate the effects before and after the implementation of the selected green façade. This will demonstrate the relevance of green facades in existing cities and how they can be implemented in existing buildings.

Keywords:
Green facades, building energy performance, bioclimatic technologies.

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More than a just a Green Façade: An evaluation of the cultural ecosystem services of a vertical garden in Quito, Ecuador

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Abstract:

The benefits of vertical gardens in urban contexts have received extensive attention over the years, especially in terms of their benefits in the reduction of the urban heat island effect, biophilia, and increases in flora and fauna, amongst others. However, the relatively recent area of ecosystem services opens an interesting academic niche that can add to scholarship related to vertical gardens, which can offer an additional dimension of the impacts they can have in urban areas. Ecosystem services are classified into regulating, cultural, supporting, and provisioning services. In this context, this research focuses on evaluating the cultural ecosystem services of a vertical garden located in the Pontifical Catholic University of Ecuador (PUCE), located in Quito, Ecuador. The research is based on semi-structured interviews, – in which the participants were drawn from the teaching and administrative staff of the Faculty of Architecture, Design and Art of the PUCE, who knew the faculty before and after the installation of a vertical garden on the building façade in 2012. The impact of the research is to establish the contributions of vertical gardens through the lens of cultural ecosystem services, which may benefit those wishing to incorporate vertical gardens in urban contexts in the future.

***Keywords*:**
Ecosystem Services; Cultural Ecosystem Services, Renaturalization of Cities; Green Infrastructure; Vertical Gardens

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Ruralizing the urban envelope.

Experimental tools to cultivate the city

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Abstract:

Promoting the integration of agriculture into urban areas could represent an ethical and social achievement in the short term; in this way, consistently with the provisions of the UN-SDG (Sustainable Development Goals), the new generations will not be disconnected from rural reality and the resulting micro-productions could represent a contribution to overcoming the population social gap (UN-SDG2 “Zero hunger”, 11 “Sustainable cities and communities” and 12 “Responsible consumption and production”). Starting from this assumption, the paper presents some results of an ongoing research, called BioLoop, aimed at laying the foundations for the activation of local micro-economies in the southern periphery of Milan. The paper presents a method and tools to support hyperlocal design, i.e. based on the energy and material resources available within a radius of one km. The results presented show the application of such tools to an urban portion of the southern outskirts of the city, taking as case study a square that hosts student housing and other public buildings. In particular, the paper focuses on the preliminary application and implementation of experimental tools: the local Atlas of Energy and Materials (AEM) and the Open-Source Projects Hub (OSPH). AEM and OSPH are products of the BioLoop project, the applied design solutions of the OSPH are based on the use of locally available resources, both in terms of secondary material and renewable energies. These solutions refer to devices for cultivation on both vertical and horizontal impervious surfaces and to a mobile collective kitchen for the transformation of food potentially produced by the same devices. In addition to the representation of the design solutions, some quantitative results on the environmental and energy load of these devices on the urban metabolism of the area are presented, both in terms of material cycles (water and nutrients) and renewable energies.

Keywords:
Circular economy; Urban agriculture; Green walls; Urban ruralization; Local renewable energies; Waste reduction

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Building Envelope Design Methodologies and Urban, Architectural and Sustainable Development

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Abstract:

The *research study's purpose* examines the design of the advanced envelope systems in relation to the developments in urban planning, architectural composition and environmental sustainability in the contemporary scenario. The research deals with the innovative conception of prefabricated façade systems according to the analysis of the design criteria directed at the interaction with the morpho-typological, functional and constructive characters proper to the evolution of urban contexts, building types and the transmission/capture modes of the climatic loads. The *results* of the research aim to identify the strategies of expressive, productive and constructive composition of the façade modules (enunciated by the "light industrialization"). This by detecting the strategies and methodologies capable of determining situations of "semantic balance", of calibration and of combination with the urban and architectural context. The results derive from the current "component design" strategies, which focus on:

- the production and combinatory procedures of enclosure and cladding materials belonging to both building innovation and tradition according to "hybrid" forms, or on "mechanical" and "tectonic" aggregation criteria between different elements and semi-finished products;
- the environmental, functional and "adaptive design" methods with respect to the climatic loads (together with the energy-saving conditions).

The *conclusions* of the research assume the objective of formulating guidelines and a design tool for the geometric, formal and material constitution of the frameworks and textures of the envelopes, in support of the design and production phases (above all by means of standardized technologies): specifically, the aim is to define the methodological guidelines of reference, in general, for the "technical hybridization" (between advanced components and both innovative and traditional cladding materials), for the "archetypal legitimization" (through the association of "massive", variable and "organic" cladding surfaces within modular and standardized components) and for the "environmental functioning" (in relation to the urban planning and the energy optimization of architecture).

Keywords:

Advanced envelopes, Component design, Prefabricated components, Environmental interaction, Technical hybridization

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A Review of Natural Ventilation in Sustainable Building Design

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Abstract:

Given the global awareness of environmental sustainability and indoor health quality, buildings with passive systems have become a prominent research topic. To reduce energy consumption while improving thermal comfort and indoor air quality (IAQ), natural ventilation has been cited as a viable passive cooling strategy. The effective implementation of natural ventilation strategies is contingent upon the unique characteristics of the local climate, which varies significantly across regions worldwide. This study offers a comprehensive review of research focused on several critical aspects related to natural ventilation, including thermal comfort, building energy consumption, indoor air quality, and ventilation potential. Through analysis and synthesis, it delineates the methodologies and parameters employed in these investigations while elucidating emerging trends within the field. Recent research trends reveal a marked surge in endeavors utilizing models to evaluate and optimize natural ventilation strategies. Scholars have conducted extensive analyses of natural ventilation potential across diverse climatic zones globally, proposing tailored utilization measures and underscoring variations in effectiveness across climatic regions. Consequently, this review underscores the imperative for further exploration and refinement of natural ventilation strategies tailored to the nuanced climatic conditions encountered worldwide. By offering insights and guidance derived from comprehensive synthesis and analysis, this study contributes to advancing the understanding and application of natural ventilation in sustainable building design and practice.

Keywords:
Natural ventilation, Energy savings, Buildings, Thermal comfort

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Assessment of building envelope materials for the transition to the circular economy

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Abstract:

Important European regulations in the run-up to 2024 will provide new, stricter rules to achieve climate neutrality for buildings by 2050. These are the revision of the now well-known Energy Performance of Buildings Directive (EPBD) and the update of the Construction Products Regulation (CPR), with a new requirement to declare sustainability requirements for all construction products placed on the European market Green (Case Green). The direction is set: the global challenge toward decarbonization and sustainability is open, and the construction sector must play its part, putting issues such as healthiness, well-being, cost/benefit balance, the principle of technology neutrality, durability, and the circular approach of the whole building and its component materials at the forefront.

The main objective of this work is to analyze the characteristics of the existing building envelope, typically found in an established urban context, by evaluating and comparing the retrofitting (deep renovation) strategies needed to achieve better energy performance, in view of the implementation of new regulations, soon to come into force, on achieving Climate neutral goals. TerMus (Energy Certification software) and One Click LCA tools were used to calculate the energy efficiency savings and the total embodied carbon emissions reduction of case study proposed.

The study aims to evaluate alternative sustainable materials that could be used to improve building performance, indicating a climate-neutral approach strategy for building envelope interventions in the building sector in Italy. This study underscores the urgency for adopting greener practices in the construction sector, leading to a more sustainable and low-carbon future.

Keywords:
Carbon neutral architecture, LCA, Circular economy, Sustainable material, Green transition

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Futuring potential technologies for enabling participation in different stages of Architectural Design

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Abstract:

This paper explores Information and Communication Technology (ICT) tools facilitating participation in Architecture. The growing imperative for sustainable practices in the Architecture Engineering and Construction (AEC) industry puts innovative digital technologies in the spotlight. The importance of stakeholders' participation in Sustainable Development initiatives is well acknowledged but involving non-experts/end-users in design processes and technology development remains challenging. This challenge is addressed by investigating the potential of innovative technologies to enhance the participation of stakeholders from design conception to implementation according to participation-related criteria. Methods include a systematic literature review to find evidence of ICT facilitating stakeholder collaboration and end-user participation, followed by the analysis of existing platforms. The study aligns findings with participation-related indicators as found in [1] and proposes integrating them into digital platforms.

The study aims to: a) Assess and categorize digital platforms/technologies in use; b) Investigate how they are enabling participation in different phases of the design process; and c) Evaluate to what extent can existing participation-related social sustainability indicators be an asset to new technologies implementation.

56 digital platforms were identified with varying AEC industry reach. Seven main categories of participatory platforms were identified: 1) Visualization, Interoperability & Management Platforms (n=13), 2) Mass-customization platforms (n=16), 3) Digital games (n=7), 4) Web-based engagement platforms (n=4), 5) Crowdsourcing platforms (n=3), 6) Digital manufacture systems (n=3), and 7) Artificial Intelligence tools (n=9). These platforms differ in their objectives, strategies used, audience targeted, and design phases reached.

While ICT technologies offer promising avenues for increased stakeholder engagement and the implementation of sustainable strategies, challenges remain in achieving truly inclusive and empowering participation, particularly for lay users. Further research is needed to assess the impact of new digital technologies on Sustainable Development and knowledge exchange among different stakeholder categories.

Keywords:

ICT-enabled participatory design; Architectural Design; Digital technologies

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Exploring the Meta-plasticity of Digital Tools Through Emerging Trends in Design Processes

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Abstract

With the emerging trends in policy and practice of enhancing collaboration among built environment stakeholders - focusing on ecological, social, economic, and cultural sustainable public buildings and space- understanding how architectural practices will respond to this trend plays an increasingly pivotal role. While current research has focused primarily on the wider impact of digital technologies upon the field of architecture, the development of collaborative methods between architects and other stakeholders for designing and visualizing public buildings and space with the help of digital tools and more specifically the theoretical concepts and frameworks to understand and evaluate these trends, appears to be an understudied topic. The challenge now lies in integrating these new tools without abandoning traditional representation and project management methods and with the rapid development of large language models and digital tools, architects are increasingly exploring these technologies to enhance design approaches. This shift echoes earlier evidence-based design practices, where architects used systematic methods to inform their strategies but seeks now to understand the decision-making processes involved in adopting these digital tools, and as these trends evolve, there is a growing need for new tools and languages to describe and navigate process-driven architectural models, drawing on theories like spatial assemblage and meta-plasticity in the digital design landscape.This study seeks to provide a window into the current emerging trends and needs for digital tools to succeed in this unfamiliar territory, developing and reorientating design research methods based on digitalization as an innovative approach to the design of public buildings and space. The current investigation presents preliminary findings of a two-year research project involving three European universities and five Finnish architectural practices, which provided sixteen case study projects as a sub-study. The tools are devised in the form of 'a playbook of playbooks' with a series of academic trial projects and hybrid co-design workshops which were conducted to develop the user experience and interface. The digital tools deploy a palette with five strategies – negotiating shared values; visualizing future experiences; creating a library of sustainable patterns; developing and supporting sustainable communities; and creating a multi-criteria decision support engine.

Analysis of how co-design processes unfold within Finnish work environments and mapping the work ecosystems of participating companies while examining the opportunities and challenges encountered with digital tools present an informed view of emerging approaches in collaborative design of public buildings and space. By providing a structured methodology, the results show a set of specific lessons and potential methods of evaluation to support companies in the built-environment sector in Finland and beyond, enabling them to co-design a sustainable public realm collectively and inclusively.

Keywords

public building design; public space; decision making; digital tools; Meta-plasticity.

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Assemblies: service-oriented digital platform for the green transition in architecture

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Abstract:

Climate change urgently requires reorientations in the building and construction sector, ensuring more sustainable practices. While major attention is currently targeted to energy efficiency and digital transformation supporting circular economies, sustainability in architecture encompasses multiple approaches. Various practices can be utilised for developing sustainable built environments; however, the effects of human behaviour, patterns of consumption, and the creative agency of architectural professionals have been underestimated.

Sustainable Product Service Systems, which shift focus from products to systemic solutions that satisfy users, are regarded by many as a catalyst for sustainable consumption and production.[1] Systems are supported by digital service platforms that link users and products and allow co-creation.[2] Service and platform thinking have entered the built environment field, inspiring new spatial solutions, such as *space as a service*, which are based on programming of spaces and services based on demands and activities of a user community. Consequently, new spatial typologies, such as network typologies, emerged alongside building and block typologies.[3] Networked services could be one sustainable way to utilise existing built environment in the spirit of circular economy, optimising spatial efficiency, and replacing or reducing the creation of new structures and emissions. The design and implementation of the sustainable building service systems require new types of collaboration between the participants and stakeholders of a project and new digital tools that can connect spatial demand and supply and allow to co-create.

This qualitative research engaged leading Finnish architectural offices in the co-creation. It explored themes of sustainability, collaborative practices, and digital tools supporting the green transition in architecture. It conceptualised a platform for collaborative design of networked and shared built environments, allowing the realisation of new sustainable service concepts and projects within the public realm. The results uncovered the great potential of Finnish architects to lead societal transformation by adopting the digital platform for service-oriented architecture.

Keywords:
Sustainability; Service-oriented architecture; Digital tools; Collaboration

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Evidence-Based Design Framework for Inclusive, Self-Directed Healthy Behaviours in Buildings and Adjacent Urban Space

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Abstract:

Design as a platform for health becomes more inclusive as it opens active healthy living features to occupants with different or compromised mobility needs and dissimilar or atypical physical or psychological functionality. Active Healthy Living Design has typically focused on urban and community environments to support physical activity; the authors of the paper expanded definition of active healthy living opportunities at building level design for various groups, too.

The objectives of the paper are to encourage new linguistics in learning and teaching as a common process for decisions around active healthy building-level design; our students learn how they can interact as future professionals, designers, planners, policy makers, etc. with people to create or decide on human centred designs improving people's lives in the built environment and the adjacent urban space. For our purposes, active healthy living consists of integrating common area affordances that support self-directed behaviours by space occupants to seek out supportive built environment features, with opportunities for physical activity into daily living routines.

Our tool explores and measures designing behaviour settings with inanimate features that connect with positive human experiences and emotions by supporting well-being and the active pursuit of health. We examined theories and their potential applications for design that supports healthy behaviour, reducing building environment stress, and employing space syntax and biophilic healing index to help encourage active self-directed healthy behaviour by a wide range of occupant ages and abilities in and around buildings. We have developed and applied a Building Ratings Tool to Assess Inclusive Design in teaching students in design at levels 6 and 7. Thus, we offer our students an opportunity to apply new acquired skills to their designs to have a positive impact to the built environment and urban space for healthy citizens.

Keywords:
Evidence-Based Design Tool; Active Healthy Living; Biophilic design patterns; Built Environment and Urban Space Affordances; Assessment of Inclusive Design

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Learning from Circularity through Nordic Collaboration: Case study on Circular construction planning project among the cities of Tampere, Stavanger and Tórshavn

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Abstract:

Nordic Countries are considered as forerunners in sustainable development. That is especially true when it comes to social sustainability, equality, and safety. In turn, low carbon objectives are rather difficult to achieve in countries with high standards of living, long distances, and climatic circumstances (long and cold winters). In the frame of the built environment, the construction and the city planning sectors have been looking for solutions for sustainability from circular economy.

This paper focuses on a Nordic Collaboration *Project Developing sustainable and circular construction planning processes and buildings* between cities of Tampere (Finland), Stavanger (Norway) and Tórshavn (Faroe Island). The premises and the results of the project are analyzed in order to understand how circular economy is defined in three Nordic cities, and what kind of potentials and challenges were identified in each country. Our main focus is in finding out the potentials and constraints of the international collaboration within the frame of circularity.

Our initial claim is that the premises of circularity is defined by so many country-specific, national characteristics, even within such a limited geographical framework, that the advantages of collaboration can be quite scarce. Mainstreaming circularity within the building sector may indeed cause new local or regional architecture defined by the local material flows and national legislation instead of developed international collaboration or regulation.

Keywords:
Nordic countries, Sustainable development, Urban development, Circular construction, Circular economy

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Enhancing Urban Resilience through Rooftop Revitalization: A Multi-scale Study of Land Surface Temperature and Urban Density in Milan

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Abstract:

Rising temperatures and extreme weather events significantly impact urban life, particularly as increasing urbanization exposes more people to these effects. Existing built environments are vulnerable and often not designed to cope with these rapid changes, enhancing urban resiliency and climate adaptability is crucial. Urban areas often experience higher temperatures than surrounding rural areas due to the urban heat island effect and heat waves. This study aims to explore the relationship between urban density and land surface temperature (LST) in the city of Milan. The analysis was conducted using remote sensing and satellite data to investigate the LST, green infrastructure, and urban density of the city at different scales, and it was complemented by on-site surveys made by walking to gather experiential and sensory knowledge on the more critical spots of the city.

The results indicate that high urban density typically leads to higher LST due to high impermeable surfaces, reduced vegetation, and more significant heat generation. These outcomes provide new insights into the potential of unexploited rooftops as opportunities to enhance urban resilience and mitigate urban heat. Implementing green and blue roofs can help reduce surface temperatures, increase insulation, and decrease heat absorption. Moreover, rooftops can be redefined as new urban spaces where multiple – public and private – uses, including residential, commercial, cultural, and social functions, can be integrated within a single building. The mixed-use development strategies will reduce the city's consumption of energy and resources, as well as mobilize a latent spatial capital that can serve as a support for contrasting the socio-spatial inequalities existing in the city.

Keywords:

Resilience; Urban design; Rooftop; Land surface temperature; Climate mitigation

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Enhancing Thermal Comfort Through the Hygroscopic Properties of Wood: A Biomimetic Strategy for Passive and Adaptive Architectural Design

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Abstract:

This research project introduces a biomimetic approach to enhance thermal comfort in architectural settings, a critical consideration in the context of climate change. The study proposes a responsive building skin that leverages the natural hygroscopic properties of wood, inspired by the moisture-responsive behavior of pinecones. Using Timoshenko's formula, Gmelina (Gmelina arborea) and Tanguile (Shorea polysperma) wood were selected to create fiberglass bilayer composites for the building skin. The specific objectives of the study were: (1) to develop a high-quality responsive building skin by evaluating (1a) the degree of curvature in response to different ranges of Relative Humidity (RH), (1b) the response time of its movement with varying moisture levels, and (1c) the rate of moisture transfer; (2) to design different cladding configurations of bilayer composite panels in various geometric patterns as prototypes for architectural applications; and (3) to determine the physical characteristics and behavior of these panel configurations under (3a) controlled conditions with varying RH and (3b) real-time exposure to the Philippine environment. Gmelina and Tanguile were chosen for their high curvature change coefficients. For the passive layer, reinforcing fiberglass cloth was used due to its low hygroscopic capacity, durability, UV resistance, and ability to withstand repetitive bending without losing its properties (A. Holstov et al., 2015). The results show that Gmelina composites outperformed Tanguile in terms of curvature change, response time, and moisture transfer. Among the configurations tested, Configuration A is recommended for exterior skins due to its effective rainwater repellence, while Configurations B and C are more suitable for interior applications or rain-protected outdoor spaces. Future research could explore other Philippine wood species for the active layer and further compare the mechanical properties of Gmelina and Tanguile.

Keywords:
Building Skin; Biomimicry; Kinetic Architecture; Indoor Humidity

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Ephemeral Architecture and Sustainability: A Comprehensive Approach for Sports Spaces in Ambato

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Abstract:

The rapid urbanization worldwide, particularly in developing countries, has intensified the demand for community services, including spaces that foster social cohesion and physical activity. However, the limited state budget often results in the allocation of land without adequate infrastructure, termed as "stadiums," which fails to meet the functional needs of both players and spectators, while also contributing to environmental degradation. To address these challenges, this study proposes the design of low-cost, multipurpose structures utilizing ephemeral architecture and sustainable practices, aimed at providing flexible and adaptable solutions for informal sports spaces. This research focuses on neighborhood stadiums in Ambato, Ecuador, employing a comprehensive mixed-methods approach, including quantitative surveys, qualitative interviews, and field observations, to thoroughly assess the specific needs and characteristics of these spaces. Through an in-depth analysis of existing references, a conceptual design framework was developed. The multipurpose objects were then designed using ArchiCad, OPENLCA, and Formit software, enabling a comparison with conventional infrastructures. The environmental impact of primary materials was rigorously evaluated through a life cycle assessment (LCA) in OPENLCA, complemented by an energy efficiency analysis conducted with Formit, offering a holistic approach to sustainable design. The results indicate that the proposed multipurpose structures provide a demountable and adaptive solution, significantly reducing carbon emissions and optimizing solar radiation usage, primarily through the use of wood, as opposed to conventional fixed structures that rely on concrete. These findings contribute directly to Sustainable Development Goal 11 (SDG 11): Sustainable Cities and Communities, particularly target 11.7, by offering innovative solutions that ensure universal access to safe, inclusive, and accessible public spaces, thereby enhancing the quality of life for resident.

Keywords:
Ephemeral architecture, Sustainable design, Life cycle assessment, Public spaces, Urban development

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Evaluating urban psychology for well-being-considerate city development: A methodological review

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Abstract:

While conserving mental health in cities can be a struggle considering the increased density of buildings, traffic, and population, cities can allow for urban development that support residents' psychology. The field of urban psychology emphasizes the bond between urban residents and the surrounding environment, acknowledging the state of mental health of the urban residents. With increasing urban risks associated with urban psychology, it is crucial to consider the user experience in designing cities and assess the perception of the surrounding environment. Including necessities that ensure psychologically healthy urban individuals can enhance the residents' perception of their environment and increase attachment to their city in addition to improvement of well-being. In this process it is important to look for possible solutions in evaluating urban psychology and discovering the quality of the environment and its support for mental health. In this study, 38 pieces of literature that discussed methodologies in evaluating urban psychology have been examined in terms of the common themes of evaluating urban psychology, i.e. sense of security and means of restorativeness. Initial results indicate that the inclusion of public spaces with the integration of green and blue landscapes can help to restore the mind from mental fatigue, reduce the effects of urban stressors, and improve the collective social psychology by attracting residents to connect and interact with each other. It is also found that urban design qualities such as mobility, scale and proportions, integrations of natural assets illumination, enclosure, and conceptual engagement can impact the residents' sense of security, comfort and engagement. Evaluating urban psychology is the initial step in understanding what aggravates mental health in cities and drawing a road map for developing spaces that consider the well-being of the user. The evaluation of urban environment in terms of its support for mental health can help to navigate urban psychology in an analytical approach by understanding the characteristics that encourage a positive psychological perception.

Keywords:
Sustainable urban development; Urban psychology; Psychological security; Restorativeness; Evaluating urban psychology

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Part IV:
Improving resilience in cities and territories

Hydrocity- An International Collaborative Urban Lab between Manchester and Riga

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Abstract:

The Contextual Urbanism Lab at Manchester School of Architecture explores and develops future Urban Design Visions for the repurposing of Kipsala Island, located on the west bank of the River Daugava, Riga, Latvia. We work in collaboration with students from the Latvian RISEBA University of Business, Arts and Technology to gain a full understanding of the opportunities presented by the island and to develop proposals for the reinvention of the island as a new, distinctive and sustainable waterside City District at the heart of a historic European capital city. Our combined Urban Lab is entitled 'Riga's Hydrocity' and was exhibited in Riga in March 2024. Despite being located directly opposite the historic and commercial city centre and affording panoramic views across the water and the city, Kipsala remains underdeveloped and home to various disparate and disconnected land uses, the Placemaking potential of exploiting and maximising the island's location and historic conditions lying dormant. Unlocking the island's potential, and those of other districts lies in considering various physical and social edges, seams and interfaces, which were explored in reciprocal study trips by the two groups of students. Having identified a site and personal manifesto, students were asked to test their ideas against the specific conditions of the selected site. This detailed analysis led into a series of iterative design experiments, exploring and testing out a range of ideas through drawing and modelling in a range of formats. This paper wants also to reflect on how an international collaborative urban lab has been a fruitful and active research investigation that amplified architecture and urbanism students' experience.

The aim is to demonstrate how international exchange between different architecture schools reflects on the opportunity to prepare Master's students their future employment using a collaborative Urban Lab as formative expertise.

Keywords:

Urban Design; Collaboration; Pedagogical Innovation; Sustainability; Regeneration

Multi-actor perceptions towards equity in domestic water management in Indonesia: responses to diversity in communities

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Abstract:

Equitable domestic water access requires responsibility and commitment from all nations, following SDGs target 6.1. Although the principle of equity has been widely discussed in theory, there is limited literature that explores the perceptions of multi-actors in domestic water management in practice. These actors may have better understanding of the differences in communities that may influence equity in domestic water management. It remains unclear how multi-actors in domestic water management perceive the principle of equity and respond to the diverse communities. This study addresses this gap by conducting semi-structured interviews with 13 actors involved in domestic water management in Indonesia, including local government officials in provincial, city and regencies, public entities, community groups and NGOs. This research aims to explore how multi-actors in Indonesia perceive the principle of equity in domestic water management and respond the diverse needs of communities. The findings indicate that multi-actors perceive the principle of equity in domestic water management in terms of accommodating diversity across places, people, process, and environments, particularly in Bandung City, Bandung Regency, and West Bandung Regency, Indonesia. Alongside the water grant program from local governments, which provides water access to low-income communities, another response from NGO to diversity is awareness to involve minority groups in domestic water management. This study further highlights the importance of environmental equity, especially responses of provincial, city and regency government in addressing the varying availability of water resources across different regions. This research emphasizes that different responses to community diversity require place-based solutions, as no single policy fits all. It is especially crucial for countries like Indonesia, which have diverse geographical, environmental and economic conditions across region.

Keywords:
Equity, Domestic water management, Diversity, Multi-actor perceptions

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Enhancing Sustainable Urban Water Management in Bolzano through Green Technologies and Digital Twins: A Sponge City Approach

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Abstract:

This study presents the initial findings of the PROJECT, which aims to enhance urban stormwater management in Bolzano, South Tyrol, through the integration of green technologies, nature-based solutions (NbS) and advanced digital technologies such as digital twins. This comprehensive study reviews existing literature on NbS and green technologies, emphasizing their benefits for stormwater management, pollutant removal, urban cooling, and carbon sequestration. Furthermore, the study examines the potential of digital twins and Internet of Things (IoT) in developing a responsive and adaptive water management system. The research evaluates the effectiveness of integrating nature-based solutions (NbS) such as bioretention systems, permeable pavements, and green roofs through a SWAT (Strengths, Weaknesses, Opportunities, Threats) analysis to assess the viability, benefits, and challenges of implementing these solutions in urban environments. The project highlights the potential of NbS to improve flood resilience, water quality, and urban biodiversity, proposing their applications in two case studies in Bolzano. These case studies focus on integrating bioretention systems, green roofs, and permeable pavements. Moreover, the integration of digital twins and real-time monitoring systems into NbS frameworks could improve predictive capabilities and operational efficiency, leading to more adaptive and intelligent urban water management. The study outlines the next steps for planning and implementing NbS in Bolzano and potentially similar regions, including location selection, cost-benefit analysis, stakeholder involvement, and overcoming potential barriers The results illustrate practical applications and underscore the importance of a holistic, interdisciplinary approach to urban planning that leverages both ecological and technological innovations to achieve sustainable and resilient urban development.

Keywords:

Nature-based solutions (NbS); Green technologies; Sponge City; SWOT analysis; Digital Twin; Urban Water Management

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Urban Regeneration for the Resilient City: Implementation of Sustainable Urban Drainage Solutions in Pisa's High Flash Flood Risk Areas

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Abstract:

Government policies and international cooperation now widely acknowledge the imperative to enhance the resilience capacities of cities, to ensure effective multi-risk disaster management. Nature-Based Solutions (NBS), among the technical instruments that reinforce urban resilience, represent alternative approaches aimed at conserving, sustainably managing, and preserving the functionality of natural ecosystems. This research, funded by UNIPI PRA_2022_22 ("Mitigating Risks in Urban Areas"), aims to develop a methodology for analysing, evaluating, and estimating the benefits obtained in terms of increased resilience in urban contexts following the implementation of policies and strategies for sustainable urban drainage. With the aim of controlling water runoff sources, improving soil infiltration, retaining, or detaining water volume, and filtering contaminants, we designed small-scale sustainable urban drainage interventions in areas of the city of Pisa prone to high hydraulic risk and high flash flood risk. Currently we are in the second phase, where we are implementing the I-tree Hydro suite to simulate the effects of the adopted solutions on the hydrological cycle of the case studies. For this purpose, we tested the software using input data that simulate generic interventions, such as green roofs, permeable pavements, and rain gardens. In the third phase, we will apply the data derived from the actual sustainable urban drainage solutions identified for the case studies.

Keywords:
Nature-Based Solutions, Urban Resilience; i-Tree toolset

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Ecosystem Services to the Test of the Territory: Perspectives for the Urban Bioregion Approach

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Abstract:

A growing body of research is focusing on the ecosystem services as a framework useful for including the biophysical processes and their reproduction in urban and territorial decision-making. Originally conceived as a heuristic metaphor, its operationalization has arisen critiques regarding especially the universalizing abstractions, standardized procedures and service monetization involved.

Within the urban bioregion approach, the concept of ecosystem services can prove a useful tool to draw attention to the socio-ecological dynamics of the territorial heritage, which includes the natural resources, as long as it is brought back to the physical and social dimensions of the territory and the local community. Starting from a consideration of the relationship to nature that the ecosystem services imply, the critiques the approach has raised, and some possible alternatives, the paper aims to reinterpret the concept and redevelop the approach from a bioregional perspective. A case study from the Florence metropolitan area, concerning integrated strategies for the management of water, provides some insights to shed light on both the opportunities and the critical aspects of a revisited approach to the ecosystem services within the urban bioregion perspective.

Keywords:
Ecosystem Services, Nature, Territorial Heritage, Urban Bioregion

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Neighborhood-Level Heat Health Risk Assessment of the Elderly Population in Eindhoven, the Netherlands

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Abstract:

The aging population worldwide presents a multifaceted challenge, exacerbated by the escalating impacts of urban heat waves (HWs), without exception in Europe. Existing studies try to identify heat health risk areas and propose corresponding adaptive strategies to mitigate the adverse effects of urban heat islands (UHIs). However, many are conducted on larger scales (e.g., regional or country scales) due to data limitations and disregarding specific vulnerabilities of the elderly population. Using Crichton's Risk Triangle conceptual framework from the Intergovernmental Panel on Climate Change (IPCC), this study aims to address the identified gaps in heat health risk assessment by focusing on the vulnerable group in the neighborhoods in Eindhoven, an aging city in the Netherlands. The integrated mapping results of the heat health risk neighborhoods were visualized based on the combination of multisource data. The results showed that only 5 neighborhoods are within the city center among the 24 most vulnerable neighborhoods, which differs from the previous studies that downtown areas usually own more heat risks. The strategies proposed in this study are expected to provide multiple stakeholders with decision-making to facilitate adaptive planning toward senior-friendly and resilient neighborhoods to cope with climate change in Western Europe or other regions with comparable conditions.

Keywords:
Climate change; Urban heat health risk assessment; IPCC; The elderly population; Eindhoven

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Nature-based Solutions trade-off and challenges: the bioregional approach to enrich NbS

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Abstract:

It is well established that nature holds solutions that can help communities address different societal challenges – from microclimate regulation to climate change, water management, green job creation, health and well-being. Nature-based Solutions (NbS) are defined as approaches inspired and endorsed by nature, offering cost-effective solutions with simultaneous environmental, social, and economic benefits (EC, 2015). NbS has been defined by IUCN as 'actions to protect, sustainably manage, and restore natural or modified ecosystems, that address societal challenges effectively and adaptively, simultaneously providing human well-being and biodiversity benefits' (Cohen-Shacham et al., 2016). They encompass a broad range of actions, based on the ecosystem approach, which involve working with nature for societal benefits. They emerged as a comprehensive concept encompassing various ecosystem-based approaches to address the impacts of the multifaceted environmental crisis on both humans and non-human entities (Liu et al. 2021). However, as emerged in literature, there are still important challenges to overcome to reach its approach's powerful capability. The paper reflects on how to enhance the current methodology and practice of Nature-Based Solutions by addressing the challenges that still exist in its conception, design and implementation. Authors propose to adopt the approach of the Urban Bioregion (Fanfani & Mataran, 2020; Colavitti & Serra, 2022), a design method to rebalance the relationship between built and open spaces, to enrich NbS and achieve a new co-evolution between mankind and the environment.

Keywords:
Ecosystems; Landscapes; Urban bioregion; Societal challenges

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Evaluating the Ecosystemic Function of the "model cities" to lead contemporary Urban Sustainability

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Abstract:

The scope of the research is the creation of comparable standards, to face urban sustainability. The research adapts the guiding lines of the EEA (European Environmental Agency), concerning the proper way, to a holistic approach, to urban challenges. An analysis is made in the five-chain effect framework DPSIR (Drivers, Pressures, State, Impact, and Response). The suggested way of EEA also concerns comparisons of indicators, between cities, to lead urban sustainability. The method of city comparisons is promoted by EEA and EC (European Commission), also applied by Urban ecology that uses as standards, greener areas for comparisons, to evaluate the environmental condition of an area. Identifying the non-existence of sustainable models for the proper comparisons, the research is exploring the model cities through time, that aimed to serve common causes, the sustainability as a solution to various social, environmental, economic and political issues. The method applied concerns the evaluation of the ecosystemic function of the known model cities or Utopias. The function is analysed in a frame in the following fields: aim, duration, role of municipality, morphology, flows, out-flows, products, social characteristics, intellectual and social development, living standard, population, number of houses, area size, causes of implementation or failure. Selective utopian city models are applied in the DPSIR framework of EEA and evaluated. The five-face chain reaction, framework, will enlighten the reasons why urban sustainability, through time, failed or not and the ways or standards to get there. The conclusion among others refer to the perennial need and effort of mostly non-experts, in solving social, environmental, economic and political issues, through urban proposals and creation of sustainable city models.

Keywords:
Urban sustainability; EEA tools; Urban ecosystem; Model city; Urban evaluation

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Part V:
The future of Urbanism and Sustainable Design

The efficiency of an urban settlement: towards a multidimensional evaluation

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Abstract

In recent decades, an integrated vision of the three dimensions of sustainable development (environmental, economic and social) has emerged. Although the growing ecological awareness has led to the dissemination of various protocols to certify the sustainability of a building or neighbourhood, there are still no tools currently used by planners for the multidimensional evaluation of urban projects on an urban scale. This contribution aims to propose a multidimensional evaluation methodology that allows to control of the level of urban efficiency of a settlement on an urban scale, through the identification of indicators that can be controlled from an urban point of view and can be used in the drafting of the implementation plans. The model is based on the concepts of urban complexity and compactness and on shared priorities such as functional and social mixité, public space as a cornerstone of planning and public housing for social cohesion, the pre-eminence of the pedestrian staircase which encourages soft and eco-sustainable mobility, the preservation of cultural, historical and natural resources, and the soil permeability that helps counteract the urban heat island phenomenon. The spaces must be reorganized in light of the new way of living, the new paradigm of mobility, of climate change that has an impact on a global scale with serious local effects, linked to territorial fragility and the themes of risk and resilience. The neighbourhood, as a place of society, must be fluid, constantly changing and capable of adapting to new environmental and social needs.

Keywords:
Settlement efficiency; Sustainable Urban Design; Indicators; Urban policies

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Sensory and proprioceptive approaches to achieve well-being from neurourbanism

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Abstract:

The study of neuroscience requires to analyze urban space not only from a functionalist or technical-constructive view, as cities are living entities that require an interdisciplinary perspective that ensures the well-being of the community. However, currently the impact on the inhabitant in large Latin American cities is negative due to poor urban planning and limited knowledge that consider specific demands, such as infrastructure for the development of a "Pragmatic life". The purpose of this work is to identify the advantages of producing a sustainable urban-architectural environment from the consideration of sensory and proprioceptive states by identifying the synesthetic perception in the anthropic factor during the permanence in the built space. From a hermeneutic-phenomenological approach, a series of cartographies are analyzed that show the difficulties that prevail in everyday life and that can be coded for the provision of strategies that promote neurourbanism, achieving a healthy environment for physical and emotional well-being of people during the experiential process of the urban environment.

Keywords
Well-being; Neurourbanism; Latin American cities

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A Quantum Approach to Urban Planning and Design

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Abstract:

This paper questions the relevance of the contemporary urban planning and design paradigm. It is suggested that current planning and design's Cartesian, positivist paradigm is unsuitable for the 21st century's urban dynamic. It is proposed that urban planning and design should rather reinvent itself to align with a 'quantum' paradigm. To further this argument, a quantum approach is explored by investigating some salient concepts from quantum physics, epigenetics, and double-elliptical geometry; these are then juxtaposed with selected architectural and planning thoughts and practice. Remarkable convergences are identified. These are proposed as 'new' principles for application in planning and design. Time is proposed as a multi-dimensional phenomenon, which influences the way we plan the future quite substantially, and the way we view time determines the clarity of the quantum approach. Lastly, suggestions for a quantum Planning Paradigm are proposed. Urban planning; urban design; architecture; quantum physics; epigenetics; double-elliptical geometry; paradigm; meta-patterns; overlap; interface; time; uncertainty principle.

Keywords:
Urban planning; Holism; Quantum physics; Uncertainty principle; Paradigm; Overlap.

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Suggestions and Practices For One Better Urban Future in Europe

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Abstract:

The current paper underscores the crucial importance of implementing practices in the Urban Agenda for the European Union. The E.U presented democratic and urban values that it voted on 26 November 2021; E.U. Ministers responsible for Urban Matters adopted the Ljubljana Agreement and its Multiannual Working Programme that materializes the start of a new phase of the Urban Agenda for the E.U. The goals of the paper are to share urban problems and suggest solutions. The planet and Europe need to increase the democratic directions in the urban environment, housing, digital transition, urban poverty, and security in public space. The planet is alive cell of democracy. One needs to learn the past for a better future, because the new generation is the tomorrow. For this reason, sustainable strategies, creative practices, and innovative solutions must be created for culture- technology, economy- environmental development. Finally, health and poverty problems must be addressed, and a holistic approach must be found for each member of society. Finally, the results are the analysis, documentation, and suggestions for the region of Europe. Each citizen is responsible for a green future.

Keywords:
Urban Agenda, Sustainable Future, Policies E.U, New Generation

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Constructing Artificial Climate and Ambivalent Modern Hong Kong

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Abstract:

On October 16, 1970, a reception at the Mandarin Hotel, attended by over 300 guests, celebrated the 20th anniversary of International Engineering Ltd. as the Hong Kong distributor and installer of Carrier air conditioning. The following day, a newspaper headline proclaimed, 'Colony one of Carrier's best markets,' highlighting Hong Kong's role in the global expansion of air conditioning. Since 1902 Willis Haviland Carrier invented 'man-made weather' for a lithograph plant in Brooklyn, NY, designed to maintain the stable interior temperature and humidity for multi-color magazine printing, air conditioning has evolved to become a critical component of industrial and commercial initiatives. Its significance has grown particularly since the 1920s, becoming an integral part of life in Hong Kong. This research examines the early stages of air conditioning adaptation in Hong Kong, tracing the seldom-explored history of environmental control from the early to mid-20th century. It reveals the social and technological challenges that have shaped the built environment and the technological networks of air conditioning, set against the societal, economic, and geographical backdrop of Hong Kong.

Keywords:
Hong Kong; Air-Conditioning and Built Environment; Architectural History; Techno-science, Colonialism

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Land Take: from Fabric Classification to Identifying Areas for Sustainable Urban Regeneration

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Abstract:

The recent Nature Restoration Law by the European Parliament includes the objective of achieving zero “net land take” by 2050. With the same aim, in Tuscany, since 2024, the Territorial Governance law require municipalities to redefine the perimeter of urbanized territory, as it is only within these areas that new buildings can be constructed.

The urbanized territory must include the historic centers, the continuous lots designated for settlement activities, facilities and services, urban parks and technological installations, undeveloped lots equipped with primary urban infrastructures intercluded.

The same law assigns a fundamental role to Regeneration Plans as chosen tools for planning marginal contexts where it is possible to reclaim areas for urban development without consuming new land. In addition, prescribes that the delimitation of urbanized territory must start from the classification of urban fabric in relation to some codified morphotypes of contemporary urbanizations; then, to define urban regeneration policies, it’s possible to identify, for each of them, critical issues, and quality objectives.

The identification and classification of urban morphotypes encounters significant challenges when concepts such as "continuity of lots" and "intercluded spaces" are translated from theory to practice. This issue becomes even more apparent in marginal contexts where the consolidated urban fabrics meet fabrics with undefined morphology and jagged edges, especially considering that it is in these areas there are the greatest opportunity of development with Regeneration Plans.

This research aims to implement a methodology for the definition of urban morphotypes while ensuring the consideration of the fragility conditions of the territory related to environmental factors. In the Municipality of San Giuliano Terme in the province of Pisa, we will identify some areas where urban regeneration for settlement development is closely linked to strategies for safeguarding and restoring green ecosystem services, protecting against hydraulic risk, and countering heat islands.

Keywords:
Urban Regeneration, Urban Fabrics, Land Take

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Beyond Transit Oriented Development – Linear Transit Cities, an urban structure for the 21st Century

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Abstract:

Since the first emergence of cities there have been changing philosophies for how to plan new cities. Kostof (1991) outlines four basic urban structures, each defined by their transport networks. Linear cities, put forward by Arturo Soria y Mata, have had limited expression, in cities and generally as an extension to manage outward growth, most notable Copenhagen's 'Finger Plan' in 1947, but also in Melbourne and Sydney in Australia (1971 and 1968 respectively).

Since the 1980s urban consolidation has also become a focus of the planning of Melbourne and Sydney, with rising costs of infrastructure for new fringe communities, as a driver. More recently, a dramatic fall in housing supply has re-focused actions to support an increase in well located housing opportunities – transit oriented development (TOD).

The NSW Government announced the Transport Oriented Development Program for Sydney in 2023. A comprehensive urban renewal initiative with a focus on 39 transit hubs directed to delivering the well understood benefits of TODs, with growth potential and explicit selection criterion.

However, what if there is a way to understand the benefits of TODs in a broader context. That is, by recognising that a single TOD is part of a wider urban network, along the rail (transit) corridor on which it is located, that provides most of the requirements expected from the attributes present across a city – a linear transit city.

This paper provides case studies of transit corridors in Melbourne and Sydney examining the accessibility to economic and social attributes, including differences related to specified TOD locations. They reveal that location matters for investments in TODs and new economic and social infrastructure. Thus, TODs can be re-imagined as linear transit cities, a new urban renewal framework for how cities, around the world, can leverage rail corridors as opportunities for managing growth and change.

Keywords:
Transit oriented development; transit cities, urban renewal; linear cities; urban structure; rail corridors; economic and social assets.

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Why do students walk, and what factors encourage them to walk to schools in sprawled cities?

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Abstract:

Walking to school has been on the decline for decades around the world, particularly in Saudi Arabia, with a significant increase in auto-dependency. Many factors can encourage or discourage students from walking to school, including demographics, socioeconomics, safety issues, built environment, weather characteristics and parental attitude toward a child's walking. Not much research has been done about the factors encouraging students to walk to school, particularly in sprawled cities where the automobile is the dominant mode of commuting and where walking infrastructure doesn't exist.

This study of students aged 6-18 from 57 schools examined the reasons behind allowing parents of their children to walk to school and the main factors that can encourage students to walk to school in a sprawled city, namely Najran City, Saudi Arabia. A total of 1218 parents completed an online questionnaire, and the results showed 81% of school students commuted by motorized modes, while only 19% (n=233) walked to school. The descriptive analysis showed that the most common factors that encourage students to walk to school reported by parents were the short distance between home and school, accompanying brothers or friends to school, increased road safety between home and school, busy parents at work, lower traffic congestion, and no main streets between home and school, respectively. In addition, all respondents suggested that the short distance between home and school is the main factor encouraging students to walk, followed by the presence of complete walking infrastructure, providing some traffic patrols in some main intersections, the lower number of non-signalized intersection, and removing obstacles from streets between home and school, respectively. Overall, the findings of this study can be used to guide and support the development of new policies to improve pedestrian infrastructure and establish new smaller schools within some neighborhoods to increase active and safe commuting to schools in sprawled cities.

Keywords:
Built environment; Walking; Short distance; Road safety; Sprawled city

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Part VI:
Innovations in Architectural Design Methods and Technologies

Pavement Albedo and UTCI Index Relationship: A Tropical Climate Application Study

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4 Adventist University of São Paulo, 13448-900, Engenheiro Coelho, SP, Brazil.

Abstract:

This paper aims to analyze the influence of different albedos of pavements on the Universal Thermal Climate Index (UTCI) in Brazilian zones. The study was carried out during the summer season and through a simulation model in ENVI-met. Two scenarios were performed: a representative area with reference sample of black asphalt and light gray concrete pavements. Under the same conditions, these scenarios were simulated in 10 climatic zones to identify the maximum difference between the UTCI over the paved areas. Hot zones (Z7 and Z10) did not show relevant differences. Maximum differences were identified in cold and humid zone (Z1) in the city of Curitiba, especially around midday. Finally, in hot and dry zone (Z6) increasing the albedo from 0.09 to 0.24, associating wid pararell wind decreased the UTCI by 1.2K in the beginning of the day. Thus, the results suggest that increasing the albedo of the pavement in hot and dry areas, combined with the perpendicular wind in the canyon, improves the thermal conditions for pedestrians in the early part of the day, but may be a poor alternative for the evening. Nevertheless, it may be an appropriate strategy for climate-responsive urban design in cold and humid areas during the midday hours.

Keywords:
Albedo; Urban Pavement; Thermal Comfort; UTCI Index

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Design of solar management modules for building energy retrofitting: Optical and geometrical definition.

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Abstract:

Given the high-energy consumption of building air conditioning systems, many envelope retrofit strategies take into account the physical, thermal and optical properties of materials. However, a limited amount of research focuses on the impact that the geometric characteristics of the façade have on solar radiation management. By not considering the destination of reflected radiation, much of it impacts the surrounding buildings and spaces. The objective of the present study is to show how the geometry of a modular façade system can be adapted to sun's path to mediate or harness solar energy. It is intended that, in the warm season, the facades will be more reflective to avoid the increase of the interior temperature and thus reduce the cooling demand of the building. On the other hand, in the cold season, the envelope should capture more solar energy to warm up the interior space and reduce heating demand. The building under study is located in a quarter of Madrid facing a significant risk of energy poverty and affected by a high severity of the urban heat island effect. In the region, direct summer and winter radiation ranges between 750 and 900 Wh/m2 and between 300 and 450 Wh/m2 , respectively. A facade module capable of reflecting the sun's rays towards the sky vault during summer while concentrating them in winter is proposed. For the design of the module, the azimuth and solar elevation of the hottest and coldest month, during the hours of maximum radiation, were estimated. A hexagonal base was used to modulate the pieces of the system and develop an irregular geometry with inclined planes and a parabolic cavity.

***Keywords**:*
Solar management, Adaptive envelope, Rehabilitation of buildings, Passive solar technology

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Optimizing Self-Compacting Concrete Mix Design: A Five-Step Hydrodynamic Method for Modern Construction

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Abstract:

This paper introduces a novel hydrodynamic model for self-compacting concrete (SCC) design, addressing a key innovation in building materials and construction techniques. The model, derived from the modified packing theory of SCC, comprises five critical steps: (1) determining the maximum particle size (dmax), (2) calculating the maximum volume fraction of the mixture particles Φm, (3) plotting the theoretical particle size distribution curve P(d), (4) assessing the volume of each constituent, and (5) calculating the masses of these constituents. The designed SCC's physical and mechanical properties are then verified through laboratory testing. This method not only enhances the performance of SCC in terms of flowability and stability with a relatively low superplasticizer (SP) amount but also aligns with the emerging trends of prefabrication and modular construction by providing a framework for designing improved SCC mixes that are well-adapted for rapid urbanization and sustainable development. The proposed model contributes to the field of innovations in building materials, offering a practical solution for developing concrete that supports resilient and sustainable urban environments.

Keywords:
Building materials innovation; Concrete mix design; Self-compacting concrete; Hydrodynamic modelling; Modified packing model

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Comparative Study of CO2 Impact in Two Circular Concrete Construction Approaches

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Abstract :

This paper presents a comparative study on environmental impacts in terms of Carbon Dioxide (CO2) emission from circular concrete construction. From full preservation to demolition, buildings are retained, components are reutilized, and materials are reprocessed into new products. However, doing so often requires new material, equipment deployment, and energy consumption. Hence, the presented research evaluates CO2 emissions related to these various circular approaches to identify the lowest CO2 strategy for decarbonization. By comparing building components such as columns constructed by different circular means, in this case, reutilization and reprocessing, the study investigates the energy and materials at the component scale, which informs the redeployment of multi-lifecycle building construction.

Keywords

CO2; Circular concrete; Embodied carbon; Reutilized components; Reprocessed materials; Life cycle analysis

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Digital Transformation Through BIM & Lifecyle Solutions for AEC Qatari Landscape

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Abstract:

The Complexity of Buildings nowadays has made the digitalization a must, by connecting the whole technical data chain of the built environment using Building Information Modeling (BIM) processes among others; Scan to BIM, 3D Modeling and Data Exchange...etc, makes it easy to monitor and to manage better the information covering the entire lifecycle of a project. Moreover, an extended collaboration model operates on a strong lifecycle system, provides an efficient environment for managing complex data from the Architecture, Engineering and Construction (AEC) industry and ensures smooth interactions between designers, suppliers, and builders. In this paper, the research team investigates with industrial partners how to develop solutions that can improve BIM workflows by using lifecycle approaches. Those workflows contain the steps adopted to reach the goal of integrating BIM and lifecycle approaches which is Building Lifecycle Management (BLM) that includes Technical Data Management and Lifecycle Assessment, to reduce the environmental impacts of buildings. BIM based lifecycle approach is an emerging and promising research area addressing the critical concern of comprehensive lifecycle management within the AEC industry.

Keywords:
BIM, Lifecycle vision, AEC Industry, Integration, PLM

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Catalogue of mechanical, optical and thermal properties of building materials to improve the AI-enhanced design of zero-emission buildings

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Abstract:

A novel methodology enhanced by artificial intelligence (AI) to achieve zero-emission building (ZEB) designs is under development within the European project ZEBAI. The methodology will integrate all the interdependent analyses and partial decision-making processes within a holistic approach that appraises simultaneously energy performance of the building, environmental impact, indoor environmental quality and economic costs. The results of a building energy simulation are significantly influenced by the accuracy of the heat and moisture transfer calculations of the individual components of its envelope. Consequently, a comprehensive and updated database of the properties of building materials is required to obtain reliable simulation results. However, most of the databases on the market do not include essential parameters for precise energy calculations, such as the optical properties (solar and visible absorptance, reflectance and transmittance), colour coordinates and thermal emittance of envelope materials. Furthermore, the behaviour upon changes of temperature and humidity of these properties, as well as of mechanical and thermal properties of building materials, are rarely considered. Consequently, technicians are forced to adopt standardised values that can deviate significantly from the true values, increasing the discrepancy between simulated and measured energy performance of buildings. This work presents an overview of the existing databases at European level containing information of mechanical, optical and thermal properties of building materials. From their analysis, the requirements for the development of a new catalogue of materials suitable for the AI-enhanced design based on machine learning and heuristic optimisation of ZEBs are established, i.e., a characterisation plan for materials and systems, the adequate conditions for processing the characterisation data and for the collection of results, and the proposed format for the final catalogue.

Keywords:
Mechanical properties; Optical properties; Thermal properties; Building materials databases; Zero-emission buildings design; Artificial intelligence

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Developing a CV- and HRI-supported Approach for off-Earth Robotic Planting

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Abstract:

The European Space Agency (ESA) funded project, Rhizome[1], implemented at Technical University (TU) Delft, Netherlands in collaboration with industrial partner, Vertico, focuses on the development of extraterrestrial habitats constructed from robotically printed components that are assembled into larger structures using a swarm of rovers. The habitat has an integrated greenhouse that relies amongst others on robotic planting. The developed Computer Vision (CV)- and Human-Robot Interaction (HRI)-supported approach implemented in collaboration with the University of Sydney (U Sydney) and the University of New South Wales (UNSW), Australia, facilitates the planting. It aims at minimizing use of human resources. Furthermore, it contributes to sustainability by (a) increasing efficiency, with robots planting seedlings faster and with greater precision than humans and by (b) improving resource utilization, with robots accurately planting seedlings at optimal spacing and depth to optimize use of water, fertilizer, etc.

The developed robotic approach relies on a mobile robotic system equipped with an anthropomorphic robotic hand based on soft-robotics technology, able to interact with the surrounding environment, objects, and humans. For planting, the robotic hand uses 2 Degrees of Freedom (DOF) to open and close and a camera mounted to the side of the robotic arm to capture the working area. By detecting the position and directional vector of the individual seedlings, the robotic hand is automatically positioned and suitably aligned for the seedling pickup. While a predefined automated pick-and-place code determines the planting positions, the human assists the robotic hand with gently grabbing and releasing the seedling. This approach aims to adapt robots to human interactions over time by improving their performance and responsiveness using reinforcement or imitation learning in due time. The overall goal is to advance sustainable development of habitats with integrated greenhouses through robotic technology transfer from on- to off-Earth applications and vice versa.

Keywords:
Space architecture, Greenhouse, Robotic planting, Computer vision, Human-robot interaction

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Energy Efficiency Monitoring Scheme for Subsidized Retrofit of Residential Buildings in Madrid. Comparison of predictions with measured results in a sample of 11 dwellings

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Abstract:

The first energy efficiency monitoring scheme for residential buildings of the city of Madrid, situated in a continental Mediterranean climate, was launched in 2021. The scheme is aimed at buildings that carry out renovation works by implementing thermal insulation systems in their envelopes. The construction works are largely financed by municipal subsidies. The purpose of monitoring is to quantify the benefits obtained with metered data. It includes the recording of information about energy consumption of electricity and natural gas and the environmental parameters of temperature, humidity and indoor air quality. One year after the completion of the works for the first three buildings (with 11 monitored dwellings), the results show improvements in terms of primary energy consumption of 51 kWh/m2 on average (26% compared to the previous situation) and a 22.6% reduction in CO2 emissions. Significant savings in natural gas consumption of between 30% and 68% are recorded, with an average of 45%. Electricity consumption remains stable, with savings of just 2%. These values are compared with predictions made by designers using official building energy performance rating tools. The amount of public subsidies is estimated on the basis of these predictions. In terms of indoor environment quality, good temperature conditions are recorded throughout the winter, once the works have been completed. However, during the summer, excessive heat is recorded for 23% of the hours. This points to the need to include measures aimed at reducing cooling demand (such as solar shading mechanisms) in the renovation plans. The air quality was found to be generally good, indicating healthy ventilation habits among residents.

Keywords:
Building energy efficicency; envelope retrofit; monitoring; indoor environmental quality

Part VII:
Design approaches to social sustainability

Investigating Universal Design within the Framework of Social Sustainability in Northern Nicosia with Analyses and User Views

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Abstract:

In recent years, involving the universal design concept in urban spaces has gained importance with the increasing variety of users. Urban designs adopting the UD concept with an aim of welcoming all individuals contribute to social sustainability (SS). Within this framework first, based on the authors' previous work, a theoretical framework is redeveloped to clarify the connection between UD and sustainable urban settings in relation to urban design parameters (UDPs) and social sustainability. Adoption of the concept of UD for the urban spaces is also highly required for northern Nicosia. Therefore, at the methodology part of the research, first, Marmara neighbourhood, selected as the research area, has been evaluated. A qualitative assessment regarding the UD principles and a quantitative evaluation based on the TSI standards, were utilized for the six urban area items of the selected avenue. In light of the results at Yüzbaşı Tekin Yurdabak Avenue, the positive impact of the evaluated items on sustainable urban design parameters is insufficient and these items are mostly inappropriate regarding the measured international standards. Second, a survey was applied in three neighborhoods (Taşkınköy, Göçmenköy and Marmara) with the participation of 150 randomly selected individuals in order to understand user satisfaction and views of the individuals about urban design parameters and universal design principles. The respondents relatively point out a noticeable disagreement about the presence of the principles of UD in urban spaces. Accordingly, it can be suggested that the urban areas in northern Nicosia are neither convenient nor sufficient for welcoming the variety of all individuals. Therefore, the concept of UD should be adopted and the urban structure should be improved by applying the existing and required regulations in the city.

Keywords:
social sustainability, universal design, urban space, analysis, survey, Northern Nicosia

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Bridging Affordability and Resilience in African Housing: A Case Study of Housing Design Guidelines in Kenya

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Abstract:

Large-scale affordable housing programs in the rapidly developing cities of sub-Saharan Africa often rely on pre-determined, best-practice standards, which are not always contextualized to local climates, urban conditions, or building practices. At the same time, the rollout of such programs, and responses to the affordable housing demand, represent opportunities to change standard practices in ways that improve environmental responsiveness and climate resilience. Methods to identify the realities of affordable housing on the ground in a specific local context are needed, while linking them to broad-scale climate resilience principles and sustainable development objectives. This study uses secondary survey data conducted in three Kenyan cities and peripheral settlements, as well as primary architectural analysis of existing affordable housing models to generate and categorize architectural typologies. These typologies are then scrutinized for the ways their design, alteration, and implementation may contribute to urban sustainability and resilience, as well as low-carbon development, and make the goals of climate-resilient housing development in Africa more feasible. Through the proposed transformation of typologies and processes, the study finds that a ground-up reframing of building regulations and guidelines is needed not only to ease the transition towards more considered site and building design and material use, but also to disincentivize standard, unsustainable industry practices. Similar approaches in other contexts will yield differing typologies and methods, but may contribute to a broader green shift of the growing design and construction industries in developing countries.

Keywords:
Affordable housing; sustainable development; African architecture; green building

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Exploring the Role of ICTs in Fostering Engagement in public spaces

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Abstract:

Public spaces serve as the cornerstone of vibrant communities, fostering social interaction, a sense of belonging, and overall well-being. Parks, plazas, and public squares provide platforms for casual encounters, organized events, and cultural exchange. This study explores the potential of Information and Communication Technologies (ICTs) to strengthen the relationship between people and these spaces. This study proposes a theoretical framework derived from international case studies across various regions. This framework will analyze how ICT applications, such as interactive displays or Wi-Fi access, influence public space engagement. Following this, the research will assess the applicability of these ICT criteria to the local context of Egyptian cities. The study aims to identify how ICTs can be strategically implemented to revitalize public spaces in Egypt, ultimately promoting a more vibrant and inclusive public realm. The study findings will inform urban planning strategies and highlight how ICTs can be leveraged to revitalize public spaces in Egypt, fostering a stronger sense of community.

Keywords:

ICT, Public spaces, ICT-based Engagement;

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“Kineo” Project: Tools for the validation of an environment-product system for the promotion of physical activity in an urban environment

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Abstract:

Installations relating to the promotion of physical activity have for many years been contemplated at an urban level as a useful and accessible tool for the population to be able to practice for free and daily. However, from a careful analysis of the arrangements, it is possible to highlight some fundamental gaps that limit the access and use of such equipment. The innovative approach of this research settles on a new point of view in the design of areas for the promotion of health through the practice of physical activity by analyzing and defining, with an interdisciplinary approach (Physiological, Architectural and Design), the components that constitute a real "Environment-Product" system. The objective is to go beyond common thinking and try to hypothesize ad hoc requirements for the realization of such projects (currently missing) in order to also verify their potential migration into other urban spaces, allowing us to visualize a future scenario in which "ghettoization" does not exist of space for physical activity but it is the space itself that contains within it the elements that allow citizens to enjoy it, increasing the amount of daily movement and at the same time improving, just as the WHO guidelines suggest, the state of general health.

Keywords:
Physical activity, Health, Built environment, Urban design, Public spaces

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Shared living with local connections: Creating a new neighborhood through the participation of young people

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Abstract:

The increasing rate of unmarried young people in Japan, coupled with the propensity toward spending more time as singles, has significantly influenced residential patterns. Traditionally, residential choices were determined by one's workplace; however, the growing prevalence of telework has expanded the range of options. Consequently, single young people have greater freedom of choice in housing, leading to a shift from long-term relationships with their neighborhoods to more short-term and tenuous ones. Considering the reduction in the number of local players due to population decline, it is necessary to consider how residents who do not intend to live permanently in a certain area can foster meaningful relationships with their neighborhoods while ensuring sustainable local management. This study posits that maintaining connection with the local community through daily interactions, engaging with intermediaries who facilitate relationship building within the local community, participating in local economic activities, and sharing intangible aspects such as the community's future vision and culture, are important aspects of the residents' relationship with the local area. Therefore, the research focuses on complex-type shared residences with non-residential facilities that fulfill the above conditions, to identify variations in complex-type shared residences and to understand the actual situation of facilities that have special characteristics. The novelty of this study lies in its focus on shared housing, where residents are generally more amenable to social interaction, and on the involvement of unmarried young people in local development.

Keywords:
Shared housing; Local management; Short-term residence; Single person; Interview

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Enhancing Quality of Life for Older Adults in Rural Thailand: The Role of Community Residential Environments in Ageing-in-Place Strategies

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Abstract:

As the global population ages, there is a growing need to support older adults in living independently and comfortably within their communities. This study examines the factors influencing the quality of life for older adults in rural Northern Thailand, focusing on the role of community residential environments in supporting ageing-in-place. Employing a mixed-methods approach, this research integrates quantitative surveys, qualitative interviews, and a detailed site survey to provide a comprehensive understanding of how physical, social, and environmental factors interact to affect well-being. The study involved 144 elderly residents, ensuring a robust and representative sample.

The findings highlight six key predictors of quality of life: healthcare access, social participation, infrastructure satisfaction, environmental quality, emotional support, and social support. Quantitative analysis reveals that active participation in community activities and robust social networks are the most significant predictors, underscoring the importance of social inclusion and engagement. Qualitative insights illustrate how community events foster a sense of belonging and how accessible infrastructure supports mobility and independence.

This study contributes to urban design by integrating health and well-being considerations into rural community planning. The ecological model of ageing and the concepts of 'Ageing in Place' and 'Active Ageing' provide the theoretical framework, emphasising the dynamic interaction between older adults and their environments. The results underscore the necessity of multi-disciplinary approaches in urban design that prioritise health and social equity, particularly in under-researched rural contexts. Given the unique socio-economic and cultural dynamics of rural Thailand, this research offers actionable insights for policymakers and community planners. By enhancing social participation, improving infrastructure, and ensuring accessible healthcare, communities can significantly improve the quality of life for their ageing populations. The study's holistic approach offers a model adaptable to similar rural settings globally, contributing to the discourse on sustainable urban design and community well-being.

Keywords:
Quality of life; Ageing-in-place; Rural Thailand; Community residential environments; Elderly well-being

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Cosmopolitan Paradox: Dynamic Egalitarianism in the Redevelopment of the Cultural Center of the Philippines Complex

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Abstract

The Cultural Center of the Philippines (CCP) complex is emblematic of Filipino cultural identity, yet it is encumbered by significant challenges that undermine its preservation and relevance. This research provides a critical examination of the hurdles faced due to the non-implementation of the 2003 business and master plan, the looming threat of obsolescence, the pervasive influence of the Edifice Complex, and the effects of multiculturalism within the rich fabric of Filipino society. By integrating a dynamic egalitarianism approach rooted in the principles of contextualism postmodernism, and actor network theory, this study endeavors to revisit and refine the CCP complex's redevelopment strategies. The objective is to ensure the conservation and amplification of its cultural significance and heritage, thereby securing its legacy for forthcoming generations.

Keywords

Cultural Center of the Philippines; Cultural Preservation; Egalitarianism; Urban Redevelopment; Heritage Conservation; Modernization; Community Engagement; Historic Urban Landscape; Symbiotic Pluralism; Edifice Complex; Dynamic Egalitarianism.

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Mapping the regulating ecosystem services provided by green infrastructure using public participation in Bucharest, Romania

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Abstract:

Urban green infrastructure (UGI) contributes to population health and well-being by providing a wide range of regulating ecosystem services. In cities, as the population density increases, the UGI is subjected to multiple pressures that reduce the surfaces it occupies and the deterioration of the remaining ones. In this context, the proper management of UGI components becomes increasingly important to maximize the benefits they provide to citizens. Our research aimed to evaluate and map regulating ecosystem services provided by UGI in Bucharest, focusing on the benefits provided by vegetation, especially urban trees. The potential of urban trees to provide services was assessed in 2021, based on citizens' stated preference (Public Participation Geographic Information System - PPGIS) and using a modeling tool (i-Tree Canopy - ITC). Using the online survey tool Maptionnaire, PPGIS allowed users to establish perimeters on the map, and ITC software allowed the generation of sample points on the map. The Kernel Density package in ArcGIS enabled the generation of maps to visualize the results. In PPGIS, the 816 respondents marked 1291 perimeters for the provision of regulating ecosystem services: noise (371), and air temperature (399) reduction, and air quality improvement (521). Through ITC, 10000 points were generated for the six land cover categories created: 344 - water, 1784 - trees, 2479 - buildings, 2192 - roads, 2072 - herbaceous plants and 1129 - open land. Based on these results, regulating ecosystem services were mapped, and areas of synergy and contrast between demand and supply were identified. Spatial distribution maps of ecosystem services complement existing planning tools and provide valuable tools for decision-making for sustainable urban development, the city's adaptation to climate change, its resilience to extreme weather events, and the improvement of the quality of the environment for residents. Our results guide management priorities for establishing new green spaces and their conservation.

***Keywords**:*
Climate change mitigation; Urban ecosystem services; PPGIS; Public participation

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Part VIII:
Urban design: Development and Management

Integrating Wellness Urban Design Principle into Socio-Technological Infrastructure:

The Case of the Old Legazpi Domestic Airport Redevelopment

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Abstract:

Wellness Urban Design is a principle that looks into the diverse needs of a city, linking urban governance management with health and well-being. It is considered a foundational component in the larger macroscale Socio-Technological Infrastructure (STI), an urban construct that provides the groundwork of responsive technological advancement and spatial expressions for inclusive and human-centric ideals within the urban setting. While extensive research has been done on healthy cities and socio-technical theory, there is a gap in literature on the complexity and comprehensiveness on how spatial-technological interventions effectively address societal needs, with issues on the digital divide and exclusivity prevailing (Hatuka, 2020). This research attempts to extract factors in Wellness Urban Design, and use them to develop STI. The 5 factors on Wellness in Urban Design of Orig and HKS Architects (2022), or Design, Diversity, Distance, Density, Destination, are augmented withs Decision, and Demarcation. The Old Legazpi Airport Redevelopment, Legazpi, was used as the case study. Quasi-experimentation and content analysis, KII, FGD, correlation, and network analysis were performed. Scenario forecasting proved that a Smart Planned Unit Development, with promenade, rates high in the Wellness index. Planning for Wellness and STI establishes a holistic and wholesome built environment, finetunes urban governance management, and eventually contributes to social transformations.

Keywords:
Wellness Urban Design; Socio-Technological Infrastructure; Urban Governance Management; Legazpi City; Smart Planned Unit Development

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Transformation of Highways to Reduce GHG Emissions and Improve Social Equity, Syracuse & Brooklyn, NY

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Abstract:

The City of Syracuse, in New York state is tearing down an elevated highway in its city center and replacing it with a new tree-lined boulevard. As an urban planner working on this $2 billion project, the goal is to reduce GHG emissions, foster economic growth, address social equity, and repair a divided city. Several highways around the world have already changed. Examples include the Embarcadero San Francisco, and the Cheonggyecheon in Seoul. The highway transformation project in Syracuse will become one of these great international examples. The project has support from the US Department of Transportation and has been published in the New York Times.

Project Background:

When the City of Syracuse constructed Highway I-81 in the 1950s, it demolished 27 blocks of the downtown. Most of the housing demolished belonged to the African-American community. The elevated highway had many negative impacts. Air pollution and GHG emissions increased, and many city blocks became surface parking. In the US, vehicles contribute 28% of total GHG emissions. Studies show residents who live within 500 feet (152M) of a highway are more likely to develop health problems such as asthma. The highway also divided the city's neighborhoods and contributed to racial inequality.

New Design:

The new at-grade boulevard developed by our design team through inclusive public workshops will have enhanced sidewalks, bike lanes, transit stops, and shift the city to clean transportation. The boulevard will have new buildings along it with retail spaces on the lower floors and apartments or offices above. The demolition of the highway's ramps creates nearly 20 acres (8 hectares) of vacant land. A portion of this new land will help restore what the African American community lost. This new plan will result in economic growth for the City of Syracuse, reduced GHG, and improve social equity.

Keywords:
Sustainable Cities; Highway Transformation; GHG reduction; Social Equity

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Exploring Urban Elements in a Post-Industrial Destination: A Case Study of Bilbao

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Abstract:

Over the past two decades, the utilization of visitor platforms such as TripAdvisor has emerged as a powerful tool, particularly in shaping perceptions of urban tourism in European destinations. These platforms often promote specific urban elements, resulting in a high influx of visitors in certain areas. The escalating tourist footfall has prompted concerns regarding the resilience of these elements under such pressure. This study explores the context in which urban tourism unfolds by analyzing main urban elements. Using the post-industrial city of Bilbao as a case study, it addresses two key research questions: (1) What are the physical and functional characteristics of the Primary Elements? and (2) Which specific area functions as a tourist magnet?

To identify the physical and functional attributes of tourist landmarks, an examination of the must-see attractions highlighted on TripAdvisor is conducted. The research findings underscore the importance of establishing a spatial analysis, where the physical characteristics of landmarks and the proximity of hotspots play a pivotal role in shaping the tourism area and consumption patterns. In the context of evolving urban tourism, these insights offer valuable guidance for future research and policymaking, emphasizing the need to protect the Old Town as a vulnerable area from tourism's detrimental impact on the urban landscape and its residents' quality of life.

Keywords:
Urban tourism; Primary elements; TripAdvisor; Bilbao; Spatial analysis

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The Paradoxical Heterogeneity of Al-Abdali's Image-Ability and the Dilemma-tic Identity of Amman

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Abstract:

Purpose – Amman's authorities and developers have initiated one of the most ambitious urban restructuring and spatial transformations of Amman's image and urban topography to catch up with the vast and rapid Urban Neoliberal Developments that hit the Middle East. Al-Abdali regeneration project, the New Downtown Business District, is conceived as an avant-garde high-end project that would reorient Amman's socioeconomic compass and redirect its environmental spatial coordinates. In their striving effort to achieve and restore the lost liveability and the unrealized purposes of the project, designers speak of concepts of complementarity, integration, compatibility, and vitality between the Abdali project and its direct surroundings and the old downtown. Accordingly, the main purpose of this study is evolving around analysing the newly generated spatial and architectural identity of Amman's old and new downtowns by determining what this paper called the self or inner identity and the projected identity of Amman and the urban structure. This study examines to what extent adopting specific interactive neoliberal modern-regional urbanism and mimicking regional and even global images influence and make up the Paradoxical Heterogeneity of Al-Abdali and the Old Downtown Image-Ability and, therefore, to understand the users' perceptions of two different study areas. Furthermore, whether Amman city and society are elevating, appreciating, and favouring such an outstanding development, and whether those developments have replaced or changed Ammani's cognitive mental map? Above all, what kind of development impacts, influences, and challenges have been generated in both Amman's old-conservative context and the new-liberal image-ability.

Design/methodology/approach – This study follows a qualitative approach by conducting a questionnaire survey followed by a comparison strategy. The questionnaire tackles the three main urban active and influential constituents, the uses; activities, the space or place; image-ability, and the users; respondents, into subjective; relative grading, and objective; absolute scale.

Findings – The study results yielded unexpected findings and showed how users perceive Al-Abdali's new downtown and how they connect it to the previous downtown. It also shows how the paradoxical elements that define Al-Abdali's imageability affect Amman's identity and its formation and transformation between the old and new generations, with a solid connection to the downtown, therefore, to the identity of Amman shown from the participants that still refer the old downtown. This research evaluates the impact of Al-Abdali's new design, which causes a feeling of segregation and social isolation as a parameter in changing the identity of its context. Thus, this paper aims to clarify the role of visual properties in defining, changing, and transforming the city's identity.

Originality/value – This study relies on original data generated using the study tool. Accordingly, it is not considered an extension of a prior study. It depends on newly investigated data achieved through the users of the selected areas.

Keywords:
Identity, imageability, urban, cognition, mental map

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The Built Environment Policy Making: The Egyptian New Administrative Capital Model

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Abstract:

The public policies for state building of new cities have several goals, the most prominent of which are increasing the urban area, reducing the population increase in city capitals, and helping in urban development by creating an appropriate environment for human activity. The New Administrative Capital in Egypt aims to establish a new economic and administrative city, which is a modern capital that is compatible with technological development and with the requirements of the built environment that includes buildings, parks, or green spaces and their division into neighborhoods and cities, which can often include the supporting infrastructure, such as water supplies or power grids.

This paper seeks to answer the questions of the impact of public policy on the built environment and whether it has sustainable interests in the new administrative capital in Egypt. By examining Egypt's decision to establish a new administrative capital, the paper seeks to evaluate the Egyptian public policies of built environments with special emphasis on the efficacy of building a new administrative capital. The study is a qualitative approach to argue that Egypt's decision to establish a new administrative capital is an appropriate policy that positively impacts urban development and is an ideal model for built environments. The paper concludes that the decision to establish the "New Administrative Capital" is based on public policy regarding the built environment. Reinforced by decisions to consider the climatic environment and green spaces as new requirements for the planning and building controls in the Egyptian governorates.

Keywords:
Public Policy; Built Environment; Egypt; Sustainable Development; New Administrative Capital

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Community Engagement as an Innovative Urban Design Strategy: Conservation and Revitalization of Pantang Historic District, Guangzhou

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Abstract:

In the context of rapid urbanization, the conservation and revitalization of historic districts face significant challenges. This paper takes Pantang historic district in Guangzhou as a case study to explore the role of community engagement as an innovative urban design strategy for conserving and revitalizing historic districts. The Pantang historic district has undergone urban regeneration and is considered an important example of community engagement in China. Through methods such as on-site assessment, field visit, and literature and map surveys, this study systematically analyses the current state of Pantang and the specific practices and outcomes of community engagement during its transformation.

The results indicate that community engagement significantly enhances the effectiveness of conservation measures, strengthens community cohesion and increases residents' sense of belonging. Residents are highly satisfied with the environmental changes, especially the renewal of the physical environment, which has injected new life into the community and enhanced economic sustainability. Moreover, the regeneration process has significantly improved residents' happiness. The conclusion is that promoting community engagement as an innovative urban design strategy can achieve the sustainable development of historic districts, enriching the city's cultural diversity and historical treasure. The Pantang case demonstrates the great potential of community engagement in the conservation and revitalization of historic districts, offering crucial reference value for similar efforts in the context of rapid urbanization.

Keywords:
Community engagement, Urban design strategy, Historic district, Conservation, Revitalization, Sustainability

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Assessment of urban forms impacts on outdoor thermal comfort: case study in Marrakech

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Abstract:

Urbanization, a profound and long lasting transformation of land cover, alters natural landscapes with the construction of structures and impervious surfaces, which modify urban microclimates and give rise to the Urban Heat Island (UHI) effect. This, further intensified by climate change, has heightened the importance of outdoor thermal comfort in urban design, making it essential for improving public health, promoting social interaction, and reducing energy consumption in cities.

This study provides insights for urban planners to enhance outdoor thermal comfort by analyzing the impact of building height, street aspect ratio, and street orientation on the urban microclimate in Marrakech, Morocco. Using the Urban Weather Generator and the Universal Thermal Comfort Index, the research quantifies these effects across various urban design scenarios. The results indicate that compact urban canyon designs can increase air temperature by up to 6°C but can be more beneficial for thermal comfort during winter nights and spring and summer days. Street orientation has the most significant influence on thermal comfort, with UTCI variations of up to 15°C. Overall, a compact urban canyon with a northeast-southwest street orientation is identified as the optimal design for improving outdoor thermal comfort in Marrakech.

Keywords:
Urban climate, Urban heat island, Outdoor thermal comfort, Urban forms, Urban planning, Marrakech

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The Feasibility of using Wind Catchers in Residential Buildings in Syria to Achieve Sustainable Architecture

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Abstract:

Wind catchers are traditional architectural elements used in the Middle East for centuries to ensure natural ventilation and cool indoor air. Recently, their importance has resurfaced as a healthy and environmentally friendly alternative, attracting the attention of planners seeking ways to reduce energy consumption for air conditioning in buildings. They have been employed in modern buildings with various functions in countries like Qatar, the United Arab Emirates, Egypt, and Iran.

Wind catchers can provide a sustainable solution for passive cooling in Syria, where energy consumption for cooling is a significant concern. By harnessing natural wind currents, they can reduce energy usage. Additionally, wind catchers can improve indoor air quality by enhancing airflow and reducing the accumulation of pollutants and moisture, leading to a healthier and more comfortable indoor environment for residents.

This paper presents a comprehensive review of various modern wind catcher designs categorized by climate, shape, dimensions, optimal height, high-performance blade design, and materials. It also analyzes the climatic characteristics of different regions in Syria, including temperature, humidity, wind speed, and direction. Based on this analysis, the paper identifies suitable specifications for each climatic zone to maximize their effectiveness.

In conclusion, this study underscores the potential of wind catchers as a viable, sustainable, and health-promoting architectural feature for reducing energy consumption and enhancing indoor air quality in Syria.

Keywords:
Wind catcher; sustainable; Syria climate

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An assessment of the feasibility of functioning an autonomous rest area located along the expressway – Case study from Poland

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Abstract:

Degradation of the natural environment, mainly caused by human activity, is one of the most important global problems. Urbanization, industrial development and an increase in the world's population contribute to the overexploitation of natural resources and also cause climate change. To counteract these unfavorable changes, actions are taken to implement water- and energy-saving technologies based on alternative sources of water and energy. One of the largest consumers of water and energy in the world is the construction sector, which is also responsible for 40% of global CO_2 emissions. It should be emphasized that climate change has also had an adverse effect on the nature of precipitation, and thus on the hydrological cycle of the catchment area. Snowless winters and long-term droughts are becoming more frequent. This problem also affects Poland, which has one of the lowest water resources in Europe, amounting to 1414 m^3/capita/year. Taking this into account, research was carried out to determine the possibility of functioning of an autonomous rest area in Polish conditions. Systems using renewable energy (photovoltaic panels and a wind turbine), as well as a system for the economic use of rainwater, were designed in the analyzed area. It should be emphasized that the use of hybrid ecological systems is necessary to increase the independence in sustainable buildings. The research assessed both the financial and environmental effectiveness of these systems.

Keywords:
Rainwater harvesting system, Renewable energy sources, Photovoltaic panels, Wind turbine, Financial analysis

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Exploratory study: Social acceptance of using energy efficient buildings

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Abstract:

Building stock is one of the main reasons of greenhouse gases. The nearly Zero Energy Buildings are main target of EU by 2030 but it seems to be unachievable right now. This paper aims to explore the improvement of energy efficient buildings with respect to social perspective aiming towards multi-level stakeholders. In addition, it also identifies the awareness level of using energy efficient buildings and climate change in the society. This paper also addresses the acceptance rate of technologies used to achieve energy efficient buildings and their cost. Multiple choice questionnaire has been used to examine stake holders' opinion about social acceptance of energy efficient buildings. The results of this study provide us the knowledge about what measures have been in place to develop awareness regarding energy efficient buildings, low carbon building energy technologies and climate change. This research also analyses the community perspective towards energy efficient buildings applicability and technologies that stakeholders are aware of.

Keywords:
Building stock; Energy efficient buildings; Nearly zero energy buildings; Stakeholders; Social acceptance

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Perceived 15-minute city: Understanding the aspects and factors influencing people's perception of their neighbourhoods.

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Abstract:

The concept of the 15-minute city has recently gained prominence in urban planning policy and practice, receiving endorsement from policymakers worldwide. This concept advocates for local living and complete neighborhoods, aiming to enhance residents' proximity to essential daily activities through active transportation modes such as walking and cycling. The concept's objective is to achieve a broad spectrum of social, economic, health, resilience, and environmental benefits, beyond merely improving people's access to their needed daily activities. Despite its popularity, there has been limited research on how individuals accept the concept and perceive their neighborhoods in relation to the concept of 15-minute city and the factors associated with these perceptions. To address this gap, this research investigates the various aspects and determinants of people's perceptions regarding the 15-minute city concept. The study utilizes data from a social survey (N=~1,600) alongside extensive spatial and transportation data for the City of Saskatoon, Canada. Employing summary statistics, the research explores the relationship between different factors associated with people perception of the 15-minute city concept. The research shows how different groups of residents have different perceptions regarding the concept. This study aims to provide urban planners and scholars with a deeper understanding of public perceptions of the 15-minute city policies and the challenges in implementing them, thereby aiding cities in achieving broader sustainability and equity objectives.

Keywords:

Proximity, 15-minute city, Perception, Accessibility

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