EXPLORING A ‘QUALITY OF LIFE’ APPROACH FOR SUSTAINABLE HOUSING IN SOUTHEAST QUEENSLAND. CASE STUDY OF CURRUMBIN ECOCOURTAGE, AUSTRALIA

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Summary
The main aim of this paper is the present initial outcomes from a research project investigating a Quality of Life (QoL) approach to sustainable housing in South East Queensland. Sustainable development models such as balance theory suggest that the benefit of sustainability is to integrate social, economic and environmental needs in the context of maintaining or improving the quality of life. A current report on Quality of Life in South East Queensland and the Queensland Governments State of the Environment index demonstrate a paradox - high quality of life but also increasing environmental impact. How to address this paradox is a major research question addressed in this project. Through examining examples of best practice sustainable housing it is possible to address this question. An example claimed to be best practice' is found in a new project, the Ecovillage at Currumbin on the border between New South Wales and Queensland. The paper will discuss research into the key factors of quality of life identified in this project and how these can assist policy makers plan for a sustainable future.

Significant strategies are identified, which bring together both the soft foundations- social and economic systems, and the hard foundation- planning, design and technology systems to create an affordable sustainable housing precinct. A biophysical system mapping methodology is used to describe the main dimensions to best practice' of the hard foundations. Performance monitoring of key quality of life indicators is also used to obtain feedback on the soft foundations.

In conclusion the paper focuses on the arguments for a nexus between planning, design and governance as a mechanism to address the current paradox and maintain quality of life whilst reducing environmental impacts.

Introduction
This project aims to evaluate quality of life and satisfaction measures of occupants of homes specifically designed to be environmentally sustainable and set within an eco-residential precinct. Currently, the perceived high quality of life in southeast Queensland is being eroded by evidence of mounting environmental un-sustainability. Though taking different theoretical and empirical approaches, most of the quality of life or ‘livability’ studies conducted throughout the world have been pitched at a regional level or above. A major gap therefore exists in understanding at the level of the precinct and community.

Here, the problem is to differentiate structural and local determinants of quality and satisfaction from those operating at higher spatial scales. State and local governments, however, have been promoting Ecological Sustainable Development (ESD) at the level of individual households with subsidy and other incentive schemes, along with broader initiatives drawing on public funds. Given such expenditure, much of which has proceeded with little foregoing research, the question therefore looms as to whether residential living under ESD premises contributes to quality of life and user satisfaction as has been claimed.

Now the opportunity has arisen to investigate this question in an industry-linkage framework by reference to an incipient residential development project at Currumbin on the Gold Coast. This project is framed according to ‘best practice’ ESD principles with dedicated technical infrastructure, both public and private, supplied by industry and local government to monitor ongoing environmental impact.

A comparative research design is required to investigate whether this infrastructure and the ethos of the precinct contribute both tangible and intangibly to quality of life and lifestyle satisfaction among residents. More specifically, among the 144 eco-dwellings to be constructed in the next two years at Currumbin, it is proposed to form two samples for comparison with a sample of other residences developed contemporaneously in southeast Queensland but not under the same ESD provisions (the ‘control’ group).
Both Currumbin samples will have the same ESD infrastructure, but one will additionally receive ‘extension services’ from researchers and local government in the form of feedback on energy and utility demand and less quantifiable aspects such as those which influence the quality of human life have been rather neglected.

In this way, it should be possible to determine the benefit-cost effects on quality of life and ESD measures created by private and public provision of both hard (technical) and soft (extension) infrastructure within southeast Queensland. Though compiled within this region, the results should have validity in similar ‘Greenfield’ contexts through Australasia. The project thus offers the prospect of evaluating the efficacy or otherwise of particular types of public and private interventions with the advantage of improving practice where appropriate.

1. Quality of Life (QoL) research

As stated above, the main aim of this project is to investigate a Quality of Life (QOL) approach to sustainable housing in South East Queensland. Sustainable development models such as Balance Theory (Mawhinney 2002) suggest that the benefit of sustainability is to integrate social, economic and environmental needs in the context of maintaining or improving the quality of life. The argument focuses on the need to address the current paradox where high quality of life in South East Queensland is traded against high environmental impact (Stimson, R., Western J, and McCrea, R., 2003, Queensland Government, 2003. Reading the two major current reports, Stimson et al. (2003) on QoL in South East Queensland and the Queensland Government’s State of the Environment Report, one is struck squarely by this paradox. A major research question therefore focuses on how to maintain or improve Quality of Life but within boundaries that limits environmental impacts. The main hypothesis advanced is that a Quality of Life model, based on sub-sectors such as housing rather than geographical regions may provide a mechanism for addressing this significant problem.

The application of Balance Theory as a planning and design approach to sustainable housing has advanced in recent years with the planning agenda being driven by a number of sustainable housing projects. A second aim is therefore to examine these projects to assess the quality of life and to identify the important dimensions and priorities within the range of sustainability parameters of social, economic and environmental impact.

Assessment methodologies have advanced in recent years to accommodate a broader, more holistic approach, to examining sustainable housing in the context of the Quality of Life paradigm. Whilst this paradigm has resonated at a macro national, and city-scale levels of impact reporting and policy formulation, researchers have attempted to apply the Quality of Life approach at a meso and micro scale of local development and design, necessitating a refinement of the construct and new research methodologies. The third aim of this project is to utilise these methods, test and refine them as an ongoing support metrics for a Quality of Life approach to evidence based planning and design in South East Queensland.

The quality of life of a population is an important concern in economics and political science. These disciplines have metrics to measure both qualitative and quantitative factors to the phenomena. Quality of Life studies also called Livability studies tend to be macro in scale covering countries, regions or cities, and examine dimensions to, and satisfaction for, peoples’ life style in terms of personal physiological needs and desires, and to what extent these are met by the economic and physical environment. Limitations to these studies have been advanced in terms of the lack of holism, i.e. the lack of connection between outputs and input (Luger 1999: 749). For example, it is difficult to identify the precise factors influencing the satisfaction levels found among respondents. The use of these studies at a detailed policy level whilst giving useful information about macro conditions has been questioned. Luger argued that outcomes of QoL studies might be more attributed to demographic, socio-economic and environmental factors rather than economic dimensions. Luger argues that because these factors are not tracked in a traditional QoL model it makes the studies valueless and antithetical with regard to policy formulation. New models of QoL have evolved such as that developed by the UK Government (UK Government 1999, 2005), which follows a ‘principles to indicator’ approach with broader set s of factors including social, economic and environmental factors (Mawhinney 2000). This approach, it is argued, qualifies as a new QoL paradigm. It offers to address the new framework of sustainability, it examines the phenomena from a range of scales - region, city and neighbourhood and also provides new methodologies for understanding the phenomena. The holistic model may offer a richer information base to facilitate policy formulation for the planning and design of particular aspects of the regional infrastructure such as neighbourhoods and precincts.

Research in the USA has followed a different path through work by the American Institute of Architects prosing an agenda for change. This organisation has made important submissions to the US Congress to establish policy development and research in this area. Called QoL principles, they provide a planning and design research agenda for built infrastructure but this is broad based and has not been formulated into a QoL model for housing (AIA 2006). Research into QoL for housing is found in the environmental planning field through the work of authors such as Anne Beer and Cathy Higgins in the UK. They acknowledge limitations to the planning process in dealing with housing suggesting… it is perhaps not surprising that the less quantifiable aspects such as those which influence the quality of human life have been rather neglected in the development of many housing projects (Beer & Higgins 1997).
1.2 The absence of effective planning and design of sustainable housing

Research in the United Kingdom by the Government Department for Environment, Food and Rural Affairs (DEFRA) has addressed this problem by linking QOL and housing quality and by also identifying key barriers to improvement. In DEFRA’s (2001) study of public perceptions, housing quality was ranked ninth as a very important headline quality of life issue along with factors such as climate change and wildlife. Overall, nine out of ten people thought it was fairly or very important. **Existential factors** such as money, health, crime and jobs are primary issues while **biophysical factors** such as neighbourhood, transportation and housing quality and environmental problems are rated more or less equally as second priority issues affecting QOL (DEFRA 2001).

1.3 Research into QOL at the sustainable housing precinct level

Research in the UK in addressing the QOL factors has been achieved through the use of demonstration projects, i.e. a project which identifies principles, processes, technologies and tools, in addressing housing quality in the context of sustainability. One notable example is the Bed ZED project - Beddington Zero Energy Development Sutton, UK (BRESCU 2002). This is a zero energy project – the onsite renewable energy generation is balanced with the energy drawn from the grid to create net zero carbon emissions. Beddington Zero also addresses environmental, social and economic issues. In the Bed ZED development, economic parameters support environmental parameters, which in turn supports social progress. For example, the use of retail units within the housing development is aimed at subsidizing the housing rental. This multi-use retail and housing strategy creates a scale effect, which supports the cogeneration energy strategy leading to the zero energy capability of the scheme. Yet, while the project aims to achieve high QOL for its residents, this claim remains largely untested (Dunster, B., 2006).

The problem of how to maintain quality of life whilst reducing environmental impact is a multi dimensional and multi-disciplinary challenge that is facing South East Queensland today. The Queensland Government’s State of the Environment Report (2003) shows disturbing trends in the pattern of human settlement, which cannot be levelled through this project, while macro studies of quality of life show approximately 91% of Queenslanders surveyed in November 2001 said they were "satisfied" or "very satisfied" with their quality of life. Yet although most Queenslanders report being happy with their quality of life, a number of the existential factors (money, health, crime and jobs) are showing a lack of capacity in infrastructure to meet the needs of an increasing population. For example health and housing affordability are indicators, which have shown change in recent years with a sharp decline in housing affordability (Queensland Government 2003).

1.3.1 Biophysical impacts

Yet, it is the biophysical factors to QOL (neighbourhoods, transportation, housing and environmental problems), which highlight areas for concern. The rate of growth in travel is higher than the rate of population growth with the number of passenger vehicles registered in Queensland increased from 1.8 Million (0.456 cars per capita) in 1998 to 1.8 Million (0.486 cars per capita) in 2002. The average distance traveled by passenger vehicles increased from 13, 200 km in 1998 to 14,300 km in 2002; between 1998 and 2002, total annual fuel consumption by all vehicles in Queensland increased by 22%.

It was also found that in the same period the use of public transport reduced, accounting for only 10.1% of journeys to work in southeast Queensland in 2001, down from 11.3% in 1991. The average travel times during peak periods on the main roads into the Brisbane CBD rose by over 7% between 1998 and 2000. With regard to energy, Queensland’s total energy consumption rose 21 per cent from 849 petajoules (PJ) in 1994-95 to 1024 PJ in 2000-01, and the main primary energy sources were black coal (45.8% of total energy use), petroleum products (37.1%), biomass (9.0%) and gas (7.6%). Attempts to shift from fossil fuels to renewable energy seem stalled. The proportion of Queensland homes using solar hot-water systems rose from 4.8% in 1994 to 9.1% in 2001 (Queensland Government. 2003).

Water use has stabilized, with average water consumption in the fourteen major urban water authorities in Queensland rated at 220 kilolitres/capita in 2000-01, while rainwater sources depleting due to climate variability. Wastewater has increased with the volume of wastewater receiving tertiary treatment in southeast Queensland rising from 36% in 1998-99 to 48% in 2000-01. Ironically, the proportion of wastewater reused in Queensland is low — an average of 5.7% in nine major urban local government areas.

In contrast solid waste generated and sent to landfill in Queensland fell 13%. The proportion of solid waste recycled in Queensland rose from 3.9% in 1996-97 to 20.4% in 2001-02. This can be attributed to good access to household recycling programs in 2001-02. In terms of housing quality, there was a significant increase in noise complaints since 1999 with both Brisbane and greater Queensland experiencing a sharp decline in housing affordability in the period 2001-03. Urban residential densities in South East Queensland increased 5.1% between 1995 and 2001, requiring the provision of great open space and pedestrian access to parklands etc.

1.3.2 Measures to reduce biophysical impacts

Newman (2006) argues that initiatives to address these issues are found in six main areas; better governance, improved global stewardship in the use of natural resources, biophysical efficiency in settlement patterns, the creation of social capital though community, and finally improving efficiency in business through integration i.e. by implementation of sustainable housing. The research proposed in this application examines initiatives concerning biophysical efficiency in settlement patterns and the creation of social capital though the community implementation of sustainable housing.
Initiatives in SE Queensland involve efforts to address the six barriers identified by Wheeler (2003) including, disincentives in the fiscal system, perceived higher costs, lack of consumer demand, lack of investment interest by developers, no agreed standards and a planning system which does not support sustainability.

There are measures in place to provide incentives in the fiscal systems for sustainable housing through reduced mortgage costs for green design, subsidies for use of green technologies such as water tanks, solar hot water heaters and photovoltaic systems. It is argued that incentive such as that provided by Bendigo Bank, which provide a 0.50% per annum reduction on the Bank’s Residential Variable Rate and no monthly service fee, achieve an interest saving of more than $48,000 over the life of the loan. It is argued that this is sufficient to provide equity for developers and homeowners to improve the design specifications needed to upgrade homes to meet environmental criteria. This also addresses issues identified by Wheeler concerning the perceived additional costs of sustainable housing.

**Consumer demand** is the attention of a number of Federal and State initiatives. The Australian Greenhouse office has developed the ‘Your Home’ marketing initiative (AGO 2006). This program targets issues such as homeowner perceptions about the quality of life improvements through owning a sustainable home. No exit studies of users of this program have been carried out to gauge the effectiveness of this marketing policy, so it remains questionable about the effectiveness of this costly exercise. In Queensland, further initiatives such as The Sustainable Homes program is a Queensland legacy of the national Year of the Built Environment 2004 (YBE) – a year that highlighted the need for our built environments to become more sustainable through improved design and function. The Sustainable Homes program aims to provide communities in Queensland with display houses that include the principles of sustainable design. Two key objectives of the initiative are to demonstrate and promote the importance of investment in sustainable design at the household and community level, and to increase the demand from homeowners, builders and developers for sustainability practice. Thirty-four homes are to be built and sold six months later. No attempts have been made to monitor or research the benefits of the design of these buildings. Discerning consumers question the value of such an exercise unless tangible benefits in quality of life are demonstrated.

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In summary, current research into QOL is seen as a macro level issue with little drilling down to community level impacts of sustainable housing. Input measures are in place to address change i.e. reducing water and energy use for new buildings but that leaves the majority of the housing stock following a business as usual approach.
Table 1 Simplistic mapping hierarchy of sustainable development in relation to available standards at three spatial scales - macro, meso and micro, and two modes of delivery - design and operations.

Few output metrics are in place in South East Queensland such as monitoring the Quality of Life at a community level in terms of existential or biophysical factors. Models of the interaction of factors at a community level are largely descriptive and lack empirical validation (McManus 2005: 85.)

1.3.3 New methodologies and models

Research into new metrics to examine the sustainability of buildings and precincts is underway at The University of Sydney and the University of New South Wales and through Dr Veronica Soebarto the School of Architecture. Supported by AHURI and the Sustainable Tourism CRC, metrics have been developed for examining sustainable buildings and neighbourhoods. Initial work funded by the Australian Housing Urban Research Institute (AHURI) supported a *Triple Bottom Line monitoring survey* comparing the social, economic and environmental impacts for types of urban subdivisions. This involved developing a new methodology to measure this range of factors. Many of the factors examined issues concerning QoL but also consider the input measures, i.e. characteristics of the biophysical factors as well as existential (commonly found in QoL) and environmental factors.

Since this project, work with the Sustainable Tourism CRC has led to the development for new building design *environmental assessment systems* (BEA) such as the new Precinct Planning and Design Standard (PPDS), which can be used for examining neighbourhoods and is now completed. A keynote address by Hyde, Prasad and Blair at the International Sustainable Buildings Conference in Tokyo, 2005 presented work on these methodologies as shown in Table 1. This shows the way a variety of assessment systems and tools apply at different spatial scales and with different modes of delivery - design and operations.
Gaps in the use of assessment systems where identified and problems concerning the benchmarking process are largely output driven. The conclusions reached were to propose an integrated methodology between planning, design and operations of neighbourhoods and precincts with a view to better addressing QoL issues.

Steering neighbourhoods to sustainability through this process is, arguably, central to the decision-making in the planning process (Hyde et al 2008).

1.3.4 Supporting evidence-based planning policy- sustainable housing

This integrated methodology is needed to support the planning and development process. This need has emerged from working in the sustainable housing area with governmental planning and regulatory processes such as the Building Code of Australia (BCE). This represents 'push' strategies to sustainable housing. Interestingly the BCA Code is in the process of transformation from a health and safety and fire mitigation standard to create environmental standards. With regard to the environmental standards these have focused mainly on energy as a main criteria which has left the Local Councils and developers in the front line for dealing with additional environmental standards. Hence, one major barriers as seen from Wheeler is that the planning process does not fully support a move to sustainable housing. Hence a central question emerges. Can the integrated methodology involving both processes, be nested effectively within the planning and development system?

An example of how this can be achieved is seen in the Ecovillage at Currumbin.

2. Case Study: The Ecovillage, Currumbin, Gold Coast, Australia.

This case study is presented through first looking at the externalities to the Ecovillage and then on the internalities - the development of control measures used in the project to achieve sustainability.

2.1 Externalities- planning system

In Australia, the delivery process for housing can be fragmented. It is largely a developer led system; a developer purchases the land, forms a sub-division and then sells parcels of the land to sub-developers who can be house owners or owners of other building types such as hotels, retail and so on. Local governments either assume control of the legal title of precinct or it remains under the control of the developer and sub-developers/owners as 'community title'.

Gold Coast Council controls the process as shown in Figure 1. Development control is influenced by a range of federal, state and local councils initiatives to promote sustainability. At the State level legislation is dominated by the IPA (Integrated Planning Act), which promotes ecological sustainable development through integrating State and Local Planning systems. The strategic planning and Environmental Impact Assessment process (EIA) has been replaced (Thomas 2005: 121). Local Planning responds to Desirable Environmental Outcome (DEO) statements in the form of policies and codes (Grummit 2006). Community input and environmental impacts are assessed. For example, input is sought from local environmental groups such as the Gold Coast & Hinterland Environment Council (GECO). Input is also sought on the environmental principles and strategies used in a development (Grummit 2006). The methodology and procedure for assessment appears dependant on many factors, most important is its significance, that is the scale, complexity and sensitivity of the development to sustainability issues (Thomas 2005: 123).
The objective here is not to critique the planning system for its inability to deliver sustainable outcomes, clearly the IPA legislation places sustainable development on the agenda for developers, but to identify areas, which can be used to improve the level of sustainability in planning and design outcomes.

2.2 Internalities- master planning

This can be achieved by interventions at a number of levels in the system as seen in case of theCurrumbin Ecovillage. This development is significant in terms of social, environmental and economic sensitivity to the area.

The Ecovillage at Currumbin, is on a 110 hectare site in the Gold Coast. The project provides for 144 eco-homes in a variety of residential configurations, together with community facilities including a small village centre. The Ecovillage incorporates a wide range of sustainability features including autonomy in water, wastewater and energy; 80 percent open space and more than 50 percent environmental reserve; negligible vegetation loss and extensive native plant regeneration; edible landscapes and permaculture and waste minimisation and recycling. The developers claim it exceeds international and Australian sustainability best practices and has been hailed by government and industry as a leading example of Ecological Sustainable Development (ESD) within the housing sector (Sunager et al 2008).

Substantiating these claims with regard to best practice, there are very different definitions of sustainability with in the international community and with in the Australia. McManus argues that ESD is a uniquely Australian definition, which is more concerned with retaining its ecological systems (McManus 2005). Whilst it is useful at one level applying this definition to urban development is hard. Hence it can be argued that IPA, which has its foundation in ESD, should be augmenting with regard to new definitions of sustainability to deal with the urban contexts and international practices. This problem with conflicts in definitions is that it finds its way into increasing the complexity and ambiguity of procedure and assessment. Thomas reports about the lack of clear procedures with re to implementing IPA. At Currumbin this caused extensive work to achieve Code compliance. The amount of documentation needed to gain planning approval was expensive, time consuming and exhaustive (Walton 2006). Adding environmental criteria such as autonomy of servicing for the site in areas of energy, water and waste means the council needs to condition a range of additional measures into the approval process. In addition a range Codes are needed to cover the biophysical aspects of designing and building houses on the development. Eco Homes are needed so that there is a reduced demand for services. Also, byelaws are need to cover social and management issues to ensure efficient use of resources and cut demand for services. The problems with procedure in this type of sustainable development that is it sits outside normal Code compliance process i.e. it is not assessable under the Planning Code, creating the need for new metrics to support the assessment procedure.

2.1.1 Lack of a common metric for both the regulatory system and the developer

Shane and Graedle (2000) and Mc Manus (2005) point to the importance of using metrics that can demonstrate environmental efficiency measures for environmental impacts assessment. It is argued that metrics cannot fulfill all the needs of planning assessment but could form one part of the process. This is argued on the basis that metrics are generic require interpretation in the local context. In the case of Currumbin a metric was created from a range of authorities such as Gold Coast Water for the water aspects, treatment from the Environmental Protection Agency. A further development that could expedite the compliance process would be to creating a common metric between regulators and developers. This would seem not only to carry forward the intent of the Integrate Planning Act but also provide simpler procedure for implementing planning approvals of sustainable development of this nature.

2.1.2 Evidenced-based planning at the precinct level

There are benefits in extending the application of the planning system at the precinct level. This can involve ‘conditioning’ measures in post construction process at the time Development Approval is given (Grummitt 2006). The reason for this is that environmental principles enshrine in international policy such as ‘continuous improvement’ can be achieved and planning measures can be validated (Hyde 2006, Hyde et al 2008). The areas of biophysical monitoring and social impacts can be measured. In conditions where both the design and management of a precinct such as the Ecovillage, it is seems imperative that planning policy is reconciled with planning reality. So impact measures can provide evidence to support planning, not as a ‘development control process’ but as ‘development evolutionary process’. This quasi- research approach, derived techniques from research are available. These are tested in this research work involving biophysical monitoring and social impact study in the form of a residential satisfaction study.

3. Discussion

The paper is aimed at discussing outcomes from work on QoL of housing in South East Queensland though a case study of the Ecovillage at Currumbin. From this work it is argued that to ensure compliance with sustainability housing objectives the planning, design and operational aspects of the development process should be harnessed and integrated effectively. This has been possible at the Ecovillage, Currumbin, which uses a range of measures to reduce environmental impacts whilst also maintaining and arguably increasing QoL. QoL has been found to be useful as a surrogate indicator for sustainability since it includes social, economic and environmental factors. The QoL residential survey developed in the project gives feedback on residents’ issues (Wells 2008). This is status control measure can be used to enhance the development control process to an ongoing evolutionary process to support Agenda 21 policy. This argues that the process of sustainability is largely evolutionary involving continued improvement of development over time. To
support this view a new standard for precinct design and planning (PPDS) is now available to enhance this process (Hyde 2007)) and a new Sustainable Building Code used atCurrumbin.

To examine ongoing operational performance biophysical monitoring has been developed to sample of domestic houses. This utilises advances in electronics systems for monitoring has enable a new methodology to be developed. Although an added cost to the project it is providing useful feedback to enable residents to assess if they are meeting environmental targets.

4 Acknowledgements

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