

Coastal sustainability: a comparative socio-economic lifestyle assessment, South Wales, UK

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ABSTRACT

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The factors which influence sustainability in coastal management span social, economic, institutional, bio-physical and legal conditions. There is a need to evaluate resource demands of coastal communities and assess socio-economic influences on sustainability. This paper addresses these issues by comparing two communities within the same administrative boundary using ecological footprint questionnaires. Community one, Rest Bay, is an affluent coastal area and community two is Caerau, a socio-economically deprived area in Wales. Resource demand and lifestyle differences were assessed and consequences identified for coastal sustainability using the sub-divisions of housing, energy, food, purchasing, transportation, and waste. Results demonstrated how and why people of varying socio-economic backgrounds impact coastal environments. Analysis showed that despite being more environmentally aware, Rest Bay residents had a significantly higher ecological footprint than Caerau residents at the 99% confidence level (unpaired t test: $t = 12.836$; $df = 198$; $p < 0.01$). This validated the use of ecological footprints to benchmark coastal differences and associated strategies. Furthermore, it informs policy-makers of the need for spatially differentiated coastal management.

ADDITIONAL INDEX WORDS: *socio-economic disparities, ecological footprint, coastal deprivation*

INTRODUCTION

Sustainable Development is defined as “development which meets the needs of the present without compromising the ability of future generations to meet their own needs” (WCED, 1987) and coastal research is addressing these issues through sustainable coastal zone management (Brommer *et al.*, 2010). Without an element of sustainability and measurable indicators within an integrated coastal management strategy, deterioration of the coastal environment is likely to persist (Charlier and Bologna, 2003). As the coastal environment deteriorates, economic wealth will eventually deteriorate since the economy is dependent on environmental functions or services (Houston, 2008). The factors which influence sustainability in coastal management span social, economic, institutional, bio-physical and legal conditions (Christie, 2005). Therefore there is a need to evaluate resource demands of coastal communities and assess socio-economic influences on sustainability.

The CCSR (2006) predicted that between 1995 and 2025 there will be a global 35% increase in population living within 60 miles of the sea and their distribution will be spatially discontinuous (Small and Nicholls, 2003). This clear trend of continued human migration to the coast has resulted in escalating investment (JHCS, 2000) and disinvestment in coastal locations with the associated socio-economic disparities. Leatherman (2001) quoted

several hundred million dollars per kilometre for beachfront property in highly urbanised areas in the United States and in Swansea, Wales, land prices for coastal residential development reached £6.2 million ha^{-1} (CCS, 2006). However, Glavovic (2006) reported that coastal poverty is debilitating for many coastal communities and argued for an analytical framework to understand poverty and the challenges for building sustainable coastal livelihoods. The Communities and Local Government Committee report on “Coastal Towns: The Governments Second Response” indicates the increasing concern of coastal deprivation in particular parts of the UK (House of Commons, 2007).

This paper addresses these issues by comparing two communities in Wales, UK. The first, Rest Bay (Porthcawl), is an affluent coastal village (Morgan, 2004) and the second, Caerau (Maesteg), is one of the most deprived areas in Wales (Murphy, 2004). Resource demand and lifestyle differences are assessed using Krause’s (2000) ecological footprint calculator and consequences are identified for coastal sustainability.

PHYSICAL BACKGROUND

Sustainable Development is now a core principle under the Governance of Wales Act (2006) and it emphasises the economic, social and environmental wellbeing of people and communities in Wales (WAG, 2009a). Although the definition of coastal

community is variable (Crowell *et al.*, 2007) it is estimated that 60 percent of the population of Wales live in coastal communities and hence the sustainability of this part of the country is central to Welsh Assembly Government's (WAG) core principle.

The two communities for this research are within the same administrative area (County Borough of Bridgend), to ensure policy uniformity and it is important to consider this in sub-national ecological footprint studies (Bagliani *et al.*, 2008). Deprivation in Wales is measured by the Welsh Index of Multiple Deprivation based on 8 proportionally allocated domains and they are: Income (23.5%), Employment (23.5%), Health (14%), Education Skills and Training (14%), Housing (5%), Physical Environment (5%), Geographical Access to Services (10%) and Community Safety (5%). Caerau has an index score of 70.1 and is ranked 11th out of the 1896 sub-wards in Wales and is eligible for deprivation relief strategies. Rest Bay has a deprivation index of 5.23 and ranked 1814th (WAG, 2008).

METHODOLOGY

The application of ecological footprints is widely attributed to the work of Wackernagel and Rees (1996: 9) who define it as "An accounting tool that enables us to estimate the resource consumption and waste assimilation requirements of a defined human population or economy in terms of a corresponding productive land area". It is now a widely used, tested and criticised method of assessing and identifying sustainability needs (Birch, 2007; House *et al.*, 2008) because it is designed to compare sustainable living to reality (Global Footprint Network, 2008). The ecological footprint used for this study was designed for relatively small areas and developed by Eric Krause of the Recycling Council of Ontario. It was based on a Resource and Energy Analysis Program (REAP) (SEI, 2007) and additional socio-economic data to aid community comparisons was included. The questionnaire was sub-divided into principle components of sustainable measurement, housing, energy, food, purchasing, transportation, and waste, so that detailed insight into how and why communities of varying socio economic backgrounds affect their environment in different ways. The questionnaire was piloted in June 2009 and the primary survey of 100 per community was undertaken between July and September 2009 using a systematic sampling strategy.

RESULTS AND DISCUSSION

The initial part of the survey clarifies the expected socio-economic position of the cohort so that it reflects the Welsh Index of Multiple Deprivation (WAG, 2008) statistics. Ecological footprint results showed a form that mirrors the macro scale analyses that proposes affluence is directly correlated with increasing footprint scores. Table 1 demonstrates that mean footprint scores for Caerau was 368.05 which translates to 6.153 Global Hectares per Person (GHP) and the equivalent Rest Bay figures were 512.55 and 7.382. Unpaired t-test results showed that Rest Bay residents had a significantly higher score than Caerau residents at the 99% confidence level ($t=12.836$; $df=198$; <0.01). Figure 1 graphically presents the spread of results and shows that although the communities have variability in ecological footprint categories there is a clear relationship between deprivation and sustainable indicators. These findings compare with the macro scale ecological footprint studies (WWF, 2010); nonetheless, this is an important finding for any coastal area that is aiming to implement a sustainable agenda. The traditional view that poverty is bound in the principle that immediate needs are supplied at the expense of available environmental resources and the idea that wealth

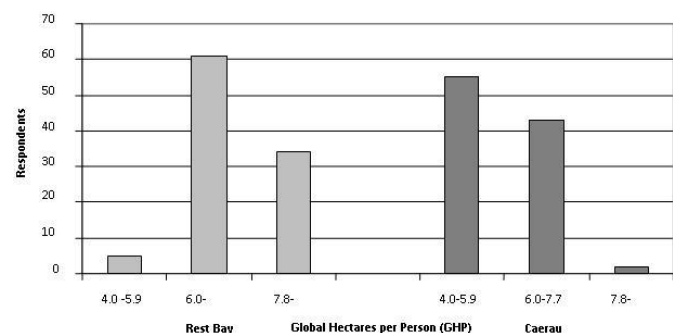
generation is supplied at the expense of affordable environmental resources is a simplification of reality (Glavovic, 2008). Further exploration of the detail highlights some important differences between the communities, for example standard deviation scores and field observations suggest there is a greater variability in the Rest Bay community ($s_r = 85.545$) compared with Caerau ($s_c = 73.178$).

Table 1: Ecological Footprint Scores and t_{calc} for Respondents from Caerau and Rest Bay

Caerau, Maesteg $n_c = 100$					Rest Bay, Porthcawl $n_r = 100$				
315	315	320	330	305	525	555	435	575	605
370	370	335	525	355	550	425	505	390	480
300	325	405	365	285	435	550	615	515	515
265	540	535	305	490	665	505	495	530	595
400	400	320	380	295	480	465	610	435	495
305	335	360	320	410	390	480	375	615	635
325	380	535	350	325	545	530	575	530	525
360	305	305	475	340	425	435	580	580	440
350	390	445	330	385	555	515	295	295	625
330	350	310	310	330	505	375	615	545	580
325	535	335	390	355	465	580	555	505	465
545	315	530	340	340	585	545	480	550	640
335	330	380	340	405	515	495	625	335	515
270	445	370	520	295	605	555	515	465	495
555	335	335	340	325	660	660	340	555	575
395	275	390	350	280	465	390	550	410	440
330	410	355	405	410	580	645	580	530	550
305	295	445	330	285	525	530	465	605	410
360	535	350	295	355	280	605	525	425	530
405	535	315	385	310	515	515	505	575	310

$n_c = 100$; $\bar{X}_c = 368.05$; $H_a = 6 - 7.7$; $s_c = 73.178$; $t_{calc} = 12.836$

$n_r = 100$; $\bar{X}_r = 512.55$; $H_a = 6 - 7.7$; $s_r = 85.545$



Category

- I. If your score is less than 150 your Ecological Footprint is smaller than 4.0 hectares.
- II. If your score is 150-350 your Ecological Footprint is between 4.0 and 5.9 hectares.
- III. If your score is 350-550 your Ecological Footprint is between 6.0 and 7.7 hectares.
- IV. If your score is 550-750 your Ecological Footprint is between 7.8 and 9.9 hectares.
- V. If your score is more than 750 your Ecological Footprint is greater than 10.0 hectares.

Figure 1: A bar chart of the ecological footprint conversion to hectares by category

This may indicate that Rest Bay residents make principle orientated lifestyle decisions because they are likely to have less economic constraints which mean that the variability is a reflection both of ethical differentiation and selective sustainable ethics. Caerau residents have more enforced uniformity of footprint due to economic constraints and are less likely to be able to make information based ethical decisions. This has implications for coastal policy makers trying to sustainably develop their region. Not only does economic success incur environmental pressures but it also leads to different considerations in the formulation of sustainable policies.

Further analysis of the results show that the sub-divisions of the survey have considerable differences and similarities between the communities. Firstly, the section associated with housing show a number of similarities, however, housing type was a principal factor in the different ecological footprints presented. Multiple household accommodation, such as apartments, were more evident in Caerau (38%) than Rest Bay (8%) due to the high amount of social housing in the community. Jeffrey (1995) highlights the importance of accommodation type in any sustainable strategy and emphasises the positive role of multiple households achieving sustainability measures. In the UK the social drivers associated with detached house ownership is a major sustainable challenge that needs to be addressed in any sustainable strategy. In the coastal zone the high land prices quoted by Leatherman (2001) can aid sustainable strategies because it creates a market for multiple household developments which have high density, high cost yet have low ecological and areal footprints. Although these kinds of development need to be carefully planned with aesthetics, services, carrying capacity etc. it does allow the potential for a sustainable 'tower block skyline model' of development. If these communities are the sole residency of individuals and are built/managed sustainably they could be a major part of coastal strategies.

Secondly, the section of the survey that addressed eating habits and purchasing characteristics helps the analysis of the results and its importance is emphasised by Frey and Barrett (2007). Rest Bay residents marginally consume more meat and fish per week than Caerau which is due to the premium price on these products. However, the survey showed that the ethically informed stance on consuming locally sourced products were biased with 40% of Rest Bay residents and 16% of Caerau residents 'sometimes' sourcing local foodstuffs. It was clear that access and availability was a problem associated with local produce. CZ managers need to consider policies that encourage access and production of a locally orientated food chain, for example, local marine products are an obvious area of potential in this respect. However, although consumption of food stuffs demonstrated an ethical consideration from Rest Bay residents when the survey referred to large purchases a different pattern was evident. 43% of Rest Bay residents made more than six large purchases during the previous year, the equivalent Caerau figure was 4%. These results are directly linked to disposable income so that high land prices and taxes in coastal communities may pressurise disposable income and hence reduce consumption. The consideration of energy efficient appliances was similar in both communities with 64% (Rest Bay) and 68% (Caerau) purchasing energy saving products. The likely reasons for this contrast to the findings for locally produced food, firstly is that there is an obvious personal economic benefit which has been exaggerated with increased fuel costs and secondly, legislative provision encourages producers to supply energy efficient goods. CZ managers need to consider

provision of mechanisms to prolong product life cycles with access to maintenance and reuse/resale facilities. For example, mariners could develop strategies to deal with the use, maintenance and reuse of boats through the provision and communication of amenities using media such as the internet (Frampton, 2010).

Thirdly, and for many the most important aspect of ecological footprint surveys, is transport because it now accounts for 26% of all carbon dioxide emissions and is the fastest growing area of energy demand (WWF, 2008). Societies perpetually evolving reliance on car and air transport is a major part of the sustainable debate. The results show that the Rest Bay residents generally have more and bigger cars, additionally, their usage is greater, with 83% using a car daily for work compared to 60% in Caerau. Public transport usage results show 23% of Caerau residents and 9% of Rest Bay residents regularly use such facilities. Convenience seems to be the principal reason for this pattern and the fact that coastal communities are often, by definition, at the periphery of public transport networks, means that using such systems is often inconvenient. It seems that the use of public transport is based on an economic necessity rather than an ethical consideration and hence policies need to make the relative inconvenience deficit narrower and the cost difference wider. Coastal areas are not unique in dealing with such problems but the parameters are generally more acute, with land cost, proximity of the sea, aesthetics, urbanisation and seasonality of access, all playing a particular coastal *mise en scene*.

Transport to and from leisure activities is another important part of the survey results. The figures show a significant difference between the communities in this respect with Rest Bay demonstrating comparative high levels of leisure transport impact. 78% of Rest Bay and 35% of Caerau residents used their car more than six times during the previous year for weekend vacations. Furthermore, 65% of Caerau and 8% of Rest Bay residents spent their main holiday within Wales. The majority of Rest Bay respondents flew to continental destinations and many commented on the attraction of eco holidays in such destinations, which highlights the paradox between an appreciation of the natural world but an unwillingness to understand the abstract impact of their actions. Hence, knowledge in sustainability is not always the basis to informed action, in fact economically induced necessity seems more important. Leisure and transport are another difficult area for CZ managers, however, improved local resident facilities, services and events could encourage residents to spend leisure time and money closer to home, with its obvious economic and sustainable benefits. The economics of tourism is well documented (Jones and Munday, 2004) and the ecological footprint on the host communities is increasingly researched (Hunter and Shaw, 2007) however the impact on the donor community needs further study.

Finally, waste is a primary issue within any footprint survey and in the EU it is fundamentally influenced by legislative commitments which is interpreted in the region by the new Waste Strategy for Wales 2009-2050 (WAG, 2009b). Initial survey questions concerned reduction of waste and results show that very few actively reduce their waste. Findings showed that both communities produced about the same amount of waste per capita and 66% of Rest Bay respondents 'rarely' and 6% 'always' tried to reduce their waste with Caerau figures showing a similar pattern of 68% and 1%. However, within these figures there were some differences, 48% 'always' and 27% 'never' composted in

Rest Bay and equivalent figures for Caerau were 12% 'always', 58% 'never' composted. This pattern was probably linked to housing type and the fact that multiple household accommodation do not have access to gardens, although the increasingly widespread use of Local Authority collection schemes may test this interpretation. Recycling collection programmes have been established in the Bridgend Local Authority, however there were noticeable differences the results with 21% 'always' and 15% 'never' recycling in Rest Bay, while 12% and 41% were the equivalents for Caerau. Hence, the approach of providing convenient opportunity for recycling seems to be working more effectively in the Rest Bay community where the survey found a perceived ethical commitment to 'the environment'. Therefore a move towards a financial based system would probably work better in Caerau where financial issues are more pressing and directly influence action. Also it does indicate that even though Rest Bay is composting and recycling more, the overall amount of waste is comparable. Hence Rest Bay residents production of non-recyclable waste is much higher than those in Caerau which is probably linked to more disposable income and consumption noted earlier.

Waste is an important sustainable issue that demonstrates generic issues for communities, but also particular concerns for coastal localities. Tourism, seasonality, urbanisation, the Europeanisation of sustainability (House, 2010) etc. certainly create a complex waste agenda for CZM. A perceived civic and environmental responsibility seems to be a driving force amongst parts of the communities but deprivation dilutes the impact. Legislative pressures are forcing Local Authorities to consider other conceptual bases for their waste strategy which could be based on a financial 'carrot and stick' approaches with a commitment to enforcement. Like within many authorities themselves the route to widespread sustainable waste management is not ethical, but financial and legislative enforcement. However, the role of non-resident tourist footprints is particularly difficult to manage in coastal localities hence strategies will need to be more differentiated, than other communities, and local characteristics need to be carefully considered (Phillips and House, 2009). Subsidiarity of waste policies means coastal tourists are often unfamiliar or unwilling to deal with the waste systems developed by local authorities which when considered with tourists high per capita volume of waste, it means this is a vital challenge.

The footprint methodology provides a tool to assess sustainability, from which indicators can be measured and provide a baseline against which improvements can be assessed. However, differentiated management strategies are required depending on regional socio-economic status and physical stressors. In affluent regions, decision making strategies should be based on personal principles, while in deprived regions, they should be driven by enforced economic criteria. This overcomes the regional coastal management problem of non-differentiated policies, because it identifies local differences within a regional framework.

CONCLUSIONS

The fundamentals of this research were to compare two coastal communities with polarised relative socio-economic status using an ecological footprint calculator to help inform sustainable coastal strategies. The results have shown a direct relationship between socio-economic status and ecological footprint scores which complies with the findings of macro footprint studies. Generally, Rest Bay residents tended to own a larger house, eat

more expensively, own more than one motor vehicle, makes large purchases on a regular basis, travel further and more frequently. This lifestyle could be considered 'unsustainable' compared to an individual with low income (Caerau respondents) who would not be in a financial position to afford it. The findings also supported Kempf and Rossignol (2005) who point out that relatively poor people are more interested in fostering physical growth at the expense of a clean environment, whereas relatively rich people are more concerned with the quality of the environment and are willing to embrace sustainability. There was a clear paradox in the fact that Rest Bay residents had more acute environmental awareness and ethics yet did not fully support their views with action, on the other hand economic constraints seemed to be the main factor in determining Caerau residents' actions. For coastal policy makers this means a differentiated approach needs to be adopted dependent on the community's relative socio-economic status with economic mechanisms dominating policies in deprived areas but awareness raising campaigns dominating the less deprived areas, however, the findings also suggested that legislative support should be central to any sustainable strategy. The detailed analysis of the ecological footprint calculator subdivisions highlighted a number of more focused policy considerations for coastal sustainable strategies. These included the sustainable benefits of: multiple occupancy housing, local produce markets, product maintenance and reuse strategies, reduction of 'inconvenience deficit' in transport infrastructure, providing resident specific facilities and development of tourist specific waste management policies. Research demonstrated the importance of using an effective and widely considered sustainability measurement tool that can be used to facilitate differentiated policy.

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