

**THE UNIVERSITY OF EDINBURGH**  
**ABSTRACT OF THESIS**  
(Regulation 3.5.13)

Degree: MSc Ecological Economics

Date: August 2008

Title of Thesis: **Just groceries?: An evaluation of corporate social responsibility and public participation in the retail of Fair Trade food in three British grocery chains**

No. of words in main text of thesis: 16,907

Public participation practitioners recognise that long-term commercial success depends on a company's ability to effectively engage all key stakeholders. Corporations themselves increasingly acknowledge this view as they are pressed to address issues of corporate accountability, responsiveness, and public engagement. The mainstreaming of the Fair Trade movement is a prime example of an attempt by international corporations to achieve best practice and establish greater local, international, and organisational integrity. While fundamental criteria must be met in order for a product to be issued the Fairtrade Certified Mark, these criteria do not ensure perfect corporate ethics. By examining a combination of public participation strategies, CSR policies, and marketing tactics, my research evaluates three UK-based companies who sell Fair Trade products: Tesco, Scotmid, and Waitrose. I will conduct a case study of each company and evaluate their approaches to Fair Trade and community relations.

**THE UNIVERSITY OF EDINBURGH**  
**ABSTRACT OF THESIS**  
(Regulation 3.5.13)

Degree: MSc Ecological Economics

Date: August 2008

Title of Thesis: **Economic growth and environment: the index of sustainable welfare (ISEW) for Taiwan**

No. of words in main text of thesis: 13,492

The relation of economic growth and environmental impact has been discussed in many literatures. Taiwan, as an island, has developed as "Taiwan Miracle". However, the cost of the economic growth to the negative impacts of the environment has not been well estimated together with the economic welfare.

This paper is first looking at the path of economic growth of Taiwan, then the environmental impact and the responses from society and governmental policy. Followed by the short introduction of the index of sustainable (developed by Daly and Cobb (1994)), the calculation of index of sustainable welfare of Taiwan 2002 to 2005, and the result and analysis.

This paper is written to give a rough sketch of what has happened environmentally and economically in the last fifty years of Taiwan, and what can be improved for the coming future from the information of the index of sustainable welfare of Taiwan.

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Degree: MSc Ecological Economics

Date: August 2008

Title of Thesis: **An assessment of the applicability of Hotelling's rule to and sustainability of the Nigerian gas sector.**

Ecological Economics was born out of a need to make economics relevant and applicable to environmental issues in a way that recognized the impacts of economics actions and the demands they place on the biosphere. Our society today has been classed as a consumerist society demanding more and more resources to meet its growing needs. This presents a problem because resources are finite, and even if resources were bountiful not all resources are economically and technologically accessible. This raises the questions how many economic activities are sustainable and for those activities that are not what can be done to make them sustainable, and ultimately the question of whether it is even possible for economic activity and sustainability to co-exist? This paper wishes to look at one of such economic activities – gas exploration and production in Nigeria and analyse whether it is possible for that activity to become sustainable. One of the theories relating to utilization of exhaustible resources, Hotelling's rule of exhaustible resources depletion will be examined to see if it is applicable to the Nigerian gas sector. Efforts to make the sector sustainable will also be looked at.

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Degree: MSc Ecological Economics

Date: August 2008

Title of Thesis: **Marginal abatement cost curves for reducing GHG emissions of the UK agriculture.**

No. of words in main text of thesis: 13,375

The UK Government committed itself to reducing emissions by 20% by 2010, and at least by 60% by 2050. This challenging target can be met only by incorporating all gases and all sectors in the mitigation efforts, including agriculture. Government recognises the need to achieve emissions reductions in an economically efficient manner. In theory this means that some attempt should be made to equalise marginal abatement costs across different sectors, and to achieve the economically optimum pollution level, which lies where the marginal pollution abatement cost curve intersects the marginal social cost curve.

Of the 654 Mt GHG emissions of the UK in 2005 50 Mt (7.6%) was from agriculture. Regarding CH<sub>4</sub> and N<sub>2</sub>O, agriculture contributed to the national emissions by 37% and 68%, respectively. Emissions from agricultural land (mainly from fertilisers) and livestock (mainly from enteric fermentation and manure) can be significantly reduced by improving management practices.

In this study we estimated abatement potential and cost associated with mitigation options in the soil management and livestock subsector for the years of 2012, 2017, 2022, and draw the MAC curves for four different uptake scenarios. Several studies evaluated different mitigation measures, and some of them have already estimated the agricultural MAC curves for the developed countries and for the UK as well. These results are in the range of 0.2 MtCO<sub>2</sub>e to 33.1 MtCO<sub>2</sub>e for the UK agriculture at a cost either below €50/tCO<sub>2</sub>e or £100/tCO<sub>2</sub>e. Our estimation of 8 MtCO<sub>2</sub>e (2022, central feasible potential) falls in between those results, but comparison must be done carefully, because the studies differ considerably in some of their main assumptions.

**ABSTRACT OF THESIS**  
(Regulation 3.5.13)

Degree: MSc Ecological Economics

Date: August 2008

Title of Thesis: **Exploring sustainability discourses about Carbon Capture and Storage in the Canadian Oil Sands: a Q methodology study**

Carbon Capture and Storage (CCS) has been suggested as a method to mitigate climate change by reducing greenhouse gas (GHG) emissions. In Alberta, Canada, some have touted CCS as a primary mechanism to reduce the GHG emissions associated with Oil Sands development. The discussion about CCS in Alberta has been accelerated by Canada's commitment to reduce greenhouse gas emissions and the desire to develop the Oil Sands. The aim of this study is to understand how well informed groups in Canada view CCS as a sustainability tool for the Oil Sands.

In order to assimilate the various views, this study used the Q methodology. Input was solicited from members of industry, academia, media, government and environmental non-government organizations. Through a method called Q-sorting, these participants sorted statements about CCS and sustainability from most important to least important resulting in a quasi-normal distribution of their views. These Q-sorts were then statistically analyzed producing three idealized points of view also known as discourses.

The first discourse, titled 'Transitionist' emphasized the need for CCS to be adopted as a step towards a low-carbon economy. Next, the 'Nationalists' understood adoption of CCS to be justified primarily in the context of Canadian economic sustainability. Finally, the 'Globalists' highlighted global intergenerational equity as the chief consideration for CCS. These three discourses offer insights into the following areas of discussion: the power of discourses, the thermodynamics argument of ecological economics, the effect of climate change policies on developing countries, the ramifications of economic discount rates for CCS.

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Degree: MSc Ecological Economics

Date: August 2008

Title of Thesis: **A review of renewable energy policy and the potential for Irish rural and island communities to benefit from their involvement in community renewable energy projects: Clare Island**

No. of words in main text of thesis: 23,200

This study examines the direction of present day renewable energy policy and the support mechanisms in place that allow rural communities to participate in helping to meet renewable energy targets while developing in a sustainable way. It takes a top down approach in evaluating the overall aims of policy on the world stage, at European level, and finally how a member state, the Irish Government have chosen to implement European policy and legislation. This involves an assessment of the support mechanisms used to increase the deployment of renewable energy technologies and which ones might aid communities most in participating in community renewable energy projects.

In assessing the potential for rural communities to use renewable energy as a means of sustainable development case studies are examined to see how small islands, often on the periphery of economic development, have used and participated in renewable energy projects. With adequate support it is shown that these communities are capable of using the latest technologies available to not only meet their own immediate energy needs but to create local employment, learn valuable skills and continue to develop in a sustainable way.

There are few examples of these projects in Ireland and so this dissertation uses Clare Island, off the Irish coast, as a case study to assess the local household energy needs of the local population, their attitudes to renewable energy and their feelings toward having an involvement in the development of renewable energy projects on the Island. Through the use of a questionnaire it showed that there was significant interest and support for the development of renewable energy to Clare Island. There was also a strong level of interest in being part of the decision making process regarding any development as well as a stated interest in getting involved in local community renewable energy projects. A greater recognition and support in Irish Energy Policy of a rural community's desire to learn more about renewable energy and to become actively involved could help meet EU renewable energy targets and provide local rural sustainable development.

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Degree: MSc Ecological Economics

Date: August 2008

Title of Thesis: **Assessing the practicalities of determining the costs and values associated with water use in rural Kenya: considering the gap between the theoretical ideal and reality**

No. of words in main text of thesis: 16,536

The increase in water scarcity experienced in many parts of the world has brought attention to the need for demand management systems to be introduced or reformed if sustainable and equitable water access is to be achieved. Price Policies are gaining popular support as a means of controlling demands for water, however their adoption does have its critics as financial transactions for water rights, especially in developing countries, experience certain levels of resistance.

This paper explains how water Pricing Policies can overcome inequity and water resource exploitation and carries out a feasibility study to determine the practicalities of a municipal governing body within a developing country undertaking a water valuing exercise. An example from Kenya is used as a case study.

The adoption of Water Price Policies by developing countries was deemed a beneficial activity, although low levels of infrastructure would prevent advanced forms of charging from being used. Further, a municipal governing body within Kenya undertaking a full water valuing exercise was found to be unfeasible in light of resource constraints. A simplified approach was found to be within the abilities of such a governing body, and very beneficial in increasing control over water demand.

**THE UNIVERSITY OF EDINBURGH**  
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Degree: MSc Ecological Economics

Date: August 2008

Title of Thesis: **Food waste recycling policy: the importance of consumer motivation**

No. of words in main text of thesis: 12,276

WRAP (the Waste & Resources Action Programme) recently published the results of a cost-benefit study assessing the options for the collection and treatment of food and garden waste in the UK, including policy recommendations for local authorities. The analysis considered private and environmental costs but it did not include the potential cost of householders' time. This report explores the issue of valuing householders' time spent on recycling efforts. A number of empirical studies of the issue are reviewed, and the method of benefits transfer is used to estimate the impact that the inclusion of time costs would have had on WRAP cost-benefit analysis. The implications for WRAP's recommendations to local authorities and for other aspects of UK waste policy are considered.

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Degree: MSc Ecological Economics

Date: August 2008

Title of Thesis: **Small steps and giant leaps. Making the programme CDM work: a solar water heating case study for Brazil**

No. of words in main text of thesis: 17,243

The programmatic Clean Development Mechanism (pCDM) was proposed in late 2005 as a strategy to reduce costs, improve the quality and broaden the scope of the CDM through a focus on the rollout of small-scale repeatable actions, particularly in sectors which despite high sustainability benefits, have not been pursued by investors on account of their low individual emission reduction potential. By aggregating large volumes of these small-scale projects considerable economies of scale were envisaged. Nevertheless, despite considerable initial interest nearly three years on from its conception no pCDM-specific programmes have yet been approved at Executive Board level.

This paper provides a conceptual overlay of the programmatic CDM and its evolution to date. It addresses the same technical issues of the conventional CDM highlighting specific intricacies of its technical requirements from a programmatic perspective.

A case study application is then carried out for a Solar Water Heating programme in Brazil to assess its viability under pCDM both in terms of methodological and economic feasibility. Results show that while the pursuit of carbon finance under a pCDM SWH programme in Sao Paulo would not be financially viable in terms of carbon credit generation this principally because of the low emission factor of the Brazilian electrical grid.

Nevertheless the sensitivity analysis carried out for more carbon-concentrated emission factors appears to offer some hope for a pCDM SWH programme in other country or where a region specific emission factor were employed.

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Degree: MSc Ecological Economics

Date: August 2008

Title of Thesis: **Measuring sustainability performance in the banking sector: a critique and application of the Sustainable Value approach**

No. of words in main text of thesis: 16,047

This dissertation examines criteria and methods for measuring sustainability performance of globally-operating banks with a focus on and an application of the Sustainable Value approach by Frank Figge and Tobias Hanh. It is presented in two parts.

Part 1 is a review paper which first discusses the Global Reporting Initiative and concludes that the criteria for sustainability performance presented by it are too numerous and cannot serve as sound basis for the assessment of banks. On the basis of different industry reports and other sustainability rankings, we then argue for a smaller set of criteria to represent the impacts of banks' business operations. For the aggregation of these impacts we examine the absolute measures corporate genuine savings and life cycle analysis and the relative measure eco-efficiency. The Sustainable Value approach constitutes a hybrid methodology that combines the advantages of absolute and relative measures as it takes into account resource efficiency and absolute resource consumption while being relatively easy to compute. However, as many impacts in this sector are rooted in the products of banks we propose to amend the Sustainable Value analysis with an assessment of lending policies and the assets under management.

Part II is a research paper which suggests further modifying the Sustainable Value approach by using weights in the aggregation process that take into account the differing environmental harmfulness of the different resources. After other small modifications the approach is then applied to measure the performance of seven banks in 2007. The results are discussed and then amended by two criteria as proxies for impacts of banks products which show different sustainability leaders among these seven banks. Integrating these two criteria and then arranging them with the results from the Sustainable Value analysis yields a comprehensive assessment of banks' sustainability performance.

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Degree: MSc Ecological Economics

Date: August 2008

Title of Thesis: **An economic assessment of carbon mitigation options from agricultural activities: Land Managers' Options in the Scottish Rural Development Programme 2007-2013**

Soil is a fundamental component on the Earth that plays multi-functions within the ecosystem. Carbon sequestration is one of the important function soil plays, which have large effects on climate change. The emission of carbon from soil can be mitigating from various sectors like agriculture, energy production, industry and transport, while the agriculture management is comparably the more cost effective option to mitigate the GHG emission, including CO<sub>2</sub>. This has drawn serious concern from policy makers from each country. The Land Managers' Options form part of the Scotland Rural Development Programme, which aim to develop a more sustainable use of the Scotland rural land. Some options in Land Managers' Options are have significant effects on mitigation of Carbon emissions from land, although none of them is set up only for mitigation of Carbon emission.

This study used two different set of Carbon mitigation potential from agricultural land management options by IPCC and Smith et al. 2000a, together with the Shadow Price of Carbon used by Defra to calculate the values for each agricultural land management options on C mitigation perspective. The value from two studies for similar land management options are varied widely, this is due to the different assumption used when predicts the mitigation potential for each land management options. The values for each Carbon mitigation land management option are then used to assess the efficiency of the Land Managers' Options' payment for farmers on Carbon mitigation perspective. The finding is that for most options that have Carbon mitigation effects, the payment rates are too high on Carbon mitigation perspective while only two options are efficient on payment. However, as all of those options are having other major benefits on maintaining biodiversity, reducing pollution and improving landscape, the payment for each option can be sufficient when all benefits are included.

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Degree: MSc Ecological Economics

Date: August 2008

Title of Thesis: **Exploring visitor attitudes towards traffic and transport: a Lake District National Park**

No. of words in main text of thesis: 17,135

Urban traffic problems are well researched and understood. There are various traffic demand management measures currently available to reduce the impacts of heavy traffic flow, such as congestion and road safety. Similar problems in rural areas, such as National Parks, are less well researched and traffic demand management measures are more difficult to implement due to the different yet equally complex social and environmental fabric.

The aims of this paper were to investigate the attitudinal drivers of visitor stakeholders, explore the potential of a road-user charge and present the results of a survey of visitors to the Lake District National Park, Cumbria.

The survey examines the potential impacts of a road –user charge on visitor experience, the attitudes and perceptions of visitors with regards to traffic volume and public transport in the area and the factors which influence those attitudes.

The proposed implementation of a road-user charge on the A591 was found to be unacceptable to 67.1% of the respondents, with only 23.5% stating that the traffic volume has a negative effect on their experience of the park.

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Degree: MSc Ecological Economics

Date: August 2008

Title of Thesis: **Building capacity and resilience in a changing environment:  
A sustainable livelihoods assessment of Loga and Filingue, Niger**

No. of words in main text of thesis: 19,325

The sustainable livelihoods approach was used to help identify factors inhibiting livelihoods within the Loga and Filingue districts of Niger. Primary and secondary data collection identified that livelihoods were impeded by an overall weakness in all capital types but in particular an overdependence on a stressed ecosystem. Degraded soils and low water capacity, and weak human and physical capital and financial capital make upward mobility a feat. Another objective of this study was to provide recommendations that could help solve several of the identified problems raised by households so that positive livelihood outcomes would build household capacity and generate resilience. To shift people from subsistence farming to making profits and participating in the market, offseason gardening, crop diversification and agroforestry techniques were recommended. As many of the land management and restoration recommendations take time and immediate solutions are also needed, income generating activities were recommended to provide a more immediate impact. They included the livestock value chain.

The surveys and research confirmed that climate variability has a significant impact on the daily lives of the populations in Loga and Filingue. If future climate change predictions for Africa come to pass, Niger stands to become an even more fragile ecosystem. Implementing the activities recommended should mitigate climate change and build up household resilience

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Degree: MSc Ecological Economics

Date: August 2008

Title of Thesis: **Water allocation: an illustration of Multi Criteria Decision Analysis in the Guipuzcoa Region, Spain**

No. of words in main text of thesis: 16,500

Climate change and population growth will have a considerable impact on water resources around the world. Therefore, new strategies need to be found to meet increasing water demands from all sectors of the economy, so the life and health of ecosystems and people are not jeopardised. These new strategies will have to come along with the Water Framework Directive and the new water culture that has been developing in Europe in recent years.

This study is an illustration on how decision making methodologies can be used for water allocation by using Multi Criteria Decision Analysis in the Guipuzcoa Region, Spain and to find new strategies to face climate change and population growth in the future. The approach used consists on – by using Equity model – maximising benefits, minimising supply and therefore increasing water availability for the future. The main decision to be taken consists on a selection of robust water management strategies to maximise benefits and minimise costs. The results given show that the model chose those strategies which require less investment and which gives large amounts of additional water supply (save water, save water 2, cooling and recycling 20% and reduction of leakage 10%). The model does not choose the desalination option for any of the strategies presented. The desalination would only be used as part of a national strategy to export water to other regions in Spain where water is scarce. The findings of this study suggest that MCDA is a useful tool as an aid to thinking and decision making for water management on a public and private level.

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Degree: MSc Ecological Economics

Date: August 2008

Title of Thesis: **Applying the linear additive model for the selection of waste treatment facilities in Patra City and in the Cyclades Islands of Greece**

No. of words in main text of thesis: 19,340

Waste management is a very complex decision making problem that requires an integrated approach for its solution. Up to 2001, 92% of the municipal solid waste generated in Greece was landfilled. After several convictions by the European court of justice, Greece finally launched its Operational Environmental Programme in order to promote the EU Waste Directive. This paper has two objectives: (1) to evaluate the different waste treatment technologies in order to find the best method in terms of environmental, economic and social criteria, and (2) to compare two different geographic areas, a city and an islands complex. The linear additive model is applied for the solution of the problem. All the relevant stakeholder groups and key-players are identified and are allowed to participate in the analysis, so that all conflicting views are considered. The application of the model was successful. It helps with the structuring of the problem and identifies anaerobic digestion with composting and recycling as the best compensated solution for both areas. For Patra, the second best solution is composting with recycling, while for Cyclades is incineration with recycling. An important finding of this paper is the low importance the "total cost" criterion seems to have, for the selection of an appropriate treatment method, among all the stakeholders groups. Further research needs to be conducted in order to better evaluate the impacts of the different waste treatment facilities on public health.

**THE UNIVERSITY OF EDINBURGH**  
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Degree: MSc Ecological Economics

Date: August 2008

Title of Thesis: **Soil carbon sequestration, environmental valuation and their effects onto wind energy expansion in the UK: the Lewis wind farm.**

As our understanding of the effect human activities has onto the natural environments of our planet we have witnessed an alarming quantity and severity of negative impacts. These range from destruction of natural habitats and ecosystems from toxic waste dumping or seepage to the diffused and global predicted impact of anthropogenic climate change. With this increased understanding has come a desire to change the situation for the better by reducing these impacts and acting in a more environmentally friendly manner. One primary method utilised in this endeavour is the switching of electricity production from greenhouse gas emitted fossil fuel fired generation to renewable low carbon energy. Currently wind power provides us with the cheapest and most developed form of renewable energy. Furthermore the industry is already well established and thus roll out and implementation can be measured in years rather than decades. The UK is also fortunate enough to be subjected to an extensive supply of wind energy.

A trade-off exists when developing wind farms between the national and global benefits from mitigated climate change due to reduced greenhouse gas emissions against local environmental impacts. These impacts are attributed to the manufacture, construction, operation and decommission of the wind farm. As a result of this conflict impartial analysis must take place in order to weigh up the costs and benefits of individual projects. This discussion highlights two emerging areas of concern with wind farm development. Firstly that carbon dioxide is released as a result of wind farm development thus creating a payback time. This has recently been expanded to include the release of carbon from terrestrial sinks. Secondly how to effectively value environmental goods and services in order to include them into empirical analysis. Incorporating and solving these key areas makes wind farm appraisal a more robust and inclusive area of research. By effectively accounting for all relevant impacts in project appraisal it is the objective to maximise welfare derived from efficient resource allocation.

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Degree: MSc Ecological Economics

Date: August 2008

Title of Thesis: **Exploring attitudes of Edinburgh residents with respect to waste management: an application of Q methodology**

No. of words in main text of thesis: 15,767

Q methodology examines subjectivity using both qualitative and quantitative methods. Attitudes are subjective and therefore it is applicable to use Q method in an attempt to achieve a greater understanding of attitudes. Attitudes are an indicator of behaviour. It is argued that current waste behaviour needs to change to create sustainable waste management practices (SEPA, 2003). A comprehensive understanding of the attitudes associated with waste behaviour is expected to aid the development of sustainable waste management. Waste management is an area which has changed significantly in the past two decades. The criteria which guide waste management policy have shifted from landfill centred processes to focus on sustainable practices.

This study examines the attitude of Edinburgh residents to waste management in their community. This includes an exploration of recycling, waste minimisation and reuse attitudes. Economic criteria – the implementation of a pay-as-you-throw policy and a deposit-refund recycling system – were also included in the analysis. Five factors, groups with similar opinions, emerged. The first, 'educators', emphasise that education is a key tool in altering waste management attitudes within the community. A fifth factor emerged as one participant was negatively loaded on factor 1. This indicates that the fifth factor holds an opposing to that of factor 1. The second factor, 'social norms shape habit', expects that waste management behaviour will change when associated activities become habit. Factor 3, 'environmentalists', represent a group which considers waste minimisation to be an important area in waste management. The final factor, 'regulation is key in our throw-away society', advocate the implementation of a pay-as-you-throw policy to increase participation in sustainable waste management behaviour. There was a consensus among the factors that waste management must achieve a higher level of sustainability to protect future generations – either by improving, educating, minimising waste or changing waste regulation.

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Degree: MSc Ecological Economics

Date: August 2008

Title of Thesis: **An empirical investigation of the relationship between flood risk and social deprivation in Scotland**

No. of words in main text of thesis: 15,363

Flood events are often viewed as being one of the most devastating forms of 'natural hazards'. It is incredibly difficult to prevent against all flood events and even more difficult to predict when they might occur. Although positive effects of flood events do exist, it is often the negative effects that will be presented in the media and academic papers. It is believed that the frequency, extent and the associated negative impacts of flood events will increase as a result of Global Climate Change over the coming years. With a predicted increase in flood events, many academics are beginning to investigate the link between flood risk and social deprivation for the UK. The first paper of this thesis reviews the literature concerned with the links between social deprivation in relation to air quality, water quality and flood risk. Much of the literature relating environmental topics to social deprivation incorporates the ideas of environmental justice and inequality which will also be covered in the first paper. The majority of research previously assessing the links between environmental topics and social deprivation has focused on air quality. Although the literature explicitly concerned with flood risk and social deprivation is narrow in scope, there are research papers which highlight some quite significant findings.

The second paper uses some of the techniques used for studies in England & Wales in order to assess links between social deprivation and flood risk and applies them to Scotland. This was necessary as there were no previous studies researching flood risk and social deprivation in Scotland. For the purpose of this study, indicative flood plain maps provided by the Scottish Environmental Protection Agency (SEPA) were combined with deprivation data in order to assess whether it is the most, or the least deprived portions of the population who are at an increased risk of flooding. The Scottish Index of Multiple Deprivation (SIMD) 2006 was used to provide figures for levels of deprivation in Scotland. The relationship between social deprivation and flood risk for Scotland did not show many similarities to previous studies conducted for England & Wales. Based on these findings, a number of recommendations have been made to improve the methods and techniques used for this study.

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Degree: MSc Ecological Economics

Date: August 2008

Title of Thesis: **Opportunity cost of conservation to communal cattle farmers in Namibia.**

No. of words in main text of thesis: 17,135

This study assesses the opportunity cost to farmers to participate in conservation in Namibia. Namibia has set up a communal conservancy programme, which gives wildlife-use rights to the local community. Part of the reason for setting up this system is to mitigate the costs of human-wildlife conflict. The idea is to gain economic benefits from wildlife through tourism and other endeavours and then these benefits can be distributed to the people most affected by human-wildlife conflict. However, the farmers on these conservancies must incur additional costs to fulfil conditions in order to claim compensation for losses due to human-wildlife conflict. This study then assesses the difference in opportunity cost between the competing land uses of traditional agricultural endeavours on communal land and the new agricultural endeavours on conservancy land. The opportunity cost can show farmers the forgone income from participating in a conservation programme so they can make informed choices about which endeavour to pursue.

This study reviews literature relevant to human-wildlife conflict and the situation that is present in Namibia. Other literature reviewed includes Namibia's history of land tenure that has led to the situation that it is today based on different choices for land uses. The role of communities, conservation, agriculture, and mitigation schemes are also discussed. The study consists of two areas in northern Namibia, which have high incidence of human-wildlife conflict. The opportunity cost approach is a good method for this study because many farmers do not keep solid records of their enterprise but this can show them the differences between the two options for cattle farming. Finally, it is discussed how this information is useful to farmers and conservationists alike to support both of their plights for success.

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Degree: MSc Ecological Economics

Date: August 2008

Title of Thesis: **An economic analysis of a windfarm built upon peatland – a case study on the Isle of Lewis**

No. of words in main text of thesis: 18,318

The Scottish Government set out a target for achieving 50% of electricity generated from renewable sources by 2020, as part of the UK government's legally binding commitment to reducing CO<sub>2</sub> emissions 60% below 1990 levels by 2050. Onshore wind generation is set to dominate much of the required renewables expansion, at least up to the interim target of 31% of electricity from renewables by 2011, as a result of Scotland's vast wind resource and the relative cost advantage and maturity of wind generation over other renewable energy technologies.

However, windfarms occupy large areas of land and can give rise to significant external costs, such as visual and noise disamenity and potential biodiversity impacts. Scotland has a particularly large number of protected areas of international importance, as well as areas of wild character and wilderness for which it is renowned. Therefore, as Scotland aims to expand its wind energy sector, it is likely that there will be increasing conflict between the goals of addressing the external costs of climate change and the preservation of Scotland's wilderness and protected areas.

This paper conducts an ex-post economic cost-benefit analysis (CBA) of a rejected proposal for a 651.6MW windfarm on the Isle of Lewis in the Western Isles of Scotland. The majority of the island is given Special Protection Area (SPA) or Special Area of Conservation (SAC) protected status under the EC Habitats and Birds Directives, as the area provides wetland (peatland) habitat for a range of rare and endangered bird species. The limitations to and the difficulties in the monetary valuation of protected areas is also reviewed.

The results of this study suggest that the 651.6MW Lewis windfarm proposal, which was rejected by Scottish Ministers, would have produced a net welfare gain to society of between £434million and £1,486million, depending on the size of non-use value used and the form of electricity which is displaced by the windfarm. This result holds even if a 'high' level of carbon loss from peat disturbance is assumed, suggesting windfarms built upon peatland can be economically viable. However, there are uncertainties over the application of the non-use value, and the possibility of lexicographic preferences among local residents. These factors are discussed in this paper.

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Degree: MSc Ecological Economics

Date: August 2008

Title of Thesis: **Virtual water trade and the water footprint of Cyprus: alternative tools to manage water resources**

No. of words in main text of thesis: 18,330

This paper applies the novel concepts of virtual water and water footprint on Cyprus which can be used as alternative tools in water management. The aim of this paper is to quantify the virtual water flows in relation to trade and to estimate the water footprint of Cyprus arising from the consumption of agricultural products. The study covers 285 crop products and 123 livestock products for the period 1996-2006.

The average per capita agricultural water footprint of Cyprus is found to be 2,028m<sup>3</sup>/year and the average total agricultural water footprint is 1,435Mm<sup>3</sup>/year, of which 1,110Mm<sup>3</sup>/year is attributed to imported virtual water through agricultural products and 414Mm<sup>3</sup>/year to domestic water use. Overall the country achieves 806Mm<sup>3</sup>/year of net virtual water savings from agricultural trade. Agricultural water use in Cyprus itself is 629Mm<sup>3</sup>/year of which 401Mm<sup>3</sup>/year originates from precipitation and 228Mm<sup>3</sup>/year from irrigation water use. In terms of virtual water exports related to crop products, the results reveal that 66.6Mm<sup>3</sup>/year of irrigation water flows out of the country. This is the most striking finding of this study that policy makers should consider given the limited water resources of the country and the environmental impacts associated with irrigated water use.

Overall the study provides additional information on agricultural water use which has been absent from the water demand assessment in Cyprus. In turn, the utilisation of the novel concepts applied here can contribute toward a more efficient and sustainable allocation of both national and global water resources.