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Contents

Measuring the environmental performance of office space: a Bristol case study

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This paper investigates how the existing stock of medium to large office buildings in a typical UK city performs in relation to current environmental sustainability benchmarks. The vast majority of office space in any UK city is not new; over two thirds of the stock in England & Wales was constructed before 1985. Whereas current efforts to benchmark the environmental sustainability focus on the design and procurement of new buildings, this paper examines the management and occupation of existing buildings. Most of the existing office stock that is here today will still be standing for decades to come and will therefore pose a challenge. The stock will be subject to increasingly stringent energy and CO_2 reduction targets, such as the government's commitment to reduce emissions by 60% before 2050 as laid down in the Climate Change Bill. The paper focuses on two aspects of environmental performance in particular. Energy use is considered both in terms of operational energy consumption relating to the building itself and in terms of transport energy consumed while commuting to and from the building. The research focuses on speculatively built office buildings of 10,000 square feet or more that have been constructed or refurbished in Bristol between 1956 and 2007. The buildings in the sample are located in the city centre and in out-of-town business parks. The stock of over 400 buildings is firstly classified in terms of type, age and location and information on rents, lease terms, vacancy rates. The buildings in the sample are classified into four categories: Naturally Ventilated Cellular, Naturally Ventilated Open Plan, Air Conditioned Standard and Air Conditioned Prestige. Using this classification an estimate of energy use and CO_2 emissions is made, and it is established how well Bristol performs within a wider context. Also, assumptions are made about the potential for the reduction of energy and CO_2. The numbers are visualised and put into context. Also, the number of CO_2 emissions per office occupant in Bristol is given. Taking the BREEAM Management & Occupation Assessment Method, the environmental performance of the stock is secondly examined in terms of their transport emissions. Using a Geographic Information System (GIS) analysis their general location and proximity to public transport facilities and proximity to transport nodes is established. Transport emissions are then estimated and classified by mode of transport. The findings of the research reveal how potentially difficult it might be for existing offices to meet increasingly stringent mandatory and discretionary environmental performance standards.

Keywords: assessment tools, carbon footprint, energy, environmental assessment, office occupation, sustainability assessment, sustainability metrics and indicators, sustainable built environment, transport

The role of parametric modelling and environmental simulation in delivering sustainable healthcare buildings

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There is a need for innovative strategies capable of facilitating the delivery of sustainable healthcare buildings that successfully achieve healthy, comfortable internal conditions while minimising the environmental impacts on building operation. The National Health Service (NHS) has recognised that it has a responsibility to pioneer efforts in the climate change agenda for the benefit of its healthcare building users, including patients and the general public. The significance of the impacts of climate change on NHS healthcare buildings is evident by the fact that the NHS carbon footprint in England is estimated to be in the region of 18 million tonnes of carbon dioxide annually, which represents approximately 3% of England's total carbon emissions. Annual energy expenditure by the NHS is currently over £429 million for electricity and heating which represents approximately 22% of the NHS England total carbon footprint. Factors that may have a negative impact leading to an increase in NHS carbon dioxide emissions include: an increase in the energy intensity of its healthcare delivery; an increase in floor area due to progress in its major building programmes; and an increase in its total activity due to demographic changes. In support of the NHS's sustainable goals and aspirations for carbon reduction and a more energy efficient healthcare building stock, parametric modelling and environmental simulation has been identified to play a key role in building energy performance assessment. This paper offers an understanding of how parametric modelling and environmental simulation can be applied for the energy efficient design of new healthcare buildings, and the energy performance assessment of existing healthcare buildings. The issue of building energy performance is important and the integration of building energy performance assessment – particularly during the new build design stage – is capable of overcoming the barrier to accessing the building energy efficiency resource potential, thereby facilitating improvement in low-energy new building design. Such an improvement could translate to a 50-75% reduction in energy consumption levels. Its implications include: a significant reduction in energy costs; contribution to the mitigation of environmental impacts and climate change; and alleviation of occupancy discomfort. This paper has reviewed current literature – and an assessment tool and method – related to parametric modelling and environmental simulation. Its possible applicability to healthcare environmental design was reviewed to identify examples of good practice, evidence-based solutions and the conceptualisation of a Virtual Health Promoting Environment (VHE) that integrates such a key assessment method for efficient building performance. It was discovered that parametric modelling and environmental simulation support building energy simulation analysis as a building energy performance assessment method that overcomes the barrier caused by ineffective decision-support. It has an important role to play in delivering sustainable healthcare buildings by facilitating: a strengthening of the evidence base of environmental impacts; the development of innovative solutions; effective integration and collaborative working between teams; and consensus building and collective decision making with multiple stakeholders.

Keywords: assessment methods, energy efficiency, environmental simulation, parametric modelling, sustainable buildings

Sustainable building production in practice and in education

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Sustainable building is a very important aspect of sustainable development. It impacts on all three of the major areas of sustainability, namely environmental, economic and socio-political sustainability. The paper Sustainable Building Production in Practice and Education is a presentation of current research with the focus on the integration of sustainability in the building process. All stages in the process are considered but the main focus is the production phase, which also includes the projecting and production planning stages.

The paper is mainly a statement of research and development projects carried out at the Building Department at Mid Sweden University within the framework Sustainable Building Production.

The education of building engineers is one of the major issues in changing the building industry, and in moving it towards sustainable building. Not only the contents but also the pedagogical forms and teaching methods are of importance.

The results from the projects Project planning, work organization and leadership on the building site and Sustainable Wooden Houses indicate that wooden houses are comparably healthy using the formulated criteria. There is also a need for improvement of the production planning process. Wooden house building could be the catalyst for the industrialization of the building process, with improvements in the working environment, more effective production planning, work organisation and leadership.

The results of the project Flexible engineering education show that it is possible to combine campus-based courses which means that you can reach new target groups for education in sustainable building.

Future development work will have to provide more focus on learning and less on teaching. Sustainable building is a way of thinking that has to be integrated into the entire course program. It should be based on both theoretical and practical experience and the dissemination of good examples.

The results from all the projects will be used to improve education in building production for the building engineering programs at university level. The transformation of research results into educational material is still under development.

Keywords: higher education, sustainable building

Mapping sustainability assessment in relation to the life-cycle of a university campus project

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Sustainability assessment is increasingly recognised as playing a wider role than purely a technically based exercise that is focused on assessing the sustainability performance of building projects. The potential has been suggested for sustainability assessment to evolve as a tool that facilitates the consideration and management of sustainability across the different stages of the project lifecycle. This aligns with calls for assessment to increasingly contribute to the predominantly subjective approach to decision making within the built environment and the need to increase the level of integration between the activities of assessment and the project lifecycle. Key to such an approach, sustainability assessment offers a role in aiding stakeholder engagement and mediation, in addition to providing a stimulus for the required learning amongst practitioners to aid the delivery of project sustainability. However, the realisation of this aspiration has so far been limited in practice with many pointing to the lack of understanding amongst practitioners of the concept of sustainability, the nature of the assessment tools and the implications these present to current practice.

This paper aims to contribute towards this emerging understanding by considering an empirically based case study which follows the application of sustainability assessment across the lifecycle of an active project. A grounded theory approach was adopted, and a series of interviews conducted with those who were involved or influenced by the consideration of sustainability and its assessment across the lifecycle of the project. Presented are the findings of an exercise aimed at identifying the emerging phases and activities of sustainability assessment that were found in practice. The case study represented a progressive attempt by a project team to consider sustainability and to use assessment to guide the development of a university campus building project within the UK. The paper explores the application of sustainability assessment in relation to the key phases of the process i.e. identification of project sustainability issues, selection of an appropriate sustainability assessment tools, the implementation of the assessment tool and during the consideration of its outputs; and across the stages of the project lifecycle By exploring an empirical context that is forward thinking by nature, some key lessons are drawn to facilitate the evolution of sustainability assessment towards the advocated approach in practice.

Keywords: assessment tools, built environment, life-cycle, projects, sustainability assessment

Mapping the knowledge flow during sustainability assessment within a university campus project

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Increasingly, importance is being attached to the role of knowledge and the requirements associated with its flow during sustainability assessment. Acknowledged as a key barrier in the application of sustainability assessment, is the limited understanding amongst practitioners relating to the concept of sustainability and its implications for practice, in addition to the nature and requirements associated with the practice of its assessment. It is suggested that knowledge management can play a significant role in aiding knowledge transfer between stakeholders during an assessment, helping to create, through social learning, a common understanding of the actions required for a more sustainable urban environment and the role of assessment within this. Understanding the processes involved in the generation, flow and capture of knowledge within this context is key to aiding the overall management and facilitation of its application in practice.

Knowledge mapping is a technique that offers the potential to develop a better understanding of the nature and flow of knowledge during complex processes. This paper presents the findings of a knowledge mapping exercise that focused on understanding the nature of this flow during sustainability assessment through an empirical case study. The analysis revealed the key sources of knowledge that a key decision-maker draws upon during the four identified phases of sustainability assessment (identification of project sustainability issues, selection of an appropriate sustainability assessment tools, the implementation of the assessment tool and during the consideration of its outputs). Knowledge exists in a variety of types and forms, and the key sources were classified around an emerging set of categories relevant to the context in question. The mapping exercise identified the variations in the types of knowledge held by the different stakeholders during the assessment, and the mechanisms most effective in ensuring its transfer to the key-decision maker. This research highlights that whilst access to explicit forms of knowledge is necessary, it is when viewed together with the implicit forms of knowledge held by the rest of the team and wider stakeholders that the basis is provided for effective decision-making and a stimulus for the desired social learning. The value of implicit forms of knowledge such as expert and tacit knowledge are highlighted within the case study. Ensuring that these pathways are facilitated through effective management that delivers continued engagement between the key-decision maker, the rest of the team and wider stakeholders is therefore essential.

Keywords: built environment, implicit knowledge, stakeholder engagement, sustainability assessment

Spatial information infrastructure and tracking and tackling urban inequalities in India

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This paper is a status report on our research program focusing on how urban governance networks can tackle urban inequalities in Indian cities by using local spatial information infrastructure (SII). Our project integrates two main research questions: (1) what are the 'profiles' of inclusion, exclusion, and adverse incorporation regarding household access to requisite livelihood resources and what are their spatial concentrations, and (2) what are the obstacles that prevent a SII from becoming more locally embedded and institutionalized in content and as platform for use by urban governance networks? The project goals are both scientific and developmental. Scientifically, it will help build a spatially disaggregated model of household deprivations and the inequalities in access to and provision of livelihood resources. Also, it represents an evolution of the contemporary livelihoods approach as it strives to better account for the institutional and relational aspects of urban deprivations and their geography. Developmentally (based on close cooperation with local authorities and community organizations) this work could provide relevant contents for localized spatial information infrastructure initiatives. It is hypothesized that improved locally derived content and spatial disaggregation of deprivations (along with close attention to the types of institutionalized relationships that dominate low-income groups access to needed livelihood resources) will help poverty alleviation programs and city governance target better in terms of location, groups, sector, and needed institutional reforms. First, drawing on the concept of the 'installed base' we discuss the importance of determining the current status and actions of the human and technical resources which could serve as the foundation of a SII that can tackle urban inequalities. Then we discuss the political and ontological barriers that need to be considered while developing this approach. Ontologically, there are issues between how different stakeholders conceive of poverty, inequality, and SII. Politically, there are issues around the type of data collection and sharing this approach requires as civil society organizations, politicians, and bureaucrats are as likely to be adversaries as allies. Also, it is unknown to what extent this sort of SII can alter the present modus operandi or to what extent it ends up being compromised by it. This is because the normative goals of democratizing, rationalizing and technologizing urban planning can be undermined by stakeholders who benefit politically or economically from maintaining the grayness, ambiguity, and decision making monopoly present in these areas. Lastly, we will address how in an era where political space is dominated by a neoliberal governance logic, it is unclear how viable an approach with quality of life and equitable access to collective resources as implied goals can be.

Keywords: entitlements, institutions, spatial information infrastructure, urban governance, urban inequality

Accelerating adoption and use of sustainability tools and metrics: the role of change initiators

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Research provides evidence of instances where the people who initiate and influence change within construction are not necessarily formally designated leaders, but informal leaders. Informal leaders typically reflect the characteristics of change initiators or opinion leaders who can influence the behaviour or attitude of other people (their followers) to adopt the behaviour or attitude of the opinion leader. The significance of the role that opinion leaders play in the construction project environment stems from their potential to act as catalysts for improvement, agents of change, or the advocates for the adoption of sustainability assessment tools. The ability to identify the attributes of such informal leaders can therefore help construction organisations in achieving a better alignment in the roles they assign to project staff. This paper presents a study that explores the concept of the opinion leader to form the basis for a research to identify which actors in the construction process exhibit the most influence on the diffusion of technology solutions.

Keywords: construction, diffusion, leadership, project, sustainability, team

Public participation in Malaysian district local planning system

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This paper explores the practice of public participation in local planning system in Malaysia. The research focused on the Sabak Bernam District Local Plan (SBDLP) 2002-2015 which was gazetted in June 2007. Public participation is compulsory in the process of preparing Development Plans (Structure Plans or Local Plans). The impact of the new requirement of Town and Country Planning Act 1976, named Town and Country Planning (Amendment) Act 2001, is that the number of public participation activities has increased in preparing District Local Plans. Sabak Bernam District Local Plan is the first District Local Plan prepared under the provision of Section 12a, Town and Country Planning (Amendment) Act 2001. The public participation programmes were held at every stage of SBDLP preparation process including a workshop and exhibition at the early stage of study; followed by a workshop after the technical report was prepared; another workshop after draft proposal was prepared; and an exhibition after the draft proposal had been amended. It shows the government has put an effort to increase the role of stakeholders in preparing development plans. The main approach of public participation adopted in this country is exhibition and hearing.

The research was carried out at two different stages. The first research was by collecting feedback from the participants of public exhibitions and workshops. A total of 51 respondents were interviewed using survey questionnaire. Secondary information was collected from the related agencies. The analysis involved analysing feedback from the public who participated in the workshop after draft proposal of Sabak Bernam District Local Plan 2002-2015 was prepared. Feedbacks of respondents have been studied to identify the effectiveness of the overall programmes and the effectiveness of each main aspect or element of public participation. It was found that series of workshops were a more effective method of public participation for development plan as compared to one exhibition after draft proposal or plan has been completed.

The second research was based on the SBDLP Public Participation and Objection Report prepared by the Department of Town and Country Planning Headquarters. Beside the content analysis of the report, an in-depth interview was carried out involving the 10 stakeholders who attended the Objection Committee Meeting. The research found that there was lack of participation by the stakeholder with only 526 or 0.46 percent of the district total population. Only 29 or 59 percent of the issues, objection and proposal raised by the public has been considered in the implementation of the Sabak Bernam District Local Plan. Therefore, there is a need to address the issues and the challenges of public participation in Malaysian district local planning system.

Keywords: Town and Country Planning Act 1976, development plans, district local plan, public participation, public participation and objection report

Stakeholder engagement in sustainable housing refurbishment in UK

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The UK government is committed to effectively implement a viable sustainable agenda in the social housing sector. To this end housing associations and local authorities are being encouraged to improve the environmental performance of their new and existing homes. Whilst much attention has been focused on new housing (e.g. the Code for Sustainable Homes) little effort has been focussed on improving the 3.9 (approx) million homes maintained and managed by the public sector (in England), which, given the low rate of new build and demolition (<1% in England), will represent approximately 70% of the public housing stock in 2050. Thus, if UK is to achieve sustainable public housing the major effort will have to focus on the existing stock. However, interpreting the sustainability agenda for an existing housing portfolio is not a straight foreword activity. In addition to finding a 'technical' solution, landlords also have to address the socio-economic issues that balance quality of expectations of tenants with the economic realities of funding social housing refurbishment. This paper will report the findings of a qualitative study (participatory approach) that examined the processes by which a large public landlord sought to develop a long-term sustainable housing strategy. Through a series of individual meetings and group workshops the research team identified: committed leadership; attitudes towards technology; social awareness; and collective understanding of the sustainability agenda as key issues that the organisation needed to address in developing a robust and defendable refurbishment strategy. The paper concludes that the challenges faced by the landlord in improving the sustainability of their existing stock are not primarily technical, but socio-economic. Further, while the economic challenges: initial capital cost; lack of funding; and pay-back periods can be overcome, if the political will exists, by fiscal measures; the social challenges: health & well-being; poverty; security; space needs; behaviour change; education; and trust; are much more complex in nature and will require a coordinated approach from all the stakeholders involved in the wider community if they are to be effectively addressed. The key challenge to public housing landlords is to develop mechanisms that can identify and interpret the complex nature of the social sustainability agenda in a way that reflects local aspirations (although the authors believe the factors will exist in all social housing communities, their relative importance is likely to vary between communities) whilst addressing Government agendas.

Keywords: public housing, stakeholder engagement, stakeholder participation, stakeholders, sustainable housing

A proposal for discursive methods of stakeholder involvement in healthcare project decision-making

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The NHS is undergoing change. Some recent initiatives include introduction of the 'Patient and Public Involvement' initiative and the 'Strengthening Accountability' guidance by the Department of Health. These and others have resulted in improved effort towards fully engaging staff, patients and the public in the design and delivery of healthcare services. Current research work of which this paper is part, investigates possibilities for better ways of delivering Whole Life Value (WLV) of healthcare facilities for the benefit of all stakeholders. This investigation targets the pre-design stages of healthcare projects. Consequently, this paper is based on the recent changes within the National Health Service (NHS) primary care facility acquisition guidance and its sustainability agenda, which entail that all stakeholders are involved in the planning of services that affect them. However, with a sector like this engaging stakeholders, the first challenge is that in one way or another, virtually every citizen is a healthcare sector stakeholder. The second challenge is that the different stakeholders each have their own needs and expectations, which may at times conflict. The third challenge noted is one of effectively engaging these stakeholders and from this several questions arise: Who is to be engaged? What contribution is expected of them? When and how do we effectively engage them? Based on Renn et al.'s 1997 'cooperative discourse' method, a stakeholder participation model is proposed for application in the pre-design stages of healthcare projects. In the model, the three step 'cooperative discourse' process is combined with value management (VM) methodology to create a synergistic effect. The premise of the 'cooperative discourse' procedure is that all stakeholders play a role at each stage but they are encouraged to impact the decision process with the specific knowledge with which they are most proficient. Combined with the advantages of VM methodology, the proposed model is intended to lead to a method for dealing with the afore-mentioned challenges. A literature review on the stakeholder engagement process has been conducted. The peculiarities that may abound when the NHS engages all its stakeholder groups in planning of infrastructure have also been discussed. The aim of this preliminary investigation has been to identify and verify the need for a stakeholder engagement model and to identify its usefulness in the context of the NHS. The paper draws conclusions in the final section and proposes to take the model into the next stage which will be to validate it with NHS primary care management, community representatives and focus groups. Issues raised will then be carried forward to inform an on-going research project.

Keywords: Value Management, cooperative discourse, engagement, healthcare projects, stakeholders

Design and Access Statements as an assessment tool to promote quality sustainable development: reflections on practice in NE England

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Planners play an important role in seeking sustainable urban design solutions, including making critical decisions on planning applications. Design decisions in planning have frequently been controversial and criticised as being subjective and too interventionist. Decisions on the design element of proposed developments are arrived at, by local planning authorities, using information provided by the applicant/developer, consideration of relevant local and national policy, observation by planners on site, views from the public and statutory consultees, negotiation between developers and planners and finally views of local councillors. This is a complex set of information and ways to clarify and expedite such decisions are needed. One recent attempt by the government to do this followed the Planning and Compulsory Purchase Act, 2004. Regulations came into force in August 2006 requiring developers to submit a Design and Access Statement (DAS) with most applications.

A DAS is intended to assist design decision making in the planning process by clarifying the design approach of the applicant from the outset, so facilitating greater common understanding by all concerned. It appears the government is currently supporting constructive intervention by planning authorities on design issues, and so reinforcing the legitimacy of democratically accountable design decisions. The government hope that DAS will make the process and outcome of decision making more open, rigorous and sustainable.

This paper seeks to briefly chart the background to government intervention in design decision making through planning. It then specifically investigates whether DAS are in fact perceived as improving decision making from the local planning authority perspective, as well as the developer perspective, using primary data from NE England. Comparisons are made with a recent national study by the Planning Advisory Service on DAS. This reveals different viewpoints on the extent to which the introduction of DAS is helping the design decision making process. Developers are more critical than LPAs, but all perceive some value in the process and offer views on potential improvements.

Keywords: design and access, design assessment, government intervention in design, planning applications, sustainable design, urban planning, sustainable development

Assessment of the embodied CO_2 in buildings towards a sustainable building design and construction

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Increasing population in urban cities and town means that new building and other social infrastructure needs to be constructed. Embodied CO_2eq emissions of new buildings should be used as one of the sustainable indicators to measure the whole life sustainability of buildings given that the embodied CO_2eq of a building becomes very significant especially as operational energy efficiency measures and standards are continually being improved. In this paper, a hybrid embodied carbon dioxide equivalent (CO_2eq) methodology used to assess the CO_2eq embodied in buildings is presented. The hybrid methodology consists of an Input-Output (I-O) and a process-based analysis. The I-O analysis is undertaken using re-derived Supply and Use and Input-Output data for Ireland which includes energy inputs into imported construction products and materials and construction sub-sectoral energy data. The Grand Canal Apartments in Dublin, Ireland is used as a case study. The buildings substructure, internal walls, floors, stairs, frame and roof was analysed in the study

The Irish construction sector is divided into five different sub-sectors, each with varying direct energy intensities and accounting for different construction activities. The construction sub-sectoral I-O direct energy intensities ranges from 25.61tCO_2eq/m€ for general fit-out to 493.27tCO_2eq/m€ for the use of construction machinery. The I-O indirect intensity averaged 347.67 tCO_2eq/m€. The total embodied CO_2eq of a Grand Canal apartment building was estimated to be 0.00718tCO_2eq/€. The use of construction sub-sectoral data in this study disaggregates the construction sector and ensures that CO_2eq intensities can be applied to specific activities which are undertaken in the construction of the building. Furthermore, disaggregation of the energy supply sectors in the I-O analysis eliminates non-energy inputs in the I-O analysis and ensures the use of specific energy tariffs and primary energy factors. By re-deriving the I-O tables to include energy inputs into imported goods and services, the whole life embodied CO_2eq of the building is assessed.

Energy saving efforts and sustainability initiatives in the construction sector such as considerations to embodied CO_2eq of building materials, selection and design options can play a significant role in reducing the overall future CO_2eq of the country. Reduction in the CO_2eq embodied in buildings helps to tackle environmental pollution but needs however to be balanced with economic and social costs in order to achieve an overall sustainable urban solution.

Keywords: Ireland, embodied CO_2eq, hybrid assessment, sustainability, construction sector

Improving traditional ventilating systems for elaborated modern needs

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Problem: Global warming and high expenses due to integrated use of electrical ventilating systems. Urban planning and design for sustainability involves taking into action reducing greenhouse gas emissions and to enhance practical methods for reducing the extent of global warming. This is to urge urban planners to minimize the effects of global warming.

Abstract: The Wind-Catcher and Solar Chimney are two of the ancient architectural elements that are suggested for the plan. The flow of water underneath is accessed as a natural cooling enterprise. The use of underground pools or connectivity of the ventilation system with a pipe to the nearest water flow is for cooling the gust of air. For each block of buildings a well is needed to access the underground water flow. Then by the use of some pipes they can all be connected to one another. Besides,for money saving issues the Wind-Catcher and the Solar Chimney can be operated by the same pipe.

A Wind-Catcher is capped and has several directional ports at the top. By closing all but the one facing away from the incoming wind, air is drawn upwards similar to how opening the one facing the wind would push air down the shaft. This generates significant cooling ventilation within the structure below, but is not enough to bring the temperature below ambient alone.

And a Solar chimney uses natural ventilation that can be created by providing vents in upper level of a building to allow warm air to rise by convection and escape to the outside. At the same time cooler air can be drawn in through vents at the lower level. Trees may be planted on that side of the building to provide shade for cooler outside air.

The heart of this paper is to help reduction of greenhouse gas emissions through reducing energy use and switching to cleaner energy sources. Through an integrated combination of Solar Chimney and Wind-Catcher will be an elaborative method to enhance the use of traditional ventilating solutions for the modern era. In an urban viewpoint, to have diversified strategies for different places in the city, notification of Zoning Policies seems vital. For Open spaces and Light Industrial Areas there is no demand for my proposal but in case of Commercial Spaces, Low & High Density Residential areas which form the majority of our spaces, this method can be vastly utilized. The result for reducing greenhouse gas emissions by this method will be awesome.

Keywords: Qanat, greenhouse gas, solar chimney, vernacular ventilation, wind catcher

Incorporating an economic measure into Ecohomes

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BREEAM is the Building Research Establishment's Environmental Assessment Method. It is a suite of tools designed to measure the environmental performance of buildings. Although originally designed for a UK context it has been adapted for and influenced a range of building rating systems world-wide. The domestic scheme, Ecohomes, has received widespread acceptance for the assessment of housing, particularly in the social housing sector. Ecohomes was originally designed as an environmental assessment method. However, recent revisions have seen an increased inclusion of social issues. The problem, however, exists that no attempt is made to include the economic dimension of sustainability. It is therefore the purpose of this paper to investigate the coverage of the assessment method over the three dimensions of sustainability and respond accordingly to any gaps.

The analysis for the coverage of the indicators found, unsurprisingly, that there is a very reasonable coverage of environmental indicators in Ecohomes. This was complemented by a reasonable coverage of social indicators. However, there is a complete avoidance of the economic dimension.

It was proposed that means of incorporating an economic dimension should be considered to make it a three dimensional sustainability assessment method. The approach developed in this paper uses published distributions of capital construction costs of houses and flats from the Building Cost Information Service (BCIS). Using these distributions a sustainability ratio is developed based on the existing Ecohomes score to measure the environmental and social dimensions while the capital construction cost defines the economic dimension. A set of grades can then be creates to measure a three dimensional Ecohomes score. Thus, the research presented allows an opportunity to see the impact and the effect of all three dimensions of sustainability simultaneously. It is possible that with further industrial consultation the approach could be transferred and applied to other building rating methods, for instance LEED. There are also, however, limitations associated with the approach which stem from a lack of reliable data.

Keywords: BREEAM, life-cycle costing, sustainable built environment, sustainability assessment

Energy profiling in the life-cycle assessment of buildings

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Few would deny the centrality of environmental issues to the sustainability agenda. Even a cursory investigation of the existing building environmental assessment methods shows that a building's energy performance is usually a key element in the evaluation process and will constitute a significant portion of the overall assessment result. Thus, increased lifecycle energy efficiency in buildings lies at the heart of most approaches to sustainable urban design, development and assessment. Advances in information and communication technologies [ICTs] offer the opportunity to increase energy efficiency in the built environment by improving the way energy profiling tools and techniques are used to measure and inform the energy performance of buildings throughout their lifecycle. The exploitation of this potential is one of the goals of a current EU FP7 funded project, entitled 'intUBE - Intelligent Use of Buildings' Energy Information. This paper illustrates how the intUBE project will contribute to improving the measurement and evaluation of building energy performance. The paper also highlights the potential offered by the energy profiling tools and techniques being developed as part of the intUBE project to contribute to the assessment of sustainable urban development.

Keywords: assessment, buildings, energy, life-cycle, profiling

Daylight simulation for sustainable urban office building design in Dhaka, Bangladesh: decision-making for internal blind configurations

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In an urban site, daylight strategies increasingly depend on the availability of natural light, which is influenced largely by the immediate surroundings of the building, particularly the presence of natural and manmade obstructions. Under such conditions the latitude of the site and its regional climatic conditions, such as ambient outdoor daylight levels and sunshine probability are found to have diminished direct impacts on the interior daylight potential. In these highly specific urban environments created by built-up surroundings, no generalised way exists to describe or predict the luminous microclimate. However, simulation can be used as a design tool for sustainable daylight design. Using simulation programs, this paper examines the significant impact of surroundings on daylight probability on urban buildings. Daylight simulation was performed in this study by creating the virtual urban environment based on the information of a true site urban office building in Dhaka, Bangladesh, a tropical location, with predominantly overcast skies. The 3D models were first generated for computer simulation in the Ecotect program to calculate the amount of daylight incident on a generated grid point on the work-plane. These models were then exported to Radiance Synthetic Imaging software to generate realistic lighting levels and finally verified with DAYSIM simulation program for annual performance evaluation. The results show that daylight entering from different sides of the building is affected vastly by surroundings and this influences the indoor illuminance and luminance distribution. This paper also demonstrates a case of decision-making between two most popular configurations (vertical and horizontal) of internal blinds used in urban offices of Dhaka. The focus of the paper is to highlight the importance of daylight simulation in sustainable urban office building design, while at the same time gives a general methodology for decision-making regarding daylight design elements.

Keywords: daylight simulation, decision making, internal blind configurations, sustainable design, urban office building

Adamstown: a sustainable new town for Co. Dublin, Ireland?

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A new 223 ha town is being developed on the south side of Lucan, 10 miles west of Dublin's city centre in the Republic of Ireland (RoI), via an ambitious twenty-year development. 'Adamstown', as it is named, is the first Strategic Development Zone (SDZ) in ROI and when completed it will consist of: 32 ha of open space (including 4 major parks); a 8.3 ha acre town centre named Adamstown Central (with an 8 screen cinema, restaurants, cafes and bars); 10,150 residential units (some with underground parking); 125,500m^2 of retail outlets and offices; 3 primary schools; 1 post-primary school; a library; a railway station; and a fire station. The population of this new town is expected to grow to more than 30,000 by 2015. This €4 billion project is well underway and is currently reported to be setting new benchmarks for European town planning.

This paper describes the Adamstown development and discusses the attempts being made to consider sustainability (not least for transport, energy and water services) within its overall infrastructure plan. The paper discusses the legacy being left for future residents of Adamstown considered in the context of future scenarios for the town.

Keywords: community planning, community sustainability, infrastructural development, sustainability assessment, sustainable development, urban infrastructure

How does a regional town make successful sustainable urban design decisions

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This paper explores how decision-trees can be used during the urban design decision-making process to facilitate the sharing and storage of information and data relevant to the process. The case-study conducted has identified the current process and challenges faced and enabled us to develop with the help of practitioners an evaluation of current decision-making using decision-tree modelling. The research involved interviewing a wide range of practitioners across disciplines, to capture methods of working, sharing and storing of data and information. This has included individual interviews and various group discussions around the table.

The research was conducted in conjunction with the Lancaster and Morecambe City Council and focused on an area currently undergoing major re-generation in the West-End of Morecambe. The West–End is perceived by the Lancaster City Council as being fundamental to successful expansion of the Midland Hotel regeneration project which is the driver for regeneration of the whole of the Morecambe area. There have been limited funds available to the project team involved in the West End of Morecambe and much of the work has necessarily considered cost and sustainability. The regeneration team have therefore been keen to embrace suitable methods to harness, share and manage the important knowledge generated during the urban design process in order to improve the future of the area under generation.

Decision-trees were drawn from completed regeneration work in the west-end, they showed the variety of decisions that had been made by those involved and clearly emphasised the fact that much of the information and data related to important decisions had not been captured in any meaningful way. In most cases the only method for retrieval of the information was by memory recall by those present at the meetings. One of the key findings from the research was that when members of staff left, who had been responsible for decision-making, they left a gap in knowledge/information.

The results of the research show the benefits that can be achieved using decision-tree analysis in a small focused area to ensure that important data and knowledge/information generated during the urban design decision-making process are collected and stored for future use in suitable ways. The findings also highlight the problems associated with the loss of important information/knowledge that currently exists during the urban design decision-making process.

Keywords: decision support, urban design, urban regeneration, urban sustainability, knowledge management

How to design a city in five easy steps: exploring VivaCity2020's process and tools for urban design decision-making

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Urban designers and planners are increasingly being asked to create and maintain communities that are more socially, economically and environmentally sustainable. Governmental and non-governmental organisations, such as the Department for Communities and Local Government (formerly Office of the Deputy Prime Minister), the Department of Environment, Food and Rural Affairs (formerly comprised of portfolios from the Department for Environment, Transport and the Regions) and the Commission for Architecture and the Built Environment, have published numerous reports and policy documents outlining the relationship between sustainability and urban design. These reports and documents provide information and practical and aspirational guidance about the value of good design and the delivery of sustainable communities. To achieve the high expectations set out by Government and affiliated organisations, some decision-makers have been exploring how buildings and open spaces 'come to be', that is, how they develop from an idea to finished project and beyond. Knowing who is making decisions, what tools they are using to make decisions and whether or not they are considering sustainability can help those involved in the process of urban design to understand the complexities and tradeoffs surrounding when and how to incorporate sustainability into projects. This paper begins by discussing our current state of understanding about the urban design process as reviewed in the relevant literature. To do this, the fields of architecture, business, design, engineering, manufacturing and planning were surveyed to understand how processes are depicted, how they function and what similarities and differences exist between those processes and a plausible process for urban design. Research conducted as part of the VivaCity2020 project is presented next, highlighting case studies from three major UK cities–London, Manchester and Sheffield–and what we have learned from understanding the urban design process in-practice. The above processes are then compared, illustrating that sustainability and the tools used to make decisions are not often consistently considered by decision-makers in the process. To this end, a revised urban design process was created and validated by experts in design, planning, regeneration and sustainability that attempts to consider sustainability at each stage of the process. Along with the process is a suite of tools, developed during the VivaCity2020 project, that can be used when making decisions about a broad range of sustainability issues, including mixed-use, land-use diversity, environmental quality, housing choices, and public conveniences. A series of tools and the process, consisting of five stages, tasks and reviews, will be explained, all of which decision-makers can utilise and follow to create more sustainable urban design projects.

Keywords: decision support, design process, tools, urban design, urban sustainability

The interplay of market forces and government action in the achievement of urban sustainability: the case of Auckland, New Zealand

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This is a case study of urban intensification in the central business district (CBD) of Auckland. The city is the commercial centre of New Zealand with a population of 1.3m. It is a sprawling city with low population density and a high dependency on private motor vehicles for transport. Auckland has recognised the need to contain urban growth within its existing urban perimeter and achieve greater intensification. Progress has been made in this regard within the CBD where significant growth in inner city residents is evident. This has been achieved through private developers reacting to market demand rather than through public sector initiatives. The availability of finance for development and investment is seen as a key enabling element. Tax advantages for investment in property and planning bonuses for residential development are also significant elements in the complex mix of matters that has enabled this urban intensification. However the quality of development is marginal. Services for the expanded inner city population have developed in line with growth.

Keywords: apartment development, planning bonuses, tax incentives, urban intensification

Sustainable urban planning in Iran

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Sustainable designs as well as ecological and geographical considerations are issues of key importance in urban planning of old Iranian cities. In a wide country such as Iran, with different climatic zone, traditional urban designers and architects have presented a series of logical solutions for human comfort. This paper explores the influence of Persian culture on Iranian cities and concentrates on principles of sustainability as affected by climatic and geographical elements. The aim of this research is to investigate traditional urban settlements of Iran as examples of sustainable urban form and demonstrate how past successful experiences can inspire modern urban planners and designers. This paper will try to answer questions such as how many great cities were designed and erected in arid region like Iran and how these cities are able to function and live during history and by which ways previous urban designers have solved the climatic and geographical problems.

This sustainable design has been used in past urbanism experiences in Iran in many aspects but in this paper the most important ones will be introduced. The main aim is to mention the importance of climatic and geographical conditions on formation and design of Iranian cities.

1. Urban structure orientation

Settlement location was selected due to some specific qualities such as connection with major roads, commercial importance, regional centrality, soil conditions, absence of floods, earthquakes and other unexpected disasters and so on.

One of the most basic principles of traditional Iranian urbanism is orientation of the city according to a specific direction which was derived from wind direction, sun exposition, climatic and geographical factors. This specific orientation is called urban ROON in Iranian traditional urbanism vocabulary. There are three different orientations in Iranian cities and it caused these cities to answer all inhabitants' ecological needs and make urban form really sustainable.

2. Regard to water sources in urban planning

Water as a natural element in urban planning of Iranian cities is considered in many aspects and has always been an essential factor in Iranian towns.

Iran is a vast country with different geographical zones and water appears in different forms. Water source had an important role in urban design and land use of Iranian cities and I will explain it comprehensively. In this part I mention just some samples of its use and effect in traditional Iranian cities and I divide them into two major groups of man made water sources: Ghanat and Maddi and natural forms such as rivers and springs.

3.Garden cities

Some of old Iranian cities have been designed as a garden city and this plan was derived from their agricultural and economical role in the region. Consideration of this fact results in social and economical sustainability of traditional Iranian cities. As perfect examples of these garden cities I will introduce Isfahan as a designed garden city and Bam as an organic one.

Conclusion

With attention to the results that are achieved from this quest in urban design experiences of historical Iranian cities and with regard to this fact that old cities are still responding to functional and psychological needs in the best way, it is necessary to learn from these lessons and benefit from appropriate urban structure orientation, site circumstances and natural, regional potentials in designing new cities and also expanding existing cities to enrich urban space and make the cities worth living.

Keywords: Qanat, garden city, traditional Iranian cities, water management, sustainable design

Sustainable mobility and urban planning: the application of the Analytic Network Process for the assessment of different transport scenarios

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The Analytic Network Process is a multi-criteria measurement theory that is used to derive relative priority scales of absolute numbers from individual judgments. The Analytic Network Process offers a general framework to deal with complex decisions which provides a comparison of the different options.

The paper shows the application of the Analytic Network Process to assess different transport scenarios in the town of Venaria Reale in Northern Italy.

In particular, considering the necessity of improving the connections between the city of Turin and the town of Venaria, the need for new infrastructures emerges. In this sense, it is necessary to investigate different project solutions, taking into account the problems related to sustainable mobility and the impacts on the urban structure that will, from necessity, be changed to a great extent.

The paper illustrates the work that has been done in order to make the decision makers able to consider the different aspects of the problem simultaneously and to find the most suitable solution.

Keywords: Analytic Network Process, complex systems, infrastructural development, sustainability assessment, transport

Design, regeneration and quality of life

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The quality of life in the urban environment is inextricably linked to social wellbeing and civic pride. When urban areas experience regeneration these issues take on even greater importance and significance with regard to the sustainability of the regenerated area. This paper will show and explore the relationship between quality of life, social wellbeing and civic pride and explain how quality design and design thinking in the urban environment can help areas become successful and sustainable examples of urban regeneration.

It has been suggested that defectively designed urban environments which are poorly implemented contribute to and can be directly related to a poor quality of social life. Elkin, McLaren and Hillman (1991) declare that cities require a built environment which promotes social interaction while simultaneously deterring vandalism and other petty crime and that poor urban design contributes to an adverse social life. It has been argued that bad design facilitates crime and that there is without doubt a direct correlation between the types of urban design implemented in a place and the amount of crime that occurs.

Good implementation of urban design can reduce instances of crime by refusing to provide an environment for it (Hay, 2007). This suggests that certain instances of petty crime are manifestations of discontent with a poorly designed urban environment and opportunist crime in an environment which provides the possibility for such behaviour.

Another example of how design can affect the quality of life is in community interaction. Public spaces cannot be undervalued and, if implemented correctly, can significantly help social cohesion in an area. The improvement of public places can have a significant impact on the conditions of life within communities and can instil a sense of civic pride in residents and convey a much improved social image to visitors to the area (Madanipour, 2004). Making residents of a place feel part of the community is of great importance to the social cohesion of a place and, in turn, this has an affect on the quality of life for all in the community.

The same can be said of the buildings which shape our urban environment; a building which is for the community, like a school, should be part of the community in a visual and symbolic sense. That is to say that if the street is representational of the community in the sense that it is shared public realm then the community buildings, in this case a school, should be part of the street physically in order to be part of the community symbolically (Mackay, 2008).

These examples show that there is an opportunity for creative thinking to assist in the design of urban environments which improve quality of life in urban development and regeneration delivering sustainable results for communities. Using further examples from research and first hand interviews, this paper will explain and explore the possibilities available in design-led development and regeneration and the positive impacts on quality of life in the urban environment which can come from this approach.

Keywords: communities, community sustainability, creative society, design process, environmental quality, social inclusion, urban design, urban regeneration, urban sustainability

Action for sustainability: challenges facing Syrian plan for sustainable urban development

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Sustainable development and by extension sustainable urban development, are evolving concepts that depend upon the development of regional and local approaches and solutions. There is a differentiation between the definitions, approaches and priorities in developed and developing countries. Most definitions of sustainability are unhelpful because of their wordiness, lack of detail or ambiguity. Also, in Syria, a chaotic urban context has existed over the past 50 years; the urban government handles urban as piecemeal solutions. The lack of a long term solution for urban growth and urban policies integration has always been the case in the Syrian urban planning process. Subsequently, creating a national agenda for sustainable urban development in country like Syria is required to bridge the gab between developed and developing countries.

This paper focuses on providing the critical requirements for achieving sustainable urban development, by analysing the opportunities and constraints in the case of Syria. The key requirement is the establishment of a solid knowledge foundation for Syria that will equip the public, urban development stakeholders, architects and planners with accurate and relevant knowledge generated within the framework of the social and economic needs, its cultures and its biophysical environment to guide their decisions and actions towards establishing a sustainable urban environment. Finally, the paper raises questions for future research into the need for new national framework and legislation considering sustainability dissensions, and highlights clearly the practical benefits of treating the urban environment and its components as a whole.

Keywords: Syria, challenges, sustainable urban development, urban growth, sustainable development

Upgrading informal settlements in Egypt towards a sustainable urban development

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Sustainable development is development that meets the needs of the present without compromising the ability of future generations to meet their own needs. It is about ensuring a better quality of life for everyone, now and for generations to come. This requires meeting four key objectives that are the social progress which recognize the need of everyone; the effective protection of the environment; the prudent use of the natural resources and the maintenance of high and stable levels of economic growth and employments. Informal settlements are areas where groups of housing units have been constructed on land that the occupants have no legal claim to, or occupy illegally; an unplanned settlements and areas where housing is not in compliance with current planning and building regulations (unauthorized housing). In developing countries, cities are experiencing a real demographic explosion. This paper will deal with the problem of the informal settlement phenomenon in Egypt and the means of its upgrading by adopting the concept of sustainable urban development. It applies SWOT-AHP method to analyze stakeholders' perception of quality of life and their relationship to sustainable development. Results revealed significant agreement between stakeholers' groups of perception of strengths, threats and opportunities.

Keywords: community sustainability, environmental sustainability, stakeholder participation, sustainable development, urban development, urban sustainability

The role of park planning in enhancing the quality of urban environments

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The significance of open spaces to our environment and quality of life is increasingly established. A number of studies on public facilities such as urban parks have been conducted in terms of their location standards, location methods, and relevance of their distribution. The development of environmental awareness has resulted in a strong demand by urban residents for green space for various purposes, including aesthetic enjoyment, recreation, and access to clean air or a relatively quiet environment. Amenity values attached to urban green spaces are non-market price despite their environmental benefits. In the absence of an explicit market price for a unit of environmental amenity, the benefits are usually ignored or underestimated by urban planning policy-makers, with the consequence that remnant urban green spaces have shrunk in size and have been gradually encroached upon by urban development and sprawl. This paper aims to investigate the relationship between urban park planning and the quality of urban environment. Additionally, it identifies design characteristics perceived in the Egyptian public parks. A quantitative system of inquiry was used in this research to investigate the contribution of the Azhar Park, Cairo - Egypt on surrounding districts. A questionnaire was conducted for collecting data. The contribution of the park on social, economic and transportation qualities of the surrounding urban districts was highlighted.

Keywords: environmental quality, sustainable development, urban sustainability

Second Egypt and sustainable future: challenges?

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In Egypt sustainability became a fashionable word in different fields, when in reality it is a concept of multi-disciplinary issues. To write the history of sustainable future there are different scenarios and approaches. The participation of all parties is a must; the government, the private sector, donors, consultant bodies and the community with democracy approach one dimension. Over population, limited resources, building capacity, service upgrading and living in desert are other dimensions of challenges. Many ideas, initiatives, conferences, and studies were/are proposed for the Egypt's future scenarios. Egypt-Cairo 2050 (the National party), the developmental corridor (Prof. El Baz proposal), and others realistic or optimistic studies are on dialogues between supporters and rejecters of each. One of the main hypotheses of this paper is that the challenge to achieve sustainable future in Egypt is not the lack of ideas and studies but to have generations whom could be responsible to build such future. Therefore, this paper will concentrate on the role of architectural engineering and urban planning studies within the centre of sustainability and future studies at the British University in Egypt as an experiment to build the history of sustainable future in Egypt. Second Life is a virtual world on the Internet in which "residents" create an identity, meet people, buy land and build their own environment or purchase an existing one idea. The idea of Second Egypt is to have the Real World – Simulated sustainable future of Egypt through games such as the SimCity, scenarios of science fiction films, graduation projects and post graduate studies.

Keywords: desert, development, sustainability assessment, virtual city, Egypt

URBA project: developing new urban housing concepts in the Helsinki metropolitan area

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The paper describes a research and development project entitled URBA (2007-2010) that was initiated to foster the vitality of urban dwelling in the Helsinki Metropolitan Area, which faces the threatening prospect of urban sprawl. Problems in the area, such as soaring prices and lack of feasible and attractive housing alternatives, are the result of a narrow and inflexible housing market. Moreover, the housing sector suffers from a lack of cooperation. In this situation, the overall aim of establishing a sustainable urban structure and providing feasible and attractive housing needs to be conceptualised in a way that takes into account the contradictory needs of actors in the area. URBA is a multi-disciplinary research project that brings together a wide range of stakeholders and actors of the housing sector. The first phase of the project has produced an initial selection of promising urban housing concepts, which serve as the basis for the development phase. The development phase is structured in the form of a collective learning and invention process that involves a wide group of participants from the housing sector.

Keywords: knowledge management, participation tools, stakeholder perspectives, sustainable housing, urban structures

London's energy system: assessing the quality of urban sustainability indicators using the service niche approach

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Urban sustainability indicators (USIs) play an important role in helping policy makers ensure the success of their cities. Indeed recent USI research has begun to shift from the development of individual metrics and frameworks to a more comprehensive assessment of their role within policy. This paper presents an evaluation of one such tool, the service niche approach to USIs. This method uses cross-cutting urban services such as water or energy provision to give a tangible focus to urban sustainability assessment and indicator development. The technique is applied to London's energy system and a series of indicators are collected and discussed. The results demonstrate that common USI problems (e.g. identifying urban boundaries, collecting comparable data) are not removed by using the service niche method, but the consequences of these short-comings can be highlighted more clearly. A key finding is the existence of a gap between 'good enough' policy indicators and more precise engineering models. The service niche approach arguably occupies an awkward middle ground between these two extremes, by trying to bring clarity and understanding to a complex field while remaining relevant to policy. It is therefore suggested the approach might be best used as a participatory learning tool, with system experts and policy makers working together to define, collect and interpret USIs.

Keywords: indicators, policy, service niche, urban sustainability, energy

London's energy system: prospects for using the service niche approach in current indicator practice

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The use of cross-cutting urban services such as energy or water provision has been proposed as a way of improving the performance of urban sustainability indicators (USIs). However for significant benefits to be realised, the new approach must be adopted by policy makers. This paper presents interviews with stakeholders from London's energy policy community and uses a diffusion of innovation framework to examine how the service niche approach fits with existing practice and consequently whether it is likely to be adopted in practice. The results suggest that while the technique resonates with current practice, it cannot overcome traditional barriers such as a lack of political will or resources alone. Two distinct expansion strategies are proposed to help build experience and leverage the full potential of the technique: replication (the creation of multiple service niche assessments in complementary urban systems) and extrapolation (extending the detailed niche activities of a local policy maker into regional or national levels). In both cases, experts could play a central role in coordinating the overall effort, collecting relevant data and analysing the aggregate results with policy makers. Therefore while the method is unlikely to be adopted as a wholesale replacement of existing strategies, it could be beneficial as a complementary assessment method.

Keywords: indicators, policy, service niche, urban sustainability, energy

Future changes in the carbon intensity of grid electricity and its effect on the carbon emissions from domestic electric heating solutions

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In response to the issue of climate change, the UK is committed to meeting its share of an EU target that 20% of the EU's energy should come from renewables by 2020. Further, it has set a target in the Climate Change Act to reduce UK greenhouse gas emissions by at least 80% by 2050. Meeting these targets will lead to a significant reduction in the carbon intensity of the UK's electricity supply.

This paper assesses the carbon emissions factor for grid electricity currently used in the Standard Assessment Procedure (SAP) for calculating carbon emissions from dwellings and the Simplified Building Energy Model (SBEM) used for calculating carbon emissions from non-domestic buildings. This currently used figure is found to be around 20% lower than those based on the most recent data. However, the carbon emissions factor for grid electricity is expected to fall. Based on the future electricity generation energy mix, as projected by studies conducted for the UK Government's Renewable Energy Strategy Consultation, carbon emissions factors have been predicted here for 2020. The central estimate is 0.294 $kgCO_2/kWh$.

Based on this projection, the carbon emissions of heat pumps are assessed if used for the provision of space heating and hot water within both existing and new-build dwellings. Comparisons are made with other domestic heating solutions and current issues with the practical application and energy efficiency maximisation of heat pumps are discussed. The results show that with the predicted carbon intensity of grid electricity in 2010, carbon emissions savings of around 30% can be made by switching from an efficient gas boiler to a heat pump. Further, carbon savings of around 60% could be achieved by 2020 if the carbon intensity of grid electricity is reduced as predicted through the greater use of renewable electricity generation.

It is concluded that accurate and regularly updated short- and long-term projections of the carbon emissions factor for grid electricity are needed to better inform decisions based on the carbon emissions from different building services solutions.

Keywords: carbon emissions factor, domestic dwellings, electric heating, grid electricity, heat pumps

Enabling low carbon living in UK housing developments

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This paper concerns the reduction of greenhouse gas emissions through the design and set up of housing developments in the UK. Current approaches, which are largely based on energy efficiency and renewable energy systems, do not sufficiently contribute to the necessary carbon emission reductions that will be required to meet UK Government targets and to avoid dangerous climate change. A tool (the Climate Challenge Tool) has been developed, which allows house builders to calculate whole life carbon equivalent emissions and costs of various carbon and energy reduction options that can be incorporated into the design of new developments. These cover technical and soft (or lifestyle) measures, covering energy used within the home, energy embodied in the building material, emissions generated through transport, food and waste treatment. The tool has been used to assess the potential for cost effectiveness of various carbon reduction options for a proposed new housing developement in Cambridgeshire. Carbon reduction achievements at the proposed site are then also compared with carbon emissions for a typical UK household. It was found that carbon emission reductions can be achieved at much lower costs through an approach which enables sustanable lifestyles than an approach which purely focusses on reducing the carbon footprint of the energy used in the building through energy efficiency and renewable energy measures. This puts in question current and future policy incentives for new homes such as the 2016 carbon neutral home target which largely focus on reducing and eliminating the emission footprint from the energy used in the homes.

Keywords: Green Infrastructure, assessment tools, carbon footprint, carbon neutral buildings, life-cycle costing, sustainable housing

Evaluation of a project for the radical transformation of the Port of Genoa according to Community Impact Evaluation (CIE)

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The paper illustrates the evaluation of a project for the radical transformation of the Port of Genoa (an around fivefold increase in traffic; innovative TEU transport system using special shuttles; construction of a dry port around 40 km from that on the sea linked by a tunnel reserved for goods transport in the Apennines) according to the Community Impact Evaluation (CIE).

To evaluate the design alternatives port scenarios, the paper proposes a comparison of two different methodological approaches: on the one hand, that developed by Lichfield (1988) for CIE and, on the other, an experimental type variation to CIE, defined here as 'weighted evaluation approach'. The first approach is based on the hypothesis that the community sector determines the preferential sector only to the extent to which the impact in which the sector is directly involved occurs. According to the second approach, all the impacts deriving from implementation of the project are considered, also according to the importance (assigned according to a percentage weight) attributed by each sector according to its interests.

Keywords: CIE, port

Whole life sustainability of the design of tourist resorts: a coastal alteration prediction model (CAP) using GIS and statistical tools

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The random and un-substantiated design guidelines of tourist resorts have had its toll on the sustainability of major coastal cities. In many developing countries along the Red Sea, with weak environmental protection institutions, resort owners often dredge lands to increase the usable area of their resorts causing considerable irreversible damage to marine life. Traditionally, the violations have been viewed as policy enforcement issues. However, within a whole life sustainability approach, other factors should be considered. Investors may have economic plot size concerns not considered by planners, tourists may prefer close proximity to deep waters, and urban planners may have failed to realize the importance of certain plot ratios or minimum dimensions and so on. Up till now there has been no metric to relate a plot's geometric properties with the encroachment it makes. If such an association could be made, a developer's resort plans may be evaluated to predict the degree by which an encroachment is likely. Not to argue that an encroachment is inevitable or with a will of its own, but that in the absence of effective environmental regulation enforcement, planners' poor design is literally inviting this devastating attitude. This paper argues that it is possible to identify a number of physical properties of plots that are associated with the long-identified phenomenon of coastal alteration. A combination of GIS and statistical tools are used to identify and model these properties. The model can be used to identify Resorts whose properties present a risk to shorelines, dredge or fill to maximize usable land. Two benefits may be thought of for this approach. First, the model helps urban planners develop a sustainable coastal area by bearing in mind the needs of tourist-developers as well as the properties of their adjacent coast. Second, the factors could be used to rationalize building guidelines and land use regulations to minimize such risk. The research uses data from three different resorts in two countries along the Red Sea coast (Hurghada and Safaga in Egypt and Jeddah in Saudi Arabia). Landsat TM7 images were obtained for each location and ERDAS Imagine â„¢ was used to detect contiguous areas where development seemed to have had the largest alteration along the coast using the post-classification change technique. Physical properties of each village were generated using ArcGIS 9.2 both before and after alteration. Two step cluster analysis and discriminate analysis were performed and it was found that alteration takes place based on the original plot properties in three distinct groups. Finally, a predictive decision-support tool for urban planners and environmental auditors was formulated using stepwise discriminant analysis. The model could classify any given case into one of the three clusters, which can give a rough prediction of the likely alteration that might take place under a given condition.

Keywords: coastal degradation, discriminant analysis, factor analysis, geographical information systems, risk prediction, tourism development, urban planning

A fairer place? A prototype framework for assessing the environmental equity implications of proposed urban developments in the UK

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There is now international agreement that the current development path of some of humanity is undermining the supporting natural systems required to meet the needs of all of the current generation as well as the likely needs of future generations. The inequity of this is obvious and although sustainable development, the agreed agenda to solve this crisis, is often couched in terms of environmental, social and economic systems in dynamic equilibrium, what is less articulated is that greater equity is a necessary driver for such a condition to be met. At the largest scale, sustainable development has been interpreted as requiring a convergence in living standards around the world to a level representing an overall contraction in the demand placed on the environment, thus having profound implications for the quantities and distribution of natural resources to be used in meeting people's needs. Put another way, meeting the needs of some should not result in others having to live within a degraded environment which reduces their ability to meet their own needs including the protection of their health and well-being: a condition in contrast with that which currently occurs across a number of geographies. Of concern therefore is that although urban decision-makers are increasingly familiar with using sustainability assessment tools to examine how their choices can promote certain environmental, social and economic objectives, the vast majority of such tools give little or no explicit consideration to equity concerns: a situation perhaps unsurprising given the complicated and inherently political nature of such concerns. One notable exception, due to its relative maturity and legal backing, is found in the United States where the Environmental Impact Assessment process can be used to examine the likely distribution of environmental impacts among groups considered already disadvantaged: a process known as environmental justice (or environmental equity) assessment. However, currently in many other countries, including the United Kingdom, no analogous process exists. Accordingly, research was undertaken by SUE-MOT, a consortium of academic, industrial, government and community partners, to develop a prototype framework which would help decision-makers examine the environmental equity implications of proposed urban developments within the United Kingdom. This paper gives a brief introduction to the role of equity in sustainable development (section 1) in order to contextualise a discussion on the concept of environmental equity and generic requirements for its assessment (section 2). The paper then provides an overview of the framework (section 3) which contains three levels of assessment, of increasing complexity, for five key environmental equity issues (the distribution of: noise impacts, air-quality impacts, visual impacts, community severance impacts, and property and community facility impacts). Finally conclusions are drawn (section 4).

Keywords: environmental equity, impact assessment, united kingdom, urban development

Urban planning and design methods for sustainable development

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Urban planning and design for sustainable development is the process of shaping the physical setting for life to deal with the three-dimensional spaces in cities, towns and villages which concerns the environmental, social and economical factors. In contemporary context many cities and urban residents will be directly affected by many of the impacts of environmental changes, which include increased intensity and frequency of extreme weather events, heat waves, flooding from sea-level rise, water shortages and other effects. On the other side, in the big cities of Europe, migration is increasing greatly for the need of work, study purpose, treatment facility and the result is economical crisis, urban sprawl, high density, transport problem, increase energy use and pollution. The sustainable debate was not only dominated by environmental issues and economic concerns, but also included the social issues. Social sustainability refers to the personal and societal assets, rules and processes, physical boundaries of places etc. For concern of these themes, the argument of the paper is 'what are planners methods in the urban planning and design for sustainable develpoment ?'. The objectives are: (1) analysis of the sustainable changes in urban areas (2) analysis of the methods for urban planning and design in the context of these changes. This paper develops arguments in two phases. Firstly we analyze sustainable changes from urban planning and designing viewpoints. Secondly, we analyze different phases of urban development such as data analysis, site survey, initial concept develop, design development and constructions phase. After analyzing different phases of urban developments, we propose methods that will guide to develop urban projects, concerns with current urban changes, the environment-economic-social structure of an area. The method would set within a theoretical framework. If we did not concern about urban planning and design for these sustainable development then planners practice doesn't relate to the practical situations. For achieving a successful urban planning and design, we have to emphasis on the sustainable development of well–functioning environments.

Keywords: development, methods, sustainable, urban planning, urban design

Incorporating energy use into the economic level of leakage model

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The alarming growth of water scarcity, coupled with widespread environmental degradation, has brought into focus the need for planned action to manage water resources in a more effective and sustainable manner. This is compounded in the water services industry by intensive energy use that leads to substantial carbon emissions into the atmosphere. This energy usage is set to increase in future, as it becomes necessary to develop newer and more energy-intensive water sources for growing cities and/or to meet higher service quality levels. Whereas energy optimisation for water treatment and pumping has recently gained a lot of research attention, there are minimal empirical studies on the energy dimension of water loss management in water distribution networks.

Increasingly, water utilities all over the world are adopting concepts for water loss management, which have been developed by the International Water Association (IWA) in particular through research and demonstration activities undertaken by the IWA Taskforce on water loss management. One of the key steps in leakage management strategy is the determination of Economic Level of Leakage (ELL), based on factors such the prevailing network conditions, water tariffs and the utility's level of technological sophistication.

Much of the work on ELL which has been reported in the literature is concerned with determining the short-term economic levels of leakage associated with the strategies of active leakage management and speed and quality of repairs. However, there is little empirical data on determination of the long-run ELL that incorporates environmental and social costs/benefits that affect society as a whole, such as energy use and its impact on the environment. Energy consumption in each of the four IWA water loss management approaches (i.e. improved speed and repair of leakages, pressure management, active leak detection and pipeline and asset management) could be determined, measured or computed to provide a more complete and environmentally-responsive economic level of leakage.

This paper will describe the various aspects of energy consumption related to these water loss management approaches and report on preliminary findings of a study being conducted as part of the EU-funded SWITCH project. SWITCH is a multi-disciplinary and integrated research project that aims to create a paradigm shift to sustainable urban water management 'for the city of the future'. The research described in the paper uses a case study of the city of Zaragoza, Spain to develop a model for the determination of long-term ELL that incorporates energy use, considering all the four approaches of water loss management: improved speed and repair of leakages, pressure management, active leak detection and pipeline and asset management.

Keywords: economic level of leakage, energy, leakage management, water distribution systems

Sustainable residential aged care: the influence of environment on carer work satisfaction and stress levels

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Throughout the world populations are moving towards urban areas (UNFPA 2007) and in Australia as in many countries populations are also ageing (Australian Bureau of Statistics 2004; Vladeck 2005; Healy, Sharman et al. 2006; Maples and Abney 2006). This has obvious implications for environmental sustainability when viewed in the context of resource depletion and environmental degradation (Basiago 1999) but also considerable inherent implications for social and urban sustainability (Basiago 1999). Currently it is thought that the ageing populations will increase the demand for residential aged care (RAC) (Coombs and Dollery 2004; Birrell and Healy 2005; Howe and Healy 2005; Mitchell and Mosler 2006) with an increasing level of dementia specific care (Access Economics 2003). However the provision of these facilities represents a significant investment of resources and the community will benefit if these resources can be better utilised.

The argument is put forward that Quality of Life (QoL) for residents is the primary aim for RAC facilities and has been the subject of many studies predominantly from a care perspective (Willhelmson 2005) and while there is a strong relationship between QoL and care (Parker 2004) the World Health Organisation Quality of Life Group notes QoL as being multidimensional and difficult to define (Barnes 2002, Bowling 2007). This paper argues that this ill defined multidimensional term therefore has other factors that may affect care and QoL, and one aspect is the effect of environmental design.

The workplace environment can be a contributor to stress by providing stressors to which an individual reacts (Lloyd, King et al. 2002) and this individual reaction (Kinman and Jones 2005) can have a varying impact on physical and mental health (Parslow, Jorm et al. 2004). There are many particular stressors associated with RAC that may combine to cause stress with some being the emotionally charged nature of dealing with older people (Haggstrom, Skovdahl et al. 2005), working with cognitively impaired residents (Brodaty, Draper et al. 2003) and exposure to and dealing with death and dying (Michie, Ridout et al. 1996).

There is an association between quality of care and work stress/job satisfaction (Edvardsson, O.Sandman et al. 2008) and with an estimated 80-90% of care undertaken by carers (as distinct from registered nurses) they may be the 'linchpin' to the provision of quality care (Proctor, Stratton-Powell et al. 1998; Castle 2007).

Evidence is increasing that the physical environment affects both job performance and job satisfaction (Vischer 2007) and where the physical environment can introduce potential stressors (Aspinall 2001) it can also be used to assist work outcomes (Stokols, Clitheroe et al. 2002). Therefore if workplace stress can be affected by the physical environment and workplace stress also affects the level of care which is a part of QoL then RAC facilities will find it advantageous to consider the insulation of workers from stressors or even the promotion of spaces that stimulate care.

This paper identifies a range of candidates as design attributes for sustainable residential aged care facilities that can impact upon carer job satisfaction and stress, and outlines a pilot study intended to confirm/extend this model.

Keywords: ageing and the built environment, design, job satisfaction, residential aged care, work-related stress, working environment

Development of a visual whole life-cycle energy assessment framework for built environment

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Global warming, climate change, ozone depletion and the escalating costs of fossil fuels over the last few years, are now becoming more challenging and complex than ever and have forced governments and engineers to re-examine the whole approach to the design and control of building energy systems and the whole construction process. As a result, carbon reduction has become a global target and a goal has been set by the UK Government to reduce by 80% UK carbon emissions by the year 2050, (DEFRA, 2004). The UNFCC (United Nations Framework Convention on Climate Change) adopted the Kyoto protocol, establishing legally binding targets for the developed world countries that ratified the protocol. It aims to reduce greenhouse gas emissions by an overall 5% below 1990 levels during the period between 2008 and 2012. Previous literature suggested that the ability to assess designs with a view to reducing their impact with seamless integration with 3D-CAD representations enables design professionals to make informed decisions on the environmental impact of building structures and their running costs.

Our review of current literature and research projects in the area of sustainability, energy and assessment applied to Built Environment identified gaps in current knowledge and tools. There is also a need to integrate sustainability within the whole life cycle (WLC) of a building from design through construction to operation.

This paper aims to give an overall review of the knowledge and technologies in the research area. We present a framework, methodologies and technologies that will facilitate the integration of Environmental Impact Assessment (EIA), Whole Life Cycle Cost Assessment (WLCCA) and Life Cycle Assessment (LCA) using 3D and BIM technologies. This approach will bring together many aspects in order to assess the environmental performance of the whole life cycle of the building at an early design stage and allow key decision-makers to enhance the accuracy of such assessments.

Keywords: building information modelling, energy profile, environmental impact, sustainability

Mapping the sustainability of small business locations

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Small to medium enterprises (SMEs) account for 63.7% of employment, 99.7% of employers and 53.8% of the economic turnover in the south west region (Department for Business Enterprise and Regulatory Reform 2008). Their involvement in long-term sustainable economic development is therefore significant. Empirical research into the needs and decision-making of SMEs is limited, with existing literature and guidance relating mainly to larger businesses and large office premises. This research seeks to understand office location decision-making by small businesses at the local scale in the Bristol city-region and to analyse the sustainability of their office locations. This will provide insight into the economic, environmental and social sustainability of current economic growth and will evaluate the current spatial planning policy framework, in order to help identify what is required for sustainable economic development in the future.

An online questionnaire has been completed by 215 SME office users in the Bristol city-region. The most important factors when choosing a location are cost, floorspace and broadband availability. Analysis of the comments made by respondents, however, reveals a strong behavioural rationale behind location choices and a more complex approach to decision-making than that of larger businesses. Only a few businesses have adopted the alternative business model of the 'virtual office', where location is less relevant. Spatial analysis has been carried out in a geographic information system (GIS) to understand the accessibility of office locations to public transport networks and nodes, and to services and facilities needed by businesses. Results suggest that existing premises may not be in sustainable locations according to current guidance. Mapping the 'softer' factors of decision-making, such as 'quality of life' criteria is complex, and current methods for assessing sustainability may not be appropriate for this. The findings of this research have implications for future spatial planning policy, current assessment methods, encouraging the growth of small businesses and preparing for sustainable growth in the future.

Keywords: Bristol city-region, accessibility, geographical information systems, small to medium enterprise, sustainability assessment

Application of analytic network process to assess risks in urban regeneration projects

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A result of ignoring the potentially adverse consequences of risks may be to compromise the progress and profit of an urban regeneration project. The main purpose of this paper is to provide a review of decision-making procedures which are demonstratively effective in providing practitioners with the method of assessing the potential risks involved in urban regeneration projects. Traditional risk assessment methodology depends on information from panel/board discussions rather than on numerical or statistical data. This leads to practical difficulties in systematising the assessments. In this paper we introduce a multi-criteria approach, which is based on the theoretical framework of Analytic Network Process (ANP) theory.

The paper commences with an introduction to the risks commonly occurring in urban regeneration projects and the suggestion that ANP is an appropriate tool for the assessment of those risks. In order to assess the risks involved in urban regeneration projects effectively, a group of assessment criteria is defined, based on the Social, Technological, Economic, Environment and Political (STEEP) concerns of the practitioners. In addition to these criteria, an over-arching commitment to sustainable development has also been assumed. These assumptions are applied in an experimental case study of a residential and commercial mixed-use project in Liverpool City Centre to demonstrate the effectiveness of the ANP model. However, due to limitations of time, the researchers are not able to forecast the feedback or calculate the final outcome of the ANP process, nor did they have adequate case studies to supply more accurate field data. In conclusion, the result of an experimental case study suggests that ANP is an effective tool to support developers in the assessment of the potential risks associated with urban regeneration projects.

Keywords: Analytic Network Process, STEEP Factors, risk assessment, urban regeneration

Enhancing urban sustainability through novel visualisation

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Sustainable decision making in Urban Design is a complex process that requires the interaction of a wide variety of stakeholders. The engagement of a range of stakeholders throughout the decision making process presents challenges including the need to communicate the complex and interdependent facets of sustainability and the need to demonstrate the short and long term implications of alternative courses of action.

This paper presents the results of an initial application of a prototype simulation and visualisation tool (S-City VT) that was developed to enable all stakeholders, regardless of background or experience, to understand, interact with and influence decisions made on the sustainability of urban design. S-City VT takes the unique approach of combining computer game technology with computer modelling to present stakeholders with an interactive virtual development. The paper uses the Dundee Central Waterfront Development Project as a case study to evaluate the potential for the application of the tool and explains how parallel research work on the implementation of a sustainability enhancement framework for the Central Waterfront Development has informed the choice of sustainability indictors and identified the key stakeholders in the decision making processes.

The paper shows how stakeholders can be presented with the outputs from the model using a 3D visualisation of the development and thus enables judgements to be made on the relative sustainability of aspects of the development. The visualisation tool employs a number of different methods of displaying the sustainability results to the stakeholders. These methods can show data in varying levels of complexity, depending on the expertise of the stakeholder, empowering all stakeholders by illustrating possible interactions between indicator values and sustainability and by showing how different stakeholder perceptions of the importance of the indicators can influence the sustainability assessment.

Initial tests on the effectiveness of the different visualisation methods in displaying the model output to communicate the sustainability of the Development are described. The results of the tests and presented and discussed and conclusions are drawn on the further development and application of the tool to model and visualise through time the possible results of decisions made at different stages of the project.

Keywords: assessment tools, comparative urban sustainability, stakeholder participation, urban regeneration, visualisation

Methods and techniques in use of collective memory for increasing sustainability of urban environments

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Sustainable development is a kind of development that equally provides environmental, economical and social services for citizens in a community in such a way natural, social, economical and man-made systems be in a safe condition. In the previous decades, environmental and economical dimensions were the main focuses of attention. The social dimension of sustainability has become an important component in sustainable discourse since 2000. Collective memory as a socially manifested psychological capacity of an individual, can affect some key theme areas of social sustainability such as social networks, health, identity of community, civic pride, neighborhood perceptions, and community participation. Therefore, conservation and representation of citizens' collective memory will enhance social sustainability and facilitate sustainable development. The aim of this paper is to investigate about how collective memory can be used in architecture, urban design or urban spaces design for increasing urban sustainability. In doing so, an inductive method has been adopted for recognizing main approaches in using collective memories through a comparative study about some experiences and then a deductive method has been adopted to discover some techniques for representing collective memory _as negotiated and selective recollections of a special community_ based on the findings of semiotics. The research findings indicate two main approaches in using collective memory (conservation of memorable objects and representing collective memories). Finally, the study concludes a matrix to model various techniques for representing collective memories, using the findings of semiotics. The study shows the various potential layers and some important facilities of collective memories that can be applied in architecture and urban design projects.

Keywords: collective memory, conservation, representation, semiotics, social sustainability

GIS analyses of low density urban areas — how much surface per floor space?

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The resource consumption for urban infrastructure should not be omitted when looking for sustainable urban development. The expenditure for infrastructure is a clear function of urban density. But even within specific types of urban residential areas – which are linked to characteristic density - the margin of variants can be very large. Beside this fact it is true for most of the existing stock (residential areas) that the material resource consumption for maintenance of technical infrastructure over a 100 year life span is higher than for buildings.

The research project presented used GIS tools to analyse urban settlements based on the urban structural type (UST) approach. An UST is a built up area of homogeneous character (open space/buildings) along which the urban area can be differentiated and most physical aspects can be described (material flow, land take, ecological indicators).

More than 500 blocks (polygons) of residential area within a city were analysed.

Three issues will be presented

- the relation between infrastructure and floor space along different urban densities
- a comparison between different Urban Structural Types in terms of land take and material flow
- detailed analyses of low density areas with regard to infrastructure efforts.

Keywords: MFA, infrastructure, urban density, urban structural type

The urban green volume — how to calculate

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The urban environmental quality depends very much on the ecological performance of urban green. Key factor for the microclimatic situation of cities is the green 'volume'. The volume can be differentiated into three basic layers of green which are of importance to urban planning. For example low vegetation (lawns) does have good assimilation values. High vegetation (trees) is favorable to improving air-temperature and moisture. Parks, where all layers of vegetation exist, do have high bioclimatic impact for the overall city balance. The Leibniz Institute of Ecological and Regional Development (IOER) analyzed empirically 116 cities in Germany to discover relations between urban green and the different land use categories. This was done with help of GIS-tools (feature recognition). Important factors for the green volume situation of cities as a whole are sealed surfaces, forest, water and minimizing areas. The results are cause-effect relations and models for urban green. These models can be helpful to develop planning strategies and management tools.

It was possible to identify 5 characteristic clusters of cities within the 116 cases. The ecological quality and quantity of green volume and connectivity could be linked to the 5 clusters with average values and indicators. The clusters take into account the land use structure, the land use density, the green volume and its spatial distribution. The information does support decisions in urban planning especially when it comes to deciding on how and where to use brown field areas.

Keywords: cluster-analyses, environmental quality, green volume

Towards an urban ecosystem sustainability assessment tool

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The pursuit of sustainability in urban environment requires the implementation of a sustainable urban planning. Urban planners and decision makers need assessment tools to assess the sustainability of cities and monitor their progress toward that goal. This task represents a challenge for urban planners, since cities are studied now as complex organisms. From urban planning to urban ecology, the city is no longer a built and a natural environment to be analysed through their mutual impacts. The city is an urban ecosystem that has a metabolism. Any assessment of sustainability of the city means the assessment of sustainability of both: the urban ecosystem and urban metabolism.

In this paper we will use the systemic approach to build a model of a city as a complex system: the urban ecosystem, in order to understand its structure and function, hence understand its metabolism. The urban metabolism is made of a dynamic cycle of flows that nourish the city and reject its wastes. The web of input and output flows woven by cities spreads well beyond urban ecosystem natural hinterlands to neighbouring and remote natural ecosystems. Using the systemic model, we can indicate the state of sustainability of the urban ecosystem and evaluate its metabolism during the given period. The sustainable city is the one that succeeds to control its metabolism to keep it closer to the natural balance value in order to respect the hinterland carrying capacity. Thus, assessing the sustainability of any urban settlement needs to assess the urban metabolism compared to its state of sustainability with adequate tools integrated in an ongoing planning and monitoring process.

Among the available metabolism assessment tools the ecological footprint is already used for urban metabolism assessment, but this tool, developed essentially from an environmental economy point of view, is not suitable for answering the urban planning needs. In fact, it assesses and quantifies the needs to natural environment services. It assesses the overshot in consumption compared to the available natural carrying capacity, but offers no vision on what to do to correct the overshot. Urban decision makers need tools to assess urban ecosystem sustainability compared to a well defined limit value of sustainability and help define the specific actions which need to be done to reach it, and then to monitor the situation progress towards sustainability.

In this paper we will propose a tool that will complete the ecological footprint in the assessment of the urban metabolism in order to reach a sustainable urban ecosystem within an urban planning process.

Keywords: assessment tools, complex systems, ecological footprint, sustainability assessment, urban planning

Development of trade-off algorithm with AHP for building life cycle cost and building environmental assessment

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Sustainability and building cost are the main drivers in attempts to reduce building energy consumption. According to DEFRA (2004) the construction industry is one of the major contributors of CO_2 emissions that drive toward climate change. Carbon reduction becomes a global target and a goal has been set by the UK government to reduce carbon emission by 60% by year 2050.

The aim of this research is: 1) to predict and reduce the environmental impact of the building life cycle, the long term building operational and maintenance costs by developing a platform that allows trading off the output from different applications namely: Environmental Assessment Trade-off Tool (EATT), 2) Communicate/interact the result from EATT with stakeholders via a Building Information Modelling (BIM) server and 3D modelling.

3D-EATT is designed as a decision making tool for facility managers and environmental consultants, and will be utilised as a platform to allow materials trade-off with the Building Environmental Assessment, Life Cycle Assessment and Life Cycle Cost Assessment to compare the cost benefit of both sustainable and ordinary materials over a normal building life cycle of 60 years. These assessments are currently fragmented and do not comply with the idea of holistic sustainable assessment as suggested in Agenda 21.

An algorithm will be developed in this research for optimisation within the 3D-EATT tool. Literature review shows that the Analytical Hierarchy Process (AHP) method from the Multi-criteria decision analysis (MCDA) family is an ideal approach for the algorithm. As an outcome of the research, 3D-EATT will move the decision making process forward during the outline design process which, should allow a better optimisation result for stakeholders.

Keywords: 3D-Environmental Assessment Trade-off Tool, Analytical Hierarchy Process, Multi Criteria Decision Analysis

Once upon a climate: arid urban utopia of passive cooling and the diversity of sustainable forms

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As sustainability is needed for built environment future, reducing communities' energy consumption and passive design are the only choices. Such approaches will also deliver improved urban thermal comfort for urban spaces. It has been argued that the complexities of urban climatology prevented the connection between climate knowledge and urban planning practice. Examples drawn for quarter neighbourhood design sets in Cairo were investigated using the numerical environmental modelling package (Envi-Met), explored the role urban passive planning can have in generating urban diversity as an important measure for urban sustainable forms. Urban form diversity can be presented in three factors. First, the degree of diversity, Dv; it is the ratio of whole site facades' areas to the whole urban site area. Second is urban context and third is housing typologies. A Degree of site compactness Dc, is the average urban site height multiplied by the urban constructed area. By increasing details of the clustered form used, simulations indicated a direct proportional relation between Dv and Dc. Maximum Dc of 2nd design set showed the highest Dv value of 2.25 and reported better comfort levels. But, this form height achieved by population limit of Egyptian urban planning law could be more than the allowed 1.5 aspect ratio value of street canyon. Consequently, the less Dv of 2nd design set was preferable. Results conducted that, whilst the detailed form is concluded by urban passive utopia search for cooling in hot regions, the comfort provision not only helps form thermal sustainability but also its urban diversity.

Keywords: Degree of compactness; Dc, medium population form, sustainable development, urban comfort, Degree of diversity; Dv

Slum rehabilitation in the context of urban sustainability: a case study of Mumbai, India

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In the last two decades, migration from villages and small towns to metropolitan areas has increased tremendously in India. This leads to the degradation of urban environmental quality and sustainable development especially in the metropolitan cities. The problems faced by the people living in the urban areas of India have become major concerns for the government over the last two decades. Slums are considered to be the major issue within many urban areas; particularly problems related to transportation, population, health and safety. India is one of the fastest developing countries with many metropolitan cities (e.g. Mumbai, Pune, Bangalore, Hyderabad, Delhi and Chennai). To explore the effect of rehabilitation of slums on urban sustainability, part of Mumbai was selected as a case study. Compared to the other metropolitan cities in India, Mumbai is one of the biggest metropolitan regions and capital of the state of Maharashtra with many slums varying in sizes. In addition, every year millions of rupees are being spent to resettle and rehabilitate slums to make Mumbai sustainable. It is reported that around 6 percent of the total land holds nearly 60 percent of the total Mumbai population (CBC, 2006). From 1980 onwards, the rate of migration and the sprawling nature of slums into the city has become an major issue, although many organisations are working towards development of Mumbai, the conditions are not conducive to achieving urban sustainable environment as most of the organisations are not working on a united front. Also, various researchers have reported that to maintain the pace of sustainable urbanisation, a holistic approach to sustainable development needs to be considered.

Considering today's poor urban environmental quality in Mumbai, there are many projects under development and execution to improve the poor conditions. Also, the World Bank has funded many projects with the primary aim of improving the city's land transport, health and education which affect thousands of families. The majority of families affected by urban development projects are located in slum areas which are under consideration for resettlement and/ or rehabilitation. The aim of this research is to examine slum areas and their effects on sustainable urban development. To accomplish the above aim, a case study based approach, engaging a series of face-to-face interviews, was used. As a part of this research, an urban development project funded by the World Bank to achieve urban sustainability in Mumbai Metropolitan Region (MMR) was explored. Also, several visits to other slums and rehabilitated areas were conducted to identify the quality of life in slums and rehabilitated areas. The data collected during the face-to-face interviews, was used for descriptive analysis considering various aspects (i.e. social, educational) of urban sustainability. Through this research, the reasons for slums and problems related to slums were explored. During the research, it is revealed that some people still think that urbanisation is responsible for unsustainable development and they are not in favour of resettlement and rehabilitation. This suggests that to achieve successful urban sustainability, other issues such as employment, education and general awareness are also required along with low-cost mass housing.

Keywords: slums, rehabilitation and resettlement, sustainable development

Social capital in urban environments: intersection of theory, research and practice literature

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It is now accepted that the social capital of communities can contribute to beneficial economic and social outcomes in urban development. Social capital theory argues that the structure of social capital is specific to its context and determined by a range of factors, including urban design. Empirical studies into health and crime recognise the contribution of the environment to social capital but little research has been undertaken into the contribution of urban design. This paper attempts to stretch the understanding of the relationship between social capital and attributes of the physical environment through an exploration of the intersection of social capital theory, urban design practitioner guidance and empirical research on social capital that considers the built environment as a variable. Viewing such knowledge through the lens of social capital, the links, overlaps, and extensions were extrapolated thereby attempting to operationalise the theoretical notion of social capital, within sustainability assessment.

The notion of 'social capital' is a theoretical construct, but most authors agree that the concept deals with aspects of social structure that enable social action. Theory suggests that social capital in a neighbourhood can 'grow' over time, and that stability of residency and opportunity for social interaction can help establish the bonds, bridges and networks that build trust and participation. Urban design guidance does not use the term 'social capital', but the content analysis of a selection of urban design guidance revealed twelve recurrent attributes, that encourage people to live, work and relax facilitating either formal or informal interaction and longer term residency in an area, encouraging the growth of social capital. These are movement structure, mixed use, local facilities, ownership, natural surveillance, access and footpaths, sensitivity to context, public space, personalisation, lifecycle needs, mixed tenure, and lifestyle differences. These identified attributes were substantiated through reference to empirical research on social capital and the built environment.

As the physical environment is a recognised 'determinant' in social capital theory, this exercise gives a better understanding on the specificities of the environmental variables, aiding the conceptualisation of social capital. Such a development in social capital theory could contribute to a more prescriptive approach to urban design and planning guidance. It also reveals that if assessment of urban sustainability is built upon knowledge of predictable relationships between variables concerned, a tool to assess the effect of urban development on social capital may yet remain an aspiration. This journey revealed that the built environment is better named as a 'facilitator' of social capital rather than as a 'determinant'. The insight into the variables of the built environment related to social capital, enables a set of proxies to be developed to assess the effect of urban development on social capital, which is the next challenge.

Keywords: assessment, social capital, sustainable housing, urban design, urban sustainability

Barriers to the adoption of sustainability assessment tools in strategic decision making

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The ubiquitous drive towards a more sustainable future has resulted in major changes in the planning and design of urban environments. Government strategies on sustainable development, published in 1999 and 2005, are thought to be driving the development of new legislations that are aimed at delivering a sustainable future for the UK. As a result, conventional stand-alone approaches to decision making in strategic planning are being replaced by more participatory and evidence-based approaches. These focus on achieving sustainability by taking into account the dynamic interactions between social, economic and environmental aspects of urban environments. The sheer volume of complex urban issues, the multiplicity of stakeholders and their varying values and diversity of viewpoints - all contribute towards making urban sustainability and its assessment an intellectually challenging task. Many tools have been developed to aid the decision making process by assessing the impacts of urban projects throughout their lifecycle. Sustainability assessment (SA) tools range from the assessment of a single indicator within a given context to the integrated assessment of a wide range of indicators covering many facets of sustainable development. However, the adoption of SA tools in decision making for strategic planning remains low.

This paper reports on the findings of the research aimed at the identification and classification of the factors that had the potential to hinder or encourage the adoption of SA tools during the preparation of a local strategic plan. Based on the findings of a review of relevant literature, a questionnaire survey, follow-up interviews and a case study, the application context of SA tools was identified. To better understand the barriers to the adoption of SA tools, concepts from information sciences were taken into account. The findings reveal that in the complex platform of decision making, the adoption of tools is often constrained by the chain effects of interconnected barriers relating to technology, people and resources. The lack of appropriate tools to serve the demands of the sustainability assessment process and the lack of relevant expertise are the major barriers to the adoption of SA tools. Emerging policy context calls for robust and integrated tools that will perform efficiently to guide the decision making process. Joined-up efforts are required from academia and industry to develop the SA tools and to enhance professionals' skills in the application of SA tools to meet the challenges of sustainability decision making in an emerging policy context.

Keywords: barriers, strategic planning, sustainability assessment, tools, urban development

Faecal sludge (FS) emptying and transport: a sustainable link in urban on-plot sanitation management

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On-plot sanitation is dominant form of sanitation in the cities of low-income countries, especially Africa and Asia. On-plot sanitation involves a chain of services that include infrastructural provision; pit or pan emptying; sludge transport; and final disposal, treatment or reuse of sludge. But so far there has been exclusive reliance on market for the latrine infrastructure to the exclusion of the other segments of the chain of associated on-plot services such as faecal sludge emptying, transport and safe disposal from the on-plot latrines. Thus, whereas more efforts have been geared towards infrastructural establishment of on-plot sanitation in an attempt to meet the MDG, very little has been done regarding the sustainable service links without which on-plot latrines in the urban spaces will cease to function at some point in time. A comprehensive review of the literature points to the fact that urban faecal sludge emptying and transport has either been completely neglected or poorly managed in many low–income countries where the on-plot latrines dominate the cities' sanitation system. This neglect and lack of appropriate management framework and capacity to manage faecal sludge emptying and transport successfully has resulted in health and environmental pollution problems in many urban areas in the low-income countries. Some of the key problems frequently mentioned are:

- Bucket and pit latrines fill up and overflow without being emptied.
- Lack of appropriate equipment and expertise for the job resulting in environmental and aesthetic mess.
- Constant breakdown of emptying and transport machines with little or no chance for repair or replacement due to lack of funds and availability of spare parts.
- Appropriate policy for emptying and transport is non-existent.
- Poor settlement and infrastructural siting which hamper or deny vehicular access, and unnecessarily increase costs to the users..
- Households' have poor knowledge and attitude towards latrine use and faecal sludge management which have created emptying and transport operational problems.
- The poor in the urban areas do not only suffer from the worst form of sanitation but also from the highest frequency of emptying and payment due to relatively higher usage rate for relatively small latrine volumes.

The implications of these problems are that the mere establishment of on-plot latrines does not guarantee total sanitation unless the pits, pans, tanks and vaults associated with the on-plot systems are regularly and properly emptied. This paper therefore explains the problems facing urban faecal sludge emptying and transport in the low-income countries, and offer suggestions as to what necessary actions ought to be taken in order to .address the problems in the low-income countries.

Keywords: low-income countries, on-plot sanitation, sustainable link, urban faecal sludge emptying and transport

Analysis of the environmental control elements in sustainable residential area planning in China

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Many newly built residential areas in China are large projects, therefore master planning phase is very important. It is a key issue to consider how to plan an overall spatial form to make the residential area satisfy the sustainable requirements of energy-conserving, resource-recycling, and environment-friendly.

Determination of the overall spatial form of a residential area, which includes aspects such as building arrangement and site planning, is the primary step of residential area planning, and an important factor of formation of characteristics of the residential area. This paper analyzes the environmental control elements that influence the spatial form of residential areas in sustainable residential area planning in China. The control elements discussed involves aspects of the original eco-resources, building arrangement, greening system, and landscape water system in the residential area. A comprehensive analysis of all the elements will provide effective guidance for planning of the overall spatial form of residential areas..

1. Reservation and Utilization of Original Ecological Resources on the Site

Separate assessment of each sustainable factor of the original site, such as vegetation, water body, and typography, can be made through ArchGIS. All the assessments of each factor are overlaid and analyzed, thus a comprehensive analysis of the original ecological resources is achieved, and then an ecological suitability analysis of land use is established. The planning of the residential area should be based on that analysis.

2. Ecologicalized Building Arrangement

Building arrangement in the residential area should be planned in a well-considered and reasonable way. Great importance should be attached to research on land use according to the specific characteristics of the area. Sunshine and wind environment of the area should be well analyzed. The ecologicalized building arrangement can be realized through simulation with application of CFD and ECOTech.

3. Optimization of Green System

The optimization of the green system of the residential area is to achieve the maximum eco-benefit of the system on a certain green space area through reasonable planning of the green system. Key factors, such as plant distribution, spatial form of green system, assessment of the green eco-benefit, should be carefully considered. CityGreen software can be used to assess the green eco-benefit of the original site of the residential area as guidance for planning of the green system, and also to simulate the eco-effect of green system in planning.

4. Sustainable Landscape Water System

A water body system with reasonable distribution based on the gradient and geological features and with good water quality will greatly promote the virtuous circle of local eco-environment. The sustainable landscape water system is mainly represented in the proper arrangement of water body, and recycling of water resources.

The sustainable strategies at the master planning phase are important basis for the construction of sustainable residential area. Furthermore, these strategies are realized completely at the planning and design level, adding no cost to the construction, and therefore can effectively lessen people's worries about the extra cost for making the residential areas sustainable, and can create positive conditions for the sustainable residential areas to become real affordable housing for the mass people.

Keywords: built environment, environmental assessment, residential area planning, sustainable housing

Accounting for sustainability: implementing a residential emissions reduction strategy using an approach that combines qualitative and quantitative 'indicators' of sustainability

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Indicators-based projects are currently central to many urban sustainable development initiatives administered by local, city, and national governments, non-governmental organizations and increasingly, commercial interests, such as corporations. However, the quantitative basis of many such projects means that achieving urban sustainability objectives through them is often reduced to a technical task–that of gathering data and 'ticking boxes'. The size, scope, and sheer number of indicators included within many such projects can also mean that indicator sets are often unwieldy. More importantly, unless administered in a 'top-down' fashion, indicators of sustainability can resist effective implementation. This paper begins from the claim that the privileging of quantitative data in some stages of indicator-based projects tends to mask possibilities for taking into account the structures of power and cultural-political assumptions within a city. It is argued that emphasizing quantitative measures, such as indicator sets, without taking into account how they can both reflect and affect existing power and value structures weakens the commitment to methodological holism that is central to the aim of achieving sustainability. In part, the techno-scientific 'edge' of indicators sets tends to privilege 'value-free' information over 'value-laden' knowledges. That is, citizen participation and active involvement do not necessarily figure in selecting indicators of sustainability, and local knowledges and inputs are sometimes overlooked. This is especially important in urban contexts, insofar as the success of sustainability projects so often depends upon locally available resources and conditions, and upon the use of these by citizens to support sustainable practices and to challenge unsustainable practices. This paper elaborates an alternative, two-level process of community engagement for indicators-centred sustainable urban development projects. At the first level, it involves citizens as active participants in the task of developing qualitative rankings of indicators of sustainability across four domains of social practice: economics, ecology, politics and culture. The approach asks participating groups to reflect upon what kinds of things indicate whether or not a city is sustainable, who benefits and who loses by acting to achieve sustainability, and what does it mean, in relation to prevailing values, to negotiate the transition to sustainable practices around indicator sets. At the second level, it uses the understandings developed in the first level as a basis for more deeply involving people in learning about and negotiating over what constitutes knowledge about how best to practice sustainable urban development. Based the experience of recent projects aimed at reducing residential emissions in Melbourne, Australia and Vancouver, Canada, the present paper discusses some of the practical issues that arise when setting out to develop and implement qualitative indicators of sustainability that incorporate quantitative metrics, where the aim of such projects is to engage citizens in the job of achieving sustainability as a set of practices, undertaken on terms acceptable to them in the context of the communities in which they live.

Keywords: assessment focus and flexibility, comparative urban sustainability, indicator development, stakeholder participation, sustainability metrics and indicators

Social inclusion and sustainable urban environments: an analysis of the urban and regional planning literature

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In 2008, the United Nations estimated that for the first time, half the world's population would be living in cities. This is accompanied by predictions that cities will become more violent, unhealthy and socially exclusive. Urban design embodying the principles of sustainable development has been proposed as a means to address these issues but the research linking urban sustainability and socially inclusive communities is limited. This paper seeks to explore how social inclusion is currently being addressed in the assessment of sustainable urban environments. The paper is based on qualitative content analysis of ten recently published urban sustainability studies. The analysis focuses on the contextual use of words associated with social inclusion in each study. Findings indicate that there is agreement on the significance of a socially inclusive environment, but there is limited understanding of how to design and measure it. The paper highlights the difficulties of addressing social inclusivity in the urban design and sustainability assessment process.

Keywords: social inclusion, sustainability assessment, sustainability indicators, urban regeneration, urban sustainability

Social sustainability: a review and critique of traditional versus emerging themes and assessment methods

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In recent years the social dimension (or 'social sustainability') has gained increased recognition as a fundamental component of sustainable development. Previous research on sustainability has been mostly limited to environmental and economic concerns. However, social sustainability has begun to attract interest in the Academia, receiving also political and institutional endorsement as part of the sustainable communities agenda and the urban sustainability discourse. Thus, the paper explores the notion of social sustainability and its main assessment methods, together with the pioneering social sustainability framework devised by the City of Vancouver, Canada. The paper illustrates how there is no consensus on the definition of social sustainability because this concept is currently being approached from diverging study perspectives and discipline-specific criteria, which make a generalised definition difficult to achieve. In addition, traditional 'hard' social sustainability themes such as employment and poverty alleviation are increasingly been complemented or replaced by 'soft' and less measurable concepts such as happiness, social mixing and sense of place in the social sustainability debate. This is adding complexity to the analysis of social sustainability, especially from an assessment point of view. Within this context, the paper builds upon the recent 'reductionist' versus 'integrated' sustainability assessment debate and contends that there is paucity of social sustainability assessment methodologies as such. Indeed, at practical level, social sustainability assessment is often conducted (i) through social impact assessment (SIA), which is extended to incorporate biophysical and economical variables or (ii) by broadening the definition of 'environment' and hence the thematic coverage of theme-specific assessment such as SIA. In terms of indicators, the analysis suggests that the development of new sustainability indicators is increasingly focused on measuring emerging themes rather than on improving the assessment of more traditional concepts such as equity and fairness. Indeed, the latter continue to be measured mainly in terms of income distribution and other monetary variables, hampering a meaningful progress in the assessment of social sustainability. Within this context, the paper also pinpoints the main differences between 'traditional' and 'sustainability' indicators, suggesting a set of characteristics for the latter. Despite these hindrances, the paper looks at how Vancouver's local authorities have approached urban social sustainability and discusses the importance of the selection of sustainability principles, objectives, themes, assessment techniques and indicators from a social perspective. Lastly, the paper concludes suggesting possible future directions within the social sustainability debate and the challenges that will have to be overcome to assess the progress toward sustainability. These include for example the examination of more elusive and 'soft' social concepts as larger sectors of communities and societies become more affluent and less worried about the satisfaction of basic needs, but also the increase of uncertainty concerning how different typologies of impact and assessment techniques should be integrated together.

Keywords: assessment, assessment methods, emergence, impact assessment, place, policy, reductionism, social capital, social inclusion, sustainability assessment, sustainability indicators, sustainability metrics and indicators, sustainable community index, sustainable development, urban regeneration, urban sustainability

‘Measuring’ sustainable living agendas

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This paper describes the process of developing a novel sustainability assessment methodology for a new urban redevelopment research project. Understanding of the process is drawn from decades of research in the development of sustainability assessment frameworks and in particular those concerning water management and urban development. Parallel research themes in the areas of organisational change, complexity and uncertainty are drawn upon in order to address acknowledged limitations of assessment frameworks for practical decision making. Different interpretations of the notion of sustainability and its assessment amongst researchers at the beginning of a multi-disciplinary urban regeneration project provide a view of the starting point of - and potential barriers to, a transition from disciplinary-focused to integrated and inclusive decision making.

The aims of the work were to:

• devise a framework for understanding and applying commonly agreed sustainability principles to a multi-disciplinary urban redevelopment research project by involving stakeholders and researchers in its construction,

• formulate a means of review and revision of the framework to reflect learning and increased integration throughout the project

• apply the framework to other types of assessment within the project, and

• log the process of framework development in order to better understand how learning and integration came about (or didn’t)

The urban redevelopment research project examines interventions into an urban river corridor that aim to produce significant social, economic and environmental gains and hence more sustainable living agendas. The research is divided into ’themes’: ’people’ (stakeholder engagement and governance processes), ’river’ (ecological goods and services), ’design’ (possibilities for intervention and innovation) and ’values’ (agents of change and measures of success). The work described here was undertaken as part of the values theme. It examines indicators of success utilised within the different themes and provides a structured view of the uncertainty these may generate in terms of holistic sustainability assessment. Implications for planning and management decisions for the perceived sustainable living agendas are considered.

There is an increasing requirement on professionals to demonstrate their efforts towards more sustainable development and to justify and audit their decision making in terms of the environment and society as well as in economic terms. Therefore, frameworks will either evolve or another way of assessing sustainability must emerge. The challenge is how to ’measure’ the dynamic process of change to a new way of working - what causes change for the better? Can the causes be understood and transferred to future projects? Within the URSULA project the aim is to at least begin to understand how to use sustainability assessment to assist the transition to a more integrated way of working.

Keywords: decision support, indicators, integration, values, transitions

Diversity, homogeneity or 'just us!': theorising contexts and contents for sustainable inter-community dialogue

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Immigration, a shrinking global village, communication technologies that transcend national boundaries have led to a generation of 'global citizens' who deal with 'difference' on a daily basis. National identity, once a stolid indicator of an individual's or community's loyalties, has become a fluid concept which is permeated by the moveable, overlapping and sometimes antagonistic existences, and affiliations of those who subscribe to it.

In many communities, variations of the 'sons of the soil' or 'local and foreign' debates continue to cast aspersions on those who are deemed 'foreign' and as well as those who are deemed 'local'. Then the integration v/s assimilation discourse implies a real, or is it a reified entity for individuals to integrate or assimilate into. It would be useful to on-going inter-community dialogue to qualify what is 'foreign' and 'local'. It would also be interesting to theorise the nature, tangibility or intangibility of this central entity and any contribution, an understanding of it, could have on the sustainability of social frameworks within urban communities.

Two multicultural societies - India and Britain - with different models of secularism, are trying to resolve issues surrounding the movements of peoples. In India the migration of various rural populations within the country, from different states to Bombay (or Mumbai), the financial capital of the country, is currently creating waves of protests from the local Maharashtrian population. Complaints of 'foreign' exploitation of the city's limited resources and lack of ample opportunity for local people are creating political and social unrest.

In Britain, immigration and it's social, economical and political implications similarly continue to dominate public discourse. There seems to be no correct answer, or perhaps many correct answers, to the question 'What does it mean to be British?'.

Both societies have in the recent past had instances when the social frameworks broke down, groups engaged in rioting and, law and order systems briefly collapsed. In all these cases communities were divided on a difference be it race, religion or origin, yet these were people that had lived together. This indicates the importance of discussion on the sustainability of communities and dialogue within them.

The movement of peoples, their families, their cultures and their identities will increasingly continue to be a part of the changing reality of the demographics of urban communities. It is important as part of discussions on sustainability, not only to plan for the differences between peoples and servicing their varied needs, but also to challenge traditional understandings of communities and to provide for their ever-changing constructs.

Keywords: adaptability, assessment tools, communities, community planning, community sustainability, comparative urban sustainability, culture, identification, integration, socio-cultural structures, sustainability assessment, urban development

Evaluation of strategic water river management through analytical network process: a case study

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In strategic planning and management of environmental resources, multicriteria analysis is often used for evaluating alternative development scenarios against a set of decisional criteria. However, the modeling of the decision making problem is usually based on a hierarchical structure which is inadequate to represent the complexity of the issues involved in a decision. In particular, water management and strategic planning usually deal with both 'traditional' issues such biodiversity, flora and fauna, population, health, water, soil, landscape and other aspects related to mobility, energy efficiency, climatic change which are more closely linked to human activities and their impacts on the eco-system. These issues, as mentioned by the EU Directive on SEA (2000/60/CE), are often interrelated and dependencies can be recognized among the aspects involved.

The aim of this paper is to discuss methodological aspects of managing conflicting interests concerning the use of territorial resources and to improve the integration of the strategic evaluation in the decision making process within the management of territorial development policies.

In particular, the paper suggests the application of the Analytic Network Process (ANP), an advanced version of the Analytic Hierarchy Process (Saaty, 2006). The ANP is the first mathematical theory that makes possible to systematically deal with all kinds of dependencies and feedback among decision elements. It requires the identification of a network of clusters and nodes, as well as pair-wise comparison to establish relations within the elements. An application of the method is illustrated related to the Strategic Management and Planning of River Po, in Italy.

The paper is structured in four main sections. The first one discusses the problems related to the strategic evaluation of water resources according to the SEA, highlighting the need for more appropriate evaluation methodologies; section two and three present, respectively, the case study and the ANP application of the method; finally, section four discusses the results and the next steps.

Keywords: Analytic Network Process, strategic environmental assessment, water management

Impact of parking design on the quality of residential life: a case study of residential car parking in Milton Keynes, UK

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For any new residential development scheme the provision of car parking space plays a fundamental role. To improve the quality and sustainability of a development, carefully designing the street layouts and parking is one of the important criteria. In the United Kingdom, it is a common practice that the majority of new residential development schemes provide on-street car parking. Traditionally, these on-street parking spaces should be considered as the additional number of car parking spaces for residents who might already have their individual household car parking space/s, for example as garage, off-street driveway or as a designated group parking area on private road.

However, on majority situations, these garages with 'minimum' width are so inadequately designed that even to get on and off as a driver by only opening the driver side's door becomes very difficult. The house with such a garage forces the vehicle owner/s to park their car/s in alternative parking spaces; i.e., on-street. However, while providing such on-street parking space the layout designer/planner uses minimum street width that can accommodate car parking only on one side of the street instead of on both sides. If the car ownership number per household for that particular area is low then this one-sided on-street parking space could accommodate the required number of car parking spaces. Conversely, on majority of cases this does not fulfil the minimum number. The residents as well as visitors start parking their car on the side walkways (footpaths); i.e., they start parking on the kerbside; hence, blocking the footpath spaces.

Few local authorities in the United Kingdom have detail residential parking standards specified for the number of parking space required for a proposed new residential development scheme. These standards are in terms of the total number of parking spaces in proportion to the total number of housing units in the master plan. In addition, for a very few number of local authorities in the United Kingdom, there are specifications for the minimum size (length and width) of the garage or parking bay specified for the residential neighbourhood. However, for the majority of local authorities, the maximum parking requirement for the new residential development is described as ratio 1:1 or 1:1.5 only; i.e., the number of parking spaces to the number of household units, depending on the number of bed rooms for each household. In practice, to meet these maximum parking requirements sometimes it is easy to produce the master plan that could display the adequate number of parking spaces in layout but in reality, many of those designed car parking spaces are not useable; it is difficult to get out of the car because there is not enough space inside the garage to open the door. As a result, the total feasible parking spaces available to the occupier are reduced from the number of parking spaces originally proposed and later constructed.

In situation where vehicle owners are habituated by parking their car on the kerbside obstructing and even sometimes ignoring the other road users such as pedestrians, cyclists, mothers with pushchairs, people with scooters, moped or wheelchairs who have walking disabilities, etc.; then the question arises whether the quality of life of those residents, who are living in such a newly developed residential neighbourhood, are affected or not? Ultimately, the quality of life by living such a built environment is affected. The quality of life for those residents is accommodating this car driver's behaviour by sacrificing their freedom of accessing their natural rights to enjoy their neighbourhood's street life.

Residents complain about the inadequate parking provision is leading to on-street parking in many new residential development schemes, even leading to neighbour disputes. Using a case study example, Milton Keynes, this paper describes this residential car parking situation.

Keywords: parking standard, quality of residential life, residential development, street planning

Environmental impact assessment as a tool for urban environmental planning and management in Brazil – a case of a mid-sized city

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Environmental management strategies have undergone overwhelming advancement in recent years, propelled by State actions (regulator and supervisory agent), and supported by the general public's requirements.

Although going to be banned from the industrial sector even in developing countries, due to acknowledged high costs involved, the end-of-pipe approach is usually applied to cities (meaning corrective actions rather than preventive ones), and the practice of environmental management in urban areas has shown to be unable to prevent environmental impacts, so as to guarantee a basic level of environmental/life quality.

In Brazil, mechanisms of governmental control are clearly inefficient and public managers in general lack the experience to use environmental planning tools, hence contributing towards the deterioration of environmental quality at the moment of an urban sprawl or any other activities associated to urban development. Basically, there is an instrumental vision regarding the role of cities in people's lives, and environmental issues are normally overlooked when a set of priorities are established by economic development requirements, leading to environmental liabilities and distancing the cities from a sustainable pathway.

This paper proposes the adoption of a differentiated approach to be applied in urban environmental planning and management. It is quite similar to an Environmental Impact Assessment (EIA) process and to some of its procedures, considering the whole city as an enterprise, with its inputs and outputs. In doing so, the flows of matter and energy define the major aspects to be considered on assessing the impacts caused by development projects, at least from the Environmental Agency's point of view.

The paper brings a case study of a mid-sized city in the State of São Paulo, Brazil, and describes the processes involved in the EIA – identification, prediction and evaluation of impacts, as well as their usual mitigation measurements. While it recognizes a major limitation of this approach in dealing with the implications related to socio-economic processes, it is believed that this proposal can contribute to improve the environmental performance of cities.

Keywords: environmental management, impact assessment, urban sustainability

Interdisciplinary suitability analysis of prospective areas for low-rise housing in Tyumen suburbs (Tyumen region, Russia)

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It is increasingly recognized that in the second part of twentieth century the acceleration of urban population growth, city development, urban sprawl, and megalopolises leads to the spreading of urban life-styles to rural areas or the movement of urban populations to suburban areas, i.e. suburbanization. Suburbanization of big cities is a diffusion process when present communications, transport accessibility and the mobility of the population influence the placement of various objects. That is, the presence of existing infrastructure plays a large part in determining the placement of various objects. Nevertheless, we should pay more attention to other factors.

Post-perestroika Russia too experienced the effects of suburbanization. The initial boom in country house building involved the central regions of Russia. Later this process became more popular not only in the European part of country but in peripheral regions as well. Tyumen region is one of them. However, it was only in recent years that real legislation regulating land use in suburbs came into force. In response to the growing demand for out-of-town housing, the city administration made a decision to assign relevant areas for low-rise housing.

This paper is devoted to developing housing in Tyumen suburbs which means that the considered activity is housing construction. Therefore, it is necessary to combine relevant factors that I need to consider for this kind of activity which could play a key role in the area's development. There are two areas for consideration: compliance with the requirements of construction and the comfort of prospective living. Based on these and existing information I can define four basic directions for assessment: landscape-ecological assessment, ecological state assessment, aesthetic qualities assessment and transport accessibility assessment.

Taking into account all these factors, I hope to prove that the assessment is sufficiently complete even it is a subjective expert's assessment. It is a two-part process. The first stage is a comparative assessment, using a values-based analysis for each area. The second stage is to use the sum of the comparative indices generated by the first stage to determine the area most suitable for development.

The total comparative assessment of areas for prospective low-rise housing is the resulting total of all undertaken assessments where favorable factors have a positive value of points and where unfavorable factors, such as ecological pollution, have a negative value.

Accordingly, based on the General Tyumen layout I have picked out five prospective areas for low-rise housing. The results show us that area 4 (Moskovskii-Ozhogino) has the best features for low-rise housing.

In conclusion, different level plans with suitability analysis approaches like this can form one of the axes of a sustainable development strategy, both for individual districts as well as for the country as a whole over the long-term period. My research is just one of the attempts to apply the suitability analysis to a real Russian city where there are challenges about developing low-rise housing in order to create a sustainable interconnected natural and man-made system for comfortable living.

Keywords: assessment methods, housing, integrated sustainability assessment, sustainable development, comparative urban sustainability

Assessment of thermal comfort inside primary governmental classrooms in hot-dry climates Part I – a case study from Egypt

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The provision of primary schools in Egypt is one of the demanding issues facing the government since the earthquake of 1992. In the aftermath of the quake, the government has built a substantial number of primary schools around the country in an attempt to replace schools lost in the disaster. This work aims to investigate the environmental performance of governmental primary schools in Egypt as an example of a hot-dry climate. The study is presented in two parts. In this paper the results of the subjective assessment of the case studies is discussed. Work was done on three stages; the first and the second investigated the environmental problems inside 19 case studies in al-Minya Governorate. The third stage further investigated the thermal comfort of occupants inside three case studies. The results suggested that the majority of the occupants were thermally discomfort for most of the time during the academic year. In the second part, the results of a field study aiming to objectively assess the thermal performance of a small sample of classrooms were discussed. This study will inform future work investigating the potential of passively enhancing the thermal comfort of occupants inside primary governmental classrooms in Egypt.

Keywords: assessment, building, environmental assessment

Assessment of thermal comfort inside primary governmental classrooms in hot-dry climates Part II – a case study from Egypt

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Previous work (Gado and Mohamed, 2009) investigated the subjective response of occupants inside nineteen primary schools in Egypt with regard to their state of thermal comfort. The results of this work, suggested that the majority of occupants were thermally discomfort for most of the time during the academic year. This paper presents an objective assessment of the thermal comfort inside three case studies out of the nineteen schools previously studied. These three case studies represent the most common school prototypes built by the General Authority of Educational Buildings (GAEB) in Egypt. The three prototypes are: Single Row Linear Form (SRLF), Double Row Linear Form (DRLF), and L Form (LF). Human and environmental factors affecting thermal comfort were monitored during the hottest month of the academic year. Results suggested that thermal performance of classrooms in terms of thermal comfort was poor, justifying by such the results of the subjective assessment previously published.

Keywords: assessment, assessment tools, environmental assessment, performance, sustainable buildings

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