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18.-20. FEBRUARY 2015, GRAZ, AUSTRIA

# CONFERENCE ABSTRACTS

1<sup>ST</sup> INTERNATIONAL ACADEMIC  
CONFERENCE ON CLIMATE CHANGE AND  
SUSTAINABLE HERITAGE 2015



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**CCSH15 ABSTRACTS**  
**FIRST INTERNATIONAL ACADEMIC**  
**CONFERENCE**  
**ON**  
**CLIMATE CHANGE AND SUSTAINABLE**  
**HERITAGE**  
**18-20 FEBRUARY 2015**  
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## **PREFACE**

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Greenhouse gas emissions have harmful effects on the quality of life, the economy, the environment and, consequently, Heritage. One of the most important and urgent problems the human species faces today is Climate Change. It concerns our cultural and natural Heritage. It is crucial to address this issue in all its social, physical and cultural consequences. This can be stressed by the quest for management approaches on international, national and local levels. Far-reaching actions are needed to adapt the natural and historic environment to make it more resilient and to limit further damage. This has significant implications for the management of Sustainable Heritage.

The CULTEMA Laboratory Network and Graz University of Technology will hold a first international academic conference on Climate Change and Sustainable Heritage in Graz, Austria on 18- 20 of February, 2015. The aim of the conference is to bring together scholars, researchers, professionals and students from a variety of fields to reach a transdisciplinary dialogue for resilient and sustainable planning. The goal is to develop strategies and principles, which are related to the impact of climate change on disaster management, adaptation and mitigation. The conference program and research are based on the knowledge of several academic disciplines, applied sciences and expertise, such as social sciences, natural sciences and humanities.

We would like to thank all the participants, the members of the scientific committee and most importantly the administration staff of Graz University of Technology for helping to put this conference together.

Christian K. Hofbauer    Elham Madadi Kandjani    Jean Marie Corneille Meuwissen

## **APPROACHES TO THE EVALUATION AND MITIGATION OF THE URBAN MICROCLIMATE**

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### **ABSTRACT**

Cities are complex entities: A multitude of environmental, economic, and social disciplines, approaches, and studies are needed to better understand the intricate life and evolution of structures we call cities. In this context, the present keynote paper focuses on the challenging and consequential topic of the urban microclimate. In recent history, cities have grown in number and size, emerging thus as massive anthropogenic interventions in the planetary environment. The urban microclimate with its temporal and spatial variance can significantly influence the performance of buildings and the well-being of the city dwellers. In light of this, there is a critical need for a deeper understanding of the tightly intertwined feedback loops between the local, regional, and global climate and their consequences for urbanism.

*Keywords: Urban microclimate, Urban heat islands, Microclimatic variance*



# URBAN BIOCLIMATE AND MICRO CLIMATE - HOW TO CONSTRUCT CITIES IN THE ERA OF CLIMATE CHANGE

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## **ABSTRACT**

Climate change will strongly affect cities. Therefore adaptation and mitigations strategies have to be developed and implemented in several steps of the planning issues. Usually urban climate is described based on temperature conditions and the formation and intensity of differences between urban and rural areas. This differences are important analysing energetic issues and approaches of mitigating air temperature based on materials and physical properties of surfaces. As people do not have perception of air temperature but an overall effect of the thermal environment, adaptation and mitigation against climate change should be focused also on the effect on humans (human thermal comfort). In order to analyse and describe human thermal comfort issues several input and output parameters are required. For the quantification of thermal bioclimate assessment methods based on the human energy balance are the most promising. They build the basis of thermal indices (e.g. Physiologically Equivalent Temperature). The most influencing parameters of human thermal comfort, especially during summer conditions are radiation fluxes (short and long wave), wind speed. Also the modifying factors (e.g. Sky View Factor and physical properties of surfaces) are very important. Some data and information can be obtained from measurements or can be simulated by micro scale models. The models can calculate urban climate conditions and visualize relevant information. They are based on morphological (sky view factor, orientation, height to width ratio) and surface parameters (Albedo) of the urban environment and have to be known. In addition, human thermal comfort studies can be performed analysing and quantifying results from regional climate models. The results can be used for the development of mitigation and adaptation strategies and for the development of urban areas and cities with less extreme conditions.

*Keywords: Climate change, Urban Climate, Urban Bioclimate, Micro-scale models, Physiologically Equivalent Temperature*

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## **SUSTAINABLE RENOVATION OF ARCHITECTURAL HERITAGE IN SLOVENIAN CONTEXT**

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### **ABSTRACT**

The architectural image of the city reflects its culture and, consequently, it preserves and transmits the historical testimony of its citizens. At present, the effects of climate change are threatening the implementation of sustainable methods for preservation of historical buildings in permanently changing urban environment. The paper will address the latest Slovenian experience in theory and practice, characterized by an interdisciplinary approach to the protection of cultural heritage, supported by the high-qualified team of architects, conservation consultants, construction engineers, management experts, and others. In this regard, the public authority, the Institute for the Protection of Cultural Heritage of Slovenia, is playing an important stimulating role as the coordination body, offering the expertise service at the national, regional and local level. Currently, one of the central topics is the extremely valuable architectural heritage from the 19<sup>th</sup> and 20<sup>th</sup> century on the territory of Slovenia, which is of essential significance also for the national identity. Namely, it represents a link between the past and the present, which was almost ignored for decades. Nevertheless, in recent years, several units of architectural heritage were systematically analysed, documented, and recorded, including not only individual buildings of various typologies, but also the groups of buildings, and the cultural heritage areas as joint creations of man and nature. The paper will introduce the cases of successful practice that demonstrate the procedure of systematic analyses, valorisation, conservation and renovation, modified for the reuse of the existing buildings in cooperation with the University of Maribor. Taking into account the aspects of comprehensive urban regeneration, they present an enormous potential not only for protecting the values of cultural heritage, but also for adapting them to the new contents and diversity of meanings.

*Keywords: cultural heritage, historical buildings, renovation, reuse, Slovenia, Maribor*

## TAPPING SOLAR ENERGY IN URBAN AREAS AS SIGNIFICANT MEANS TO CLIMATE CHANGE MITIGATION

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### ABSTRACT

Continuously growing appetite for energy in order to fuel, maintain and improve our lifestyles leads us into a hazardous situation. The growing notion about the risks of Climate Change, depletion of natural resources and extinction of living diversity on this planet, leaves an omnipresent sense of urgent need for change. Whether one agrees or disagrees with the heated and controversial debates about the ongoing Climate Change and its consequences to us as humanity, somehow the evidence that we cannot go on in the same manner as in the past centuries keeps gaining more and more global presence, which is hard to overlook. By now, we are equipped with unprecedented technological advancement and capacity to tap numerous renewable energy sources, which would allow us to reduce CO<sub>2</sub> emissions. In addition, widely spread communication networks enable us to connect our intelligence and knowledge. Despite all of these collectively achieved technological and academic advancements, the struggle for the integration of renewables in our living and working environments seems to maintain its persistence. In our otherwise diverse urban landscapes the encounter of an urban district run predominantly on renewable energy sources is still quite a rare one. One has to ask the question at this point, what are the seemingly invisible barriers for upscaling of solar energy use, for instance? What are the framework conditions that enable or disable implementation of innovative models for alternative energy use in urban settings? What do the examples from implementation projects in urban districts tell us? How does the education at universities integrate the so far gained knowledge regarding renewables in the context of urban planning? The international and Austrian teams of the IEA SHC Task 51, carrying the title ‘Solar Energy in Urban Planning’ has set out on a search for answers to these questions. The aim of this collaboration is to provide interesting insights into concrete examples and worldwide experiences, and to produce useful recommendations.

*Keywords: Solar Energy, Urban Planning, Climate Change*

# **MULTI-SECTORIAL AND MULTI-STRESS: RESIDENT PERSPECTIVES ON PROTECTING THE GREAT BARRIER REEF**

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## **ABSTRACT**

The environmental quality of the Great Barrier Reef World Heritage Area (GBRWHA) is at risk due to continuing poor water quality, cumulative impacts of climate change and extreme weather events, over fishing, the crown of thorns starfish and the impact of tourism, dredging and shipping. The growth of resource-sector related activities, in particular, has triggered global media attention and raised questions about the management of the GBRWHA. To explore residents' perceptions of the risks and impacts on the reef caused by the resources and tourism sectors, a series of semi-structured in-depth interviews were undertaken with 27 residents and 11 key stakeholders in the Gladstone region. Findings show high levels of place attachment and concern for the reef, but less support for reducing economic activity within the GBRWHA. A range of cognitive limitations and biases were identified including normalcy bias (e.g. the belief that shipping disasters will not occur), information bias (i.e. belief that better monitoring would reduce impacts), self-serving bias (e.g. by those who benefit economically from activity impacting on the reef), and attribution to others (e.g. foreign ships causing the impact). In addition, participants' often expressed that existing legislation to protect the reef is sufficient but poorly implemented, with the complex governance structure leading to high levels of confusion in regards to who is actually responsible for protecting the reef. The paper concludes with a set of recommendations for strengthening local support for conservation of the Great Barrier Reef.

*Keywords: Great Barrier Reef, Tourism, Dredging, Cognitive bias, Governance*

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## **IMPACT OF SALT AND MOISTURE ON STONE DECAY OF CULTURAL HERITAGE**

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### **ABSTRACT**

The presented investigation is part of a longer-term project which deals with the influence of salt and moisture on weathering of historic stonework along climatic gradients. In the maritime-humid climate of England we investigated a 300 hundred year old boundary wall of the Worcester College in Oxford. The aim was to assess the influence and the interaction between moisture and salts in the formation of the observed weathering structures. A range of non-destructive techniques were applied; in this contribution we report on (1) Mapping of weathering phenomena; (2) ERT (Electrical Resistivity Tomography); (3) Handheld Moisture Meter; (4) Paper pulp poultices and the associated laboratory investigations (Ion Chromatography). First results show that ERT, moisture measurements and salt concentrations correlate to some degree. The development of different weathering features (soiling, crumbling, crusts, cavernous weathering) correspond to the observed 2D-resistivity patterns. Crumbling seems to enhance water ingress into the stonework while crusts have a sealing effect; however, the correlations are complex and not fully understood yet. Salts (chlorides, sulfates and nitrates) probably derive from different sources (atmospheric, road salts, urine and capillary rise).

*Keywords: salt weathering, cultural heritage, limestone, 2D-geoelectrics*

# **THE IMPACT OF CLIMATE CHANGE IN HONG KONG ON THE STRATEGIC PLANNING FOR BUILT HERITAGE – A CASE REVIEW OF LUI SENG CHUN**

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## **ABSTRACT**

No city in the world could really be free from challenges posed by climate change nowadays. New buildings, with the support of new design and technology, are more sustainable than old and historic buildings. Decision makers always believe that stakeholders' interest, political and financial pressure, social and community resistance are obstacles to the conservation of cultural heritage. Besides, climate change, in terms of rise of temperature, heavy precipitation, tropical cyclones, etc. has brought additional hazards to building fabrics and facilities. Strategic planning for conservation and management can provide a visionary direction that can steer decision makings and implementation in the conservation of cultural heritage. Lui Seng Chun is Grade I Historic Building in Hong Kong and it has been adaptively re-used by Hong Kong Baptist University since 2012. Conservation measures and strategic planning have been taken to protect the building fabrics against heavy precipitation while preserving the visual aesthetic and cultural identity of the building. However, concerns about the adverse impact of climate change and proper measures to mitigate the impact have not been significantly addressed. If these concerns could be well taken care of, the strategic plan for conservation and management of built heritage would be more holistic and more sensitive to the challenges of climate change.

*Keywords: climate change, built heritage, strategic planning*

# **RETHINKING CITY PUBLIC SPACES THROUGH GREEN INFRASTRUCTURE AS AN URBAN DESIGN APPROACH, TOWARDS MORE SUSTAINABLE CITIES IN EMERGING COUNTRIES, CASE STUDY OF GREATER CAIRO**

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## **ABSTRACT**

Recently the value of green infrastructure as an urban design approach has become increasingly recognized by planners, policy makers and designers, particularly in the developed countries. Thus why the available data and experience are being appropriated to the rich world economic and social needs. Today main cities of the world are facing rapid and sometimes chaotic urban sprawl which contain the risk of creating unsustainable urban environments, this problem is recognized clearly in the case of emerging countries main cities in Africa, Asia, South America, The main objective of this paper is to evaluate the possibility of using the green infrastructure as an urban design approach for dealing with city public spaces as a tool for making more sustainable cities, particularly in emerging countries. This paper describes the advantages of using the green infrastructure as an urban design approach for improving cities sustainability through rethinking the public spaces design concepts. An analytical comparative study was done about various cases of using green infrastructure as an urban design approach in city public spaces, using SWOT analysis to determine a guideline for city public spaces urban design principals, considering the economic solutions for emerging countries case. Also analyzing the current situation of Greater Cairo public spaces as the case study which represents the main cities of emerging countries. The study has clarified how the green infrastructure can enhance sustainability of urban communities by rethinking the design principals of the public spaces through green infrastructure as an urban design approach, depending on local natural elements, which make it suitable for developing world and of course emerging countries, also has shown that the Green Infrastructure through its social and economic impact can deliver multiple benefits from the valuable urban public space it occupies, compared with other conventional design approaches.

*Keywords: Public spaces, Green infrastructure, Urban design, Sustainable cities, Emerging countries.*

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## **THE SEA LEVEL RISE AND ANCIENT SETTLEMENT UNDER THREAT: THE CASE OF ANATOLIA**

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### **ABSTRACT**

Sea level rise is one of the important problems that caused by climate change. According to the IPCC Fifth Assessment Report, the rate of sea level rise since the middle of the 19<sup>th</sup> century has been larger than the mean rate during the last two millennia and scenarios based on scientific researches shows that this increase would continue. The problem of sea level rise threatens especially low elevation coastal zones (LECZ). These zones are one of the major geographical areas where people prefer to locate from past to present. Lots of ancient settlements, valuable for the history of mankind, are located in LECZ of the Anatolian Peninsula including Mediterranean Sea Coast, Black Sea Coast, Aegean Sea Coast and Marmara Sea Coast. The critical changes in the levels of seas and rivers in ancient times had caused the relocation, transportation and also extinction of human settlements on the Anatolian Peninsula. These findings that obtained from the history of Anatolia show that how vulnerable these ancient settlements are due to changes in the nature. In this study, the main aim is to determine the ancient settlements that locate in Anatolia in Classical, Hellenistic, Roman and Byzantine periods in the LECZ of Anatolian Peninsula. As a methodology, SRTM elevation data is used to calculate area of 0-10 meter of the low elevation coastal zone. For determining the approximate boundaries of ancient settlements, 1 km buffer zone is created surrounding of ancient settlement's central points geographically. GIS is used for spatial analysis such as intersection, buffering and processing the separate vector data. According to the analysis results, a substantial number of ancient settlements locate at 0-10 meter elevated area that is under the risk of extinction due to the rising of sea level by climate change as a critical effect.

*Keywords: Climate Change, Sea Level Rise, Ancient Settlements, Anatolia.*

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## COASTAL MANAGEMENT: RESOLVING CLIMATE CHANGE ISSUES THROUGH A STATUTORY FRAMEWORK

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### ABSTRACT

India's long coastline has been impacted by unregulated human activities, rapid economic growth, indiscriminate urbanization and sea level rise, causing distress to marine areas. There is overwhelming scientific evidence to suggest that rise in sea levels along India's coast has been increasing at the rate of 1.3mm per year and is likely to continue rising in the future despite the curb in the increase of global temperatures. India's coastal management is undermined by the absence of a comprehensive statutory framework to regulate coastal zone activities and the ensuing laxity in enforcement and compliance of regulatory norms and the absence of political will to protect nation's natural heritage. Industrial activities affecting India's coastal ecosystems are governed by a comprehensive set of legislative instruments that are sectoral in their approach and do not provide adequate measures to protect threatened shorelines and coastal areas. The regime falls short of regulating industrial activities and infrastructure development along the coasts and has proven to be inadequate in preventing pollution of the seas and the oceans. There is an incontrovertible need to configure a legal framework for coastal zone management that has in its core, an agenda that addresses climate change, promotes sustainable development with a clear mandate to pursue adaptation programs in order to ultimately meet international standards. This paper will attempt to present an argument in favor of a statutory framework that will enhance the integrated coastal zone management plan in India, steps to resolve conflicts arising out of economic, social and environmental factors that encompass coastal zone regulation by way of a discussion into existing international laws and requisite reforms in international coastal governance.

*Keywords: Integrated Coastal Zone Management, Natural Capital, Coastal Zone Regulation, Sustainability, Maritime Heritage*

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## CONSIDERATION OF SOME CLIMATE PARAMETERS USING STATISTICAL INDEXES CASE STUDY: WEST OF CASPIAN SEA

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### ABSTRACT

Long-term observational data are essential for detecting and understanding local, regional and global climate change. The goal of this paper is to consider climate data of west of Caspian Sea for any trends Annual means of 2m temperature and precipitation at the stations of Anzali, Rasht, Astara and Lahijan for 1956-2011 are investigated. Some inconsistencies in the data were found. Our analysis and computations are done for Mean, maximum and minimum of temperature, precipitation. Using some statistical methods such as Pearson and spearman correlation and Z-score are done some analytical consideration. The precipitation has mostly a downward trend, strongest in Anzali, opposite to the general global trends that are mostly upward in areas of abundant precipitation such as in the study area.

*Keywords: Caspian Sea region, Climatic trends, Time series analysis*

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# LEARNING FROM URBAN HERITAGE: LOOKING FOR CLUES OF CLIMATE RESPONSIVENESS IN THE VERNACULAR URBAN PATTERN OF MARDIN, TURKEY<sup>1</sup>

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## **ABSTRACT**

This paper considers how factors such as urban design practices and social and cultural norms, inform the spatial organization, and residents' use of, different urban settlements situated within particular climatic territories. Based on an in-depth case study of Mardin, a city in south-eastern Turkey that experiences extreme seasonal temperature variations, the paper analyses the (social and cultural) factors that shape residents' (in)ability to manage thermal comfort levels - a key indicator of climate-responsive design - within the home and in the wider urban environment (e.g. streetscape). The paper adopts a comparative approach in order to assess the levels of climate responsiveness at two settlements within the city. The first site is the historic urban core (Old Mardin), an area characterised by vernacular building design and traditional urban patterns such as narrow streetscapes. The second (New Mardin) is a more contemporary high-rise development of the kind delivered across Turkey since the 1960s, and which is characterised by a generic apartment block-style of design. Interviews, surveys and technical measurements were used to assess and compare levels of climate-responsiveness at the two sites. The results indicate that vernacular-heritage design patterns (exemplified by Old Mardin) offer greater possibilities for climate adaptation. The paper concludes by making recommendations about how to better integrate the two development models (vernacular/heritage and contemporary/generic) to create a more climate-responsive urban environment.

*Keywords: climate responsiveness, urban design, vernacular pattern*

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<sup>1</sup> Mardin is a city, mainly medieval in origin and located on the slopes of a rocky hill in the south-eastern part of Turkey. The city has been named a candidate for the World Heritage List by UNESCO and preparation is in progress.

# THE MANAGEMENT OF NATURAL HAZARDS FROM A GENDER+PERSPECTIVE

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## **ABSTRACT**

Different groups of people – defined by their gender as well as by age, socio-demographic background and spatial circumstances – have different capacities in dealing with climate change and its impacts like the increase of natural disasters. So far, research on the gender dimensions of climate change and natural disaster has mainly been conducted on major natural catastrophes in the Global South. The project „Gender Impact Assessment in the Context of Climate Change Adaptation and Natural Hazards” (GIAClim) was the first project analysing the gender aspects of a natural disaster in Austria. This paper presents results of this project. The aim of the project was to identify gender-relevant aspects of natural disasters and disaster

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risk reduction (DDR) and to develop a gender analysis tool for natural disasters in the Austrian context. The interdisciplinary project comprised of a case study on a mudslide event in 2012 in Styria and included e.g. expert interviews, analyses of socio-demographic data, analyses of everyday life activities, planning instruments and policies as well as a media analysis. In combination with the results of a literature review of disasters in Asia, Africa and America as well as guidelines on the integration of gender aspects in DDR, the findings of the Austrian case study analysis inform a Gender Impact Assessment for natural hazards in Austria and practical gender analysis tools for regional and local governments as well as for practitioners in disaster management.

*Keywords: gender aspects, natural disaster, Austria*

## THE HERITAGE CHALLENGE

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### ROUSING CONSCIOUSNESS

The patrimony of the 60s and 70s is in a difficult position today, although its importance for our present and future is unquestionable. As the curator of the 14th International Architecture Exhibition/ Fundamentals, Reem Koolhaas, stated: “In a time of ubiquitous Google research and the flattening of cultural memory, it is crucial for the future of architecture to resurrect and expose these (architectural evolution from 1914 to 2014) narratives.” But the worst enemy of recent heritage is the heritage itself, demonstrated by on-going demolitions or negligence of the Late Modernism testimony. Although, in the last two decades, remarkable restoration of public buildings of the sixties and seventies indicates a slowly growing awareness of this period, considerations to include residential buildings are still missing, revealing a lack of ability to deal with them, something that risks the loss of this part of history. In public debates, housing typologies of New Brutalism, with their significant complexity of structural and functional appearance materialized by reinforced concrete, are defined as a burden. The ignorance of architectural evolution is not only removing an important part of an architectural and sociological narrative, it is also negating the potential of existing sources. The valuation of Late Modernism residential buildings is based on present aesthetic trends or excessive demands caused by social-political problems rather than by an objective analysis. I will focus on the terrace house typology developed in the 60s/70s and analyze one of the settlements most significant for further developments: the Siedlung Halen (Halen Housing Development 1955-1961/ atelier 5). The discussion of its architectural concepts is accompanied, however, by an acknowledgement of the need for a technological update. The forward-looking approach though which habitat is seen as a total of the valuable past and future living environment, can aid in drawing attention to heritage decay.

*Keywords: housing development, Siedlung Halen, atelier 5, New Brutalism, reinforced concrete*

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## CONSERVATION ACTION PLAN FOR THE OLD TOWN OF TRIPOLI

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### **ABSTRACT**

Historical buildings and areas seem to produce higher levels of debate, particularly when it comes to the process of the right decision that must be taken and the appropriate option of intervention to be implemented. In this regard, the decisions must articulate the answer of concerning questions such as: How is conservation to be carried out? What is the nature and scale of changes proposed and carried out to the physical urban fabric? In practice, numerous options exist and their relationships can be shown on a scale which ranges from the least to the most drastic intervention. The option chosen will depend upon a variety of economic, legislative and other types of constraints. One of the most important legislative constraints affecting the choice of intervention options involves the constitutional protection of areas or buildings of architectural or historic significance. The ultimate aim of conservation is not to conserve material for its own sake but, rather, to maintain (and shape) the values embodied by the heritage with physical intervention or treatment being one of many means. Thus, the aim of this paper is an outline of a comprehensive conservation concept of an historical area, the Old Town of Tripoli in Libya, from decay and other threats due to abuse of its built environment. This is not only about the conservation of what was significant in the past; however, it is the conservation of the existing present situation which links the past with the future.

*Keywords: Conservation of Historical area, Old Town of Tripoli, Heritage, Built environment, Historic significance, Conservation action plan*

## PHOTOVOLTAICS IN THE CULTURAL HERITAGE OF THE ROOFSCAPE OF GRAZ

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### **ABSTRACT**

The historical centre of Graz belongs to the UNESCO world cultural heritage. In particular the roofscape in the centre of Graz is protected by the UNESCO. Consequently the integration of solar energy collector and/or photovoltaic modules is challenging from an aesthetic perspective. The most cost-competitive photovoltaic technology (based on crystalline Silicon solar cells) has a bluish and shiny appearance which is a strong contrast to the red roof tiles dominating the roofs of Graz. Thus an active contribution to mitigate climate change by production of renewable energy in the centre of Graz is limited by constraints of the cultural heritage. In the frame of the PV@Graz project a novel coating technology is developed. This coating is considered to be applied onto glass plates which cover almost all photovoltaic modules and solar thermal collectors. The coating should change the aesthetical appearance of photovoltaic modules in order to fit into the cultural heritage of the roofscape in Graz. Moreover the coating ideally does not decrease the power output of the modules and the designated aim of the project is to have less than 10% loss in power when applying the coating. For achieving the challenging project-aims of the aesthetical requirements for the integration of photovoltaics onto the roofs of the centre of Graz is investigated profoundly by applying art-historically methods. We will present results on the challenges for integrating renewable energy into towns with a cultural heritage. In particular latest results on the aesthetical requirements of the historical roofscape of Graz in terms of integration of solar energy are presented. In addition first results on the development of the coatings for making photovoltaic modules aesthetically compatible for the application onto red roof tiles are presented.



## **APPROACHES TO PREVENT AND MITIGATE THE EFFECTS OF CLIMATE CHANGE ON NORWEGIAN CULTURAL HERITAGE**

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## **ABSTRACT**

This paper presents a short overview of four projects which The Norwegian Institute for Cultural Heritage Research (NIKU) has participated in. All projects are interdisciplinary, studying how cultural heritage is affected by climate change, and developing tools for the management of cultural heritage in a changing climate. The first project studies the preservation conditions for archaeological deposits in a changing climate. The second project is related to energy efficiency, providing a more holistic approach to the role of existing buildings in climate mitigation. The third project is a website aimed to help Norwegian municipalities analyse the most severe threats caused by climate change, and the vulnerability of their cultural heritage to this threat. The final project is currently ongoing; namely, establishing European Guidelines for improving energy performance of historic buildings: CEN TC 346, WG 8.

*Keywords: climate change, Norwegian cultural heritage, mitigation, management*

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<sup>2</sup> Working group leader in project 2 CERCMA and project leader project 4 CEN TC 346, WG 8

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## **SAVING ENERGY CONSUMPTION IN THE PHASE OF BUILDING CONSTRUCTION, A STEP FORWARD TO ACHIEVE SUSTAINABILITY**

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### **ABSTRACT**

Egypt in the scope of the global energy crisis, which threatens to drain resources from traditional energy (non-renewable energy), and it is in a bad need to make energy reduction and to emphasize the sustainability concept. Sustainable architecture, Green architecture and Environmental Architecture all of those trends represents the importance of saving energy consumption through all phases of the Building Life Cycle. This Paper presents an introduction for how to achieve sustainability in construction work, starting from Design decisions (particularly in the selection of building materials and methods of construction) in an attempt to save energy consumption without continuing to drain the surrounding environment. Energy consumption during the construction phase (this phase start from the raw materials used in construction, transporting and Site operating energy until the construction is completed.) represents 40% of the energy of the whole building, and in the absence of a specific method that helps Architects in evaluating the different factors affecting the energy consumption in the construction stage. That can lead to more energy consumption. This Paper aims to achieve the Environmental balance within reducing the Energy Consumption in Construction phase and applying practical actions to reach the sustainability.

*Keywords: Egypt-Sustainability – Energy Consumption – Environmentally - Building Construction.*

## **IMPACT OF SOCIO-CULTURAL VALUES ON HOUSING DESIGN IN PALESTINE**

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### **ABSTRACT**

Socio-cultural values -mainly privacy- had a significant role of forming traditional housing in Palestine, but they may not have the same role in designing contemporary housing, which is usually translated as high-rise apartment buildings. Discarding these values may result in a reluctance from Palestinian families for living in such buildings. Inside Nablus city, that acknowledged as an example, the fact that there is a high percentage of apartment units that are still vacant in a high percentage. This paper aims at understanding the impact of socio-cultural values on housing design in Nablus city, and then presents a survey on people's experiences with such designs. The main conclusion of the investigation sustains that socio cultural values still have a strong impact on contemporary spatial design of apartment units, but less influence on the spacing articulation between such units together. As a result, people can be satisfied on the interior design of their apartments more than the outdoor environment. This fact may play a major role on people's attitude for living in these buildings. Articulation of apartment units with better spacing relations is the most important factor that must be considered in any future design. This conclusion was translated into a set of recommendations to improve the qualities of contemporary housing design, based on the paper findings.

*Keywords: Housing design, Socio-cultural values, Privacy, Palestine*

## **INTEGRATED BIKEWAY DESIGN IN GREEN CITIES**

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### **ABSTRACT**

It is important to promote sustainable travel network that help to preserve the environment through energy efficient ways of travel. This can be fulfilled through ensuring complete bicycle networks and provide amenities within new projects to promote cycling as appropriate to the scale of the project. Cycling is considered an important issue in the transportation system, it is an easy, cheap and clean transport mode, and it is friendly to the surrounded environment as well. However, like walking, many of the measures to encourage cycling are low key and simple. Cycling can be made more popular by providing direct and convenient traffic-calmed routes, with a safe place for people to leave their bikes at their destination. This research is focusing upon the importance of encouraging cycling and the need for it, especially in crowded cities as the city of Cairo where cycling is not much as other cities, mainly because it is unsafe and inconvenient. The research illustrates the problems that are facing the bike users and addresses the different types of bikeway design, the required facilities, and the possible solutions for implementation of a bike way network especially in crowded polluted cities.

*Keywords: Bikeways , Streets , Environment.*

## **CLOSING THE GAP BETWEEN KNOWING AND DOING CONCERNING LIVINGGREEN**

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### **ABSTRACT**

The central issue that is addressed in this contribution is how to get proven innovations adopted and implemented in practice? In the frame work of the Intereg IVb project Livinggreen that has started in 2009 attempts are made to accomplish this in a process of transnational learning. Knowledge about innovative ecologically sound building materials, tools and packages for sustainable renovation and retrofitting of monumental buildings and in the aftermath of this, the building stock at large is available. Also much attention is paid to methods of knowledge dissemination. Moreover EU-, national- and local goals to fight Co2 emissions by transforming houses sustainably, are set! Never the less, there still is a considerable gap between knowledge development on the one hand and the adaptation and implementation in daily praxis, on the other hand. In our Interregt EU project, we aim to bridge this gap and have the new knowledge, technologies and eco-building materials adapted, used and implemented by small and medium enterprises and home owners. We are half way the extension project and like to present and reflect in a broader international circle on our findings.

*Keywords: Implementation, CO2 reduction, Sustainable renovation, Sustainable retrofitting, cultural heritage*

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## DEMAND RESPONSE AND BUILDING RENOVATIONS AS A WAY TO REDUCE CO<sub>2</sub>-EMISSIONS OF ELECTRIC HEATING

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### **ABSTRACT**

This paper presents results that are based on a calculation model for the power of thermal losses in the building stock. By power of thermal losses we mean the amount of power required to maintain desired indoor temperature when considering the thermal and technical characteristics of the building envelope and ventilation. Finnish reference year weather data and data of the residential building stock are used to demonstrate the model. We have compared demand response and building renovations as a way to reduce CO<sub>2</sub>-emissions of heating in the building stock. The demand response analysed in this paper is about replacing part of the electric heating by using convective fireplaces in the single family houses. The renovation measure described in this paper is the impact of window renovations in the building stock level. We modelled the situation where the thermal transmittance of windows is equal to the requirements set for the new buildings by the National Building Code of Finland. This model is a step towards more complex power modelling in the building stock level. For more holistic approach the effects of the residents' energy use and thermal loads caused by the sun and wind could be added to the model.

**Keywords:** *demand response, energy efficiency, CO<sub>2</sub>-emissions, power modelling, energy renovation*

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## **RENEWING A HISTORIC TYPOLOGY WITH MODERN SUSTAINABLE MASSIVE WOOD ARCHITECTURE**

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### **ABSTRACT**

In Norway 96 % of all new private housing is built in wood. These are often light structures; however it can be argued that massive wood constructions are more climate-friendly in a long term perspective. Log and massive timber are considered a good solution for the reduction of carbon waste, and are gradually winning part of the market. Building with wood has long traditions in Norway; log constructions have a long standing history, and timber framing was also widely used. The case study presented here shows the process of restoration and rehabilitation of one of the properties in the historic area of Bakklandet in the city of Trondheim, and demonstrates how a historic building type has inspired the architecture of the new addition. The study argues that re-use, adaptation and interpretation of historic wooden structures are relevant for future environmentally friendly building practice. The new interpretation of a historical construction closes the gap between 18th centuries sustainable building and today's need for carbon-binding and sustainable architecture.

*Keywords: Bakklandet, Massive wood, Building typologies, Sustainability, Urban conservation*

# TOWARDS SUSTAINABLE TOURISM: URBAN TRANSFORMATION IN ANCIENT HERITAGE, KAMPONG KAUMAN SURAKARTA, INDONESIA

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## ABSTRACT

Kauman is one of the ancient heritage kampongs in Surakarta, Indonesia, which was a place for abdi dalem ulama (religious servers of Surakarta Palace). Close location to Surakarta Palace, a special character of Muslim's environment and a diverse architecture will strengthen the kampong to be potentially developed as an urban heritage area. Besides, it nowadays attracts many tourists due to growing batik industries. Consequently, the kampong has some potential decay. For instance, the industrialization process of batik has endangered the socio-cultural preservation of traditional batik making. A number of houses which were transformed into shops have changed the kampong fabric. Therefore, several important strategies such as urban revitalization and development have been initiated to improve the kampong as well as achieving sustainable tourism. In principle, the strategies to achieve the sustainable tourism in Kauman are implemented by integrating the involved actors (visitors, industry, environment and host communities) to realize kampong as a place for business of batik industries, a place for tourism activities and a place for religious servers of Palace as well as for Muslim students. However, several constraints will be encountered in implementation stage, related to conflict of interest, political will and consistency from the government.

*Keywords: urban heritage, revitalization, development, sustainable tourism*

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## **A METHODOLOGICAL FRAMEWORK FOR SUSTAINABLE TOURISM PLANNING: STRATEGIC GOVERNANCE FOR A GREEK DESTINATION**

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## **ABSTRACT**

The present study aims to provide a basis for sustainable tourism planning, strategic governance and policy modeling, applied in a tourism destination of Northern Greece, Chalkidiki. The methodological framework combines Life Cycle Assessment (LCA) and Multi-Criteria Decision Analysis (MCDA) to estimate the contribution of hotel's sector and tourism travel to climate change, and design a realistic mitigation strategy in areas of considerable tourism activity. A comparative analysis of different tourism-related activities for different sizes/categories of hotels in the area under study provides important highlights for processes and/or flows that have the highest CO<sub>2</sub> emissions generated by air and road transport and hotels' operational use based on LCA principles. Air transport to the tourism destination and back contributes primarily to CO<sub>2</sub> emissions for medium to large-sized hotels in comparison to other activities. As far as operational use of all hotels is concerned, HVAC systems are the most energy intensive "end-users" and thus responsible for high CO<sub>2</sub> emissions in all cases. LCA allows the identification of environmental "hot spots" and MCDA plays a crucial role in revealing improvement actions. MCDA synthesizes interdisciplinary knowledge from representatives of tourism industry and, in general, different views of respective stakeholders. The approach requires the

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stakeholders' involvement in order to incorporate their environmental, economic and social preferences for measures to be promoted. The analysis indicates that rational energy use, improvement of energy efficiency in buildings and water management measures should be primarily put forward for the case under consideration. The findings highlight that a specific climate change mitigation strategy depends on the status of the area's environmental quality, its vulnerability, its economy and the level of the problem's understanding by local authorities and tourism industry.

*Keywords: climate change, Life Cycle Assessment, PROMETHEE, decision-making, sustainable tourism*

# THE ROLE OF CULTURAL AND NATURAL HERITAGE FOR THE SUSTAINABLE FUTURE OF THE DANUBE RIVER BASIN

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## **ABSTRACT**

The Danube and the Danube River Basin possess a wealth of cultural and natural heritage. With a size of approximately 6000 km<sup>2</sup>, the Danube delta is the biggest remaining European wetland and a world heritage site since 1993. Natural resources available in this region enabled traditional economic activities as well as specific cultural and social practices since centuries. Both the natural resources but also traditional economies are an important asset for future sustainable tourism. The Wachau, a part of the Austrian Danube valley, is a famous cultural heritage site. As in the Danube delta, the preservation of the particular and unique landscape is closely linked to prevailing environmental conditions. The Danube delta and the Wachau are just two examples for heritage sites which depend on the presence of animal and plant species and their ability to develop self-sustaining populations and communities. As all biota show distinct thermal preferences during their life cycle, they are prone to the effects of climate change. Knowing these effects is indispensable for proper maintenance and preservation of the respective heritage sites. This presentation will discuss the effects of climate change on the presence of aquatic plant and animal species in the Danube River with a particular focus on fishes. Our study is part of Danube:Future, an international and interdisciplinary research and capacity building program, which aims at investigating the role of natural and cultural heritage for the sustainable future of the Danube. Danube:Future was accepted as a flagship-project of the European Strategy for the Danube Region, priority area 7, knowledge society.

*Keywords: Danube, biodiversity, Danube:Future program*

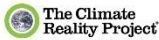
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