PhD Conference 2015

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Poster Abstracts, Page 8.

Talks to be presented as follows:

Omar Abdullah: Risk Based Prioritisation of Pharmaceuticals in the environment
Numerous studies have shown that residues of pharmaceuticals occur in the natural environment, raising concerns about their impact on non-target organisms or human health. One region where little is known about the exposure and effects pharmaceuticals in/on the environment is Iraq. Due to the high numbers of pharmaceuticals used by the public health sector in Iraq (hospitals and care centres), there is a need for a systematic approach for identifying substances that should be monitored in the environment in Iraq and assessed in terms of environmental risk. In this study a risk-based prioritization approach was used on 99 pharmaceuticals in use in Iraq. Initially, information on the amounts of pharmaceuticals used in Iraq was obtained with the top use medicines found to be paracetamol, amoxicillin and metformin HCl with annual consumption exceeding 20 tonnes. Predicted environmental concentrations (PECs) and predicted no-effect concentrations (PNECs), derived from ecotoxicity end-points, were then used to rank the pharmaceuticals in terms of risk to different environmental compartments. Amoxicillin, valproic acid and paracetamol were identified as highest priority in surface waters and sediment. Paracetamol, captopril and glibenclamide were identified as highest priority in drinking water, in terms of risk for both adults and children. Amoxicillin, erythromycin and amiodarone HCL were identified to pose the greatest risk in the terrestrial environment. Future work will focus on understanding the occurrence, fate and effects of these substances in the environment in Iraq.
Email: osa502@york.ac.uk, Supervisor: Alistair Boxall

Mohd Firdaus Mohd Anuar: Uptake and Effects of a Nanopesticide in Earthworms
Over the past few decades a significant body of work has been done to understand the ecological and health risks of synthetic pyrethroid pesticides (SPs). Recently the use of nano-encapsulated SPs has been proposed. As nanoparticles can behave very differently from dissolved chemicals, it is possible that the environmental fate and toxicity of these nanopesticides could be very different from the conventional SPs In this study, an OECD-style toxicity test was conducted using bifenthrin, a widely use third generation synthetic pyrethroid in the field of agriculture, forestry and public health against earthworm, Eisenia fetida were exposed to conventional and nanoformulations of bifenthrin at a concentration of 100 mg/kg of active ingredient for 28 d using five different soil types. Soil pH, earthworm weight change and mortality were observed at 0, 7, 14, 21 and 28 day. Cocoon production was determined at 28d and cocoon viability was determined after another 28 d in clean soils. The uptake of bifenthrin into the worms was also determined. While, the conventional and nanoformulations of bifenthrin had a small but significant effect on earthworm mortality and coccon production compared to the controls, there was no difference in the toxicity of the different formulation types, even though uptake of bifenthrin from the conventional treatment was significantly greater than the nanoformulation treatments. The results indicate that while nanopecticides are accumulated less than conventional pesticides, the toxicity (based on soil concentration) does not differ.
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Mohd Ammarr Mohd Aripin: Role for hatcheries in addressing fish ecological resilience; a systematic review approach
Over the past century there has been growing interest in artificial fish propagation, driven by concerns about declining of fish populations and species. The hatchery or artificial fish propagation or captive breeding is assuming an important role to restore fish stocks that have been depleted. A systematic review was conducted to prove the ability of hatchery in addressing fish ecological

resilience. The primary question for this systematic review is "Do artificial fish propagation and restocking or restoration activities capable of increasing fish ecological resilience?". The study focused on the primary in studies that report on the empirical evidence of support among scientists or authors regarding the capability of artificial fish propagation and restocking or restoration activities in increasing fish ecological resilience.
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Nvenakeng Suzanne Awung: Quantifying local communities' voices at decision-making process: from Mount cameroon National Park REDD+ project

One key component in developing local community sustainability is the ability to negotiate and make contentious environmental decisions. However, few studies evaluate the influential role played by local communities during consultation and decision-making process. The trinity of voice practical theory (access, standing, and influence) was examined for evaluating participatory decision-making process regarding contentious forest issues. The voice of local communities during consultation and decision-making at the cluster-platform was assessed through stratified random sampling which was used to collect data from 259 respondents around Mount Cameroon National Park (MCNP) to evaluate its appropriateness for environmental legitimacy using SPSS. This study shows that the level of local participation in the Mount Cameroon National Park REDD+ project was directly related to standing and influence accorded to delegate of local communities at consultation and decision-making processes. There was also a direct correlation between level of standing accorded to local stakeholder and ability to influence decisions. Though park managers understood local communities' concerns, these concerns were not being addressed. Also local opinions neither counts at discussion table (no standing) nor were they influencing final decisions (no influence). Bomboko registered lowest in both standing and influence as well as participation. Although local communities' delegates are accorded access, they are neither accorded standing at decision-making process nor influencing REDD+ design within MCNP. Standing and influence accorded to all stakeholders should be adequately balance not only for equity and ethical considerations but also to generate sustainability and environmental legitimacy of forest projects.
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Siân de Bell: Ecological restoration for health outcomes

There is growing evidence showing that the environment and public health are linked. At the individual level, having access to natural spaces is beneficial to mental health, reduces social isolation, and increases participation in physical activity. At the population level, areas with higher proportions of green space are associated with lower death rates and better health. However, there has been little research examining the connection between the health of the environment and human health. Improving environmental health ensures the provision of ecosystem services which are essential for human life and understanding the association between environmental health and human health could inform the restoration and conservation of the natural environment. This study is part of the Health of Populations and Ecosystems (HOPE) project and aims to look at sites in which ecological health has been changed through restoration of the environment, from a damaged state to a more natural one, and collect evidence for any related changes in health among the local population. This will add to the evidence base for health and environment research by directly examining relationships between ecological health and public health and changes over time.
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Louise Best: Late Holocene sea-level change and saline intrusion, Humber Estuary, UK

Sea-level change is a key global issue due to its effects on coastal regions and resources. There are particular concerns over the preservation of potable water supplies from the chalk aquifer of East Yorkshire in respect to the potential risks of saline intrusion as a result of sea-level rise.
This project aims to produce sea-level data for the late Holocene from the Humber Estuary,

elucidating the history of sea-level change, and providing an insight into current and possible future trends for the region. High resolution litho- and bio-stratigraphical field and laboratory methods are adopted for paleao-sea-level reconstruction. Data from one of the study sites will be presented and the findings discussed.
As well as furthering understanding of the Holocene evolution of the Humber Estuary, the production of sea-level data from this project will be used to explore the likely implications of sea-level rise on the groundwater within the chalk aquifer. This incorporates a geological dimension to the project, with the role of changing sea-level, and saline intrusions, being linked to the local groundwater processes, and explored in conjunction with the project partner Yorkshire Water.
Email: lab554@york.ac.uk, Supervisor: Katherine Selby

Mike Bungard: Amphibian Species Traits; their selection from qualitative sources and response to climate change

Species Distribution Models (SDM) are important tools for assessing the potential distribution of species under climate change. SDMs allow the potential allocation of funds and positioning of protected areas in order to best facilitate conservation objectives, however models suffer from predictive instability. This instability is perhaps, ironically, more pronounced when faced with the common focus of SDMs: rare species. Rare species are not only rare in a conservation sense but due to their rarity, they also suffer from a paucity of data. Thus we encounter the rare species paradox (Lomba et al. 2010), that those species most in need of modelling are also the hardest. Individual species models are therefore limited in their application in this particular instance. Species traits offer a mechanism whereby not only can rare species "borrow strength" from similar species but traits allow the model to reflect the hutchinson niche of species. However, species traits are typically quantitative e.g. leaf area, seed weight, etc. Using Malagasy amphibians as our exemplar, we develop a methodology for extracting qualitative data from readily available species accounts (field guides, Red List accounts and Amphibiweb) and inserting that data into SDMs. We categorised and assessed all 248 species from Madagascar and combined Categorical Principal Components Analysis (CATPCA) with K-means cluster analysis to produce distribution maps for species traits. From here we hope to identify the impact of high resolution climate scenarios on traits and thereby the impact on rare species/ecological assemblages.
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Isabel Grijalvo Diego: Modelling pesticide contamination under baseline conditions in two small agricultural catchments (Upper Welland, Leicestershire)

Pollution from agriculture including the use of pesticides is one of the primary causes of degradation of freshwater bodies in the UK. The Soil and Water Assessment Tool (SWAT) is a hydrologic model at catchment-scale able to simulate the fate and transport of pesticides in agricultural catchments. The SWAT model was used to simulate stream flow and metaldehyde losses to surface water in the Stonton and Eye Brook sub-catchments located in the Upper Welland catchment (Leicestershire, UK). After simulation, sensitivity analysis and sequential uncertainty fitting (SUFI-2) was used for hydrological calibration. Model results were evaluated based on efficiency coefficient values and standard statistical measures. The Nash and Sutcliffe model efficiency coefficients (NSE) for daily stream flow calibration were 0.74 and 0.70 and r2 of 0.74 and 0.71 for the Stonton and Eye Brooks, respectively, indicating a good model performance. SWAT was able to predict the temporal pattern for metaldehyde high concentrations. In addition, simulated concentrations matched measured within a factor of two for both catchments. The results indicated that SWAT created realistic simulations and can be used as a tool to understand pesticide behaviour at catchment-scale. However, better pesticide usage data is needed in order to accurately model pesticide losses.
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Tom Holmes: The effects of storminess on coastal ecosystem services and wellbeing

Saltmarsh and sand dune ecosystems provide numerous important services. They are, however, threatened by rising sea level, urban development and potential increases in storm frequency and magnitude. Investigation of the resilience of these ecosystems, and of coastal users, to storms is vital to support effective coastal zone management. This research combines environmental science and environmental psychology to investigate social-ecological responses to storms. Sediment cores from UK saltmarshes in the Humber Estuary and Morecambe Bay are used to reconstruct saltmarsh evolution over the last century. Potential storm deposits in these cores have been identified using grain size analysis and 210Pb/ 137Cs dating, and correlated with documented storms. Geochemical and pollen analyses will allow environmental changes and responses of these low-lying ecosystems to storm events to be assessed and their capacity to maintain function and service provision to be evaluated. In-depth, semi-structured interviews were conducted with a range of coastal users at the two study sites. The emerging themes informed the design of a large-scale quantitative survey of coastal users, implemented seasonally from winter 2015. This mixed-methods approach investigates the value attributed to these low-lying coastal ecosystems, perception of environmental change and the impacts of storms on wellbeing, place identity and resilience.

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Nwabueze Igu: Floristic composition and diversity of freshwater swamp forests in the Niger Delta

The study explored the floristic composition and diversity across 24 hectares of forest plots comprising 138 species within 100 genera and 41 families. While Elaeis guineensis Jacq. recorded the highest importance values for sites 1 and 2 (being disturbed forests), Diospyros mespiliformis Hochst. and Sterculia oblonga Mast dominated site 4 and Rhizophora racemosa G. Mey recorded the highest value for site 3. The Arecaceae whose dominance was attributed to disturbance, recorded the highest values for the first three sites (both the disturbed freshwater swamp forests and the transition zone), while Malvaceae were the highest for site 4 (the intact forest zone). Though the abundance and floristic composition of the forest types varied, there was a general high similarity across the ecosystem. Species diversity, richness and rarity correlated with disturbance across the forest sites; while species richness and diversity had the most significant relationship among the biodiversity indices. The results of the study showed that the freshwater swamp forests are not made up of distinct floristic composition which are not found in other forest ecosystems, but are constrained by environmental factors which makes the ecosystem to be selective in species occurrence, and to exhibit tendencies of monodominance.

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Lena Jeha: Are Community Revolving Funds a Sustainable and Equitable Method of Slicing the REDD+ Pie? Insights from Mt. Elgon, Uganda.

Reduced Emissions from Deforestation and Degradation (REDD+) is highly controversial market-based policy instrument. Designed to finance carbon capture and storage though forest conservation and afforestation; it been deemed a cheap and dirty solution to climate change. Further concerns that it may exacerbate existing inequalities and undermine the rights of poor forest-dependent communities have plagued its progress in the global policy- making arena.As rapid deforestation continues to threaten carbon eco-system services, endowment funds have been pumped into the first generation of pilot projects with the hope that they can tease out controversies over livelihood impacts and provide evidence for effective, efficient and equitable intervention methods.The purpose of this talk is to present empirical data on how a Conservation Incentive Program called Mt.Elgon Regional Eco-System Conservation Project (MERECP) has impacted Benefit Sharing at the community level in Mount Elgon. Following the McDermott et al (2011) multidimensional approach to measuring equity, I will evaluate whether smallholder farmers in Uganda have the 'eligibility,ability and willingness' to become efficient providers of Carbon

services (Pascual et al 2010).
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Tim Katzenberger: Biological effects of exposure to microplastic in the 3-spined Stickleback (Gasterosteus aculeatus)

The pollution of aquatic systems around the world with plastic debris is a matter of growing concern. Rising production levels combined with the long durability of plastic waste has led to plastic debris accumulating in many ecosystems where it slowly degrades into micro and nano sized particles. The environmental impacts of these plastic particles are not well understood, however, there are concerns that due to their small size, they could be directly or indirectly ingested and thus enter into the food chain where they have the potential to negatively impact the health of invertebrates and vertebrates. Adult 3-spined sticklebacks (Gasterosteus aculeatus) were used for two dietary exposures. (1) A 14-day controlled diet of live Artemia that had been cultured in the presence or absence of manufactured 1 or 9.9µm fluorescent plastic spheres and (2) A 28-day controlled diet of food pellets, previously contaminated with degraded and non-degraded states of plastic carrier bag types. Additionally, an exposure of juvenile sticklebacks (7 dph) was performed to test the effects of a plastic spiked water column (0.5 µm spheres) on early life stages. The results of faecal matter examinations and GI dissections provided evidence for the trophic transfer of plastic particles from a contaminated diet to fish. Our data suggests that there are no biological effects for 1 and 9.9 µm plastic spheres in adults whereas the juvenile exposure showed significant responses towards 0.5 µm sized spheres.
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Majid Khan: Influence of solubility of pesticides on the effect of formulation in sandy loam soil

In the preliminary experiment, an effect of formulation was observed on the leaching behaviour of propyzamide within soil and it was also observed that the effect changed over time. It is hypothesised that the effect of formulation is more pronounced for less soluble compounds. The study presented here tested if leaching of very low and moderately soluble pesticides could explain the influence of solubility of pesticides on the effects of formulation in sandy loam soil. Technical grade and commercial formulations of azoxystrobin, propyzamide, triadimenol and cyproconazole were applied to small columns (10 cm long, 2 cm diameter) packed with sandy loam soil. The soil columns were leached on day 1 and 7 after pesticide application. Leachate was collected and analysed. The effect of formulation was highly significant ($p<0.001$) for all the pesticides. The relative difference in mass leached between formulated and analytical grade material of low solubility pesticides was less than the pesticides with grater water solubility. These results suggest that the effect of formulation was more pronounced for pesticides with greater water solubility compared to less soluble compounds which is the reverse of the relationship that was initially hypothesised. The effect of type of formulation was also investigated using SC and EC formulations of azoxystrobin. Greater leaching losses of azoxystrobin were observed from EC formulation compared to SC formulation. Sorption experiments will be carried out to aid interpretation of the results from column experiments.
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Kyoduk Koo: Environmental exposure to pharmaceuticals in the future

Failed to submit an abstract.
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Phoebe Morton: A Burning Issue

Peatlands cover about 3% of the world’s surface but store over 30% of its soil organic carbon. This is made possible by constantly high water tables (WTs) that prevent much of the decomposition of

Sphagnum mosses, which are the main component of British peat. In the UK, there are many threats to the integrity and longevity of peat stores including draining for extraction or farming, burning to encourage heather plants for grouse shooting, and climate change. Many drained peatlands are under restoration and peatlands have previously survived changes in climatic conditions, but effects of heather management on peatland carbon dynamics are underexplored.This study investigates the effects of different types of heather management, namely burning versus mowing, on three peatland sites in north-west England. Gaseous (CO2 and CH4) and fluvial (DOC and POC) fluxes are monitored to create carbon budgets for different managements. Changes in vegetation composition, specifically Sphagnum cover, are also assessed and WT depths manipulated in ex situ experiments to inform on which management strategy may be most effective at preserving and growing the long-term carbon store in the peat as well as sustaining a viable grouse moor.
Email: pam503@york.ac.uk, Supervisor(s): Andreas Heinemeyer, Colin McClean, Astrid Hanlon

Anil Rautray: Using Participatory Tools to Define Acceptability Criteria for New Rice Varieties in Eastern India

Biophysical and socio-economic factors constrain rice yields in rain-fed rice growing areas in India, as a result of which achieving sustainable household food is difficult in most of the poor farming households This research embedded within the larger project aim to explore how farmers' participation in rain-fed rice breeding can help develop suitable varieties more efficiently with a specific focus on integrating a gender dimension into participatory varietal selection. The focus of the research is to obtain a clearer understanding of the 'enablers' required to accelerate and widen adoption. To achieve this, participatory research approaches are used to develop suitable technologies suited to farmers' livelihoods and ecosystems. The key emphasis in the research is the role of women farmers in the entire process. In due course of time this research will develop methodologies for assessing gender specific criteria of useful traits of rice varieties; Develop participatory approaches that include male and female farmers in selecting new rice lines; Identify stages along a breeding program where farmer interfacing is optimal.
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Abi Sutton: Leadership in small-scale fisheries

Small-scale fisheries (SSF) and communities that rely on them are increasingly at risk from social and environmental pressures. Community-based fisheries management (CBFM) has been adopted in a variety of SSF globally to reduce some of these pressures. SSF leadership is thought to be an important contextual condition in CBFM. Our research aims to explore how SSF leadership and other important contextual conditions act in concert to influence social and ecological outcomes in SSF. This presentation first offers findings of previous research, which analysed experiences of CBFM from 50 cases in Southeast Asia using Qualitative Comparative Analysis (QCA). Insights from QCA show significant complexity within the case studies, with multiple pathways of causal conditions leading to successes and failures in CBFM. The second half of the presentation highlights the direction of current research which uses primary data collection. Interviews with key individuals in SSF, from numerous contexts are in the process of being conducted. The objective of this research is to explore in detail the mechanisms that facilitate good leadership practice. There will be a focus on the structural implications of management teams, support systems, accountability, and how leaders will play a part in helping communities adapt to environmental change.
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Sam Thompson: Aggregation of engineered nanoparticles in the natural environment: is the process reversible?

Engineered nanoparticles (ENPs) are increasingly being used in a wide range of product types. The increase in use of ENPs will inevitably lead to increased emissions to the natural environment so it is important to develop an understanding of the environmental fate, behavior and effects of ENPs.

Following release to the environment, ENPs can aggregate depending on the environmental conditions and consequently aggregation is one of the key processes that is included in environmental exposure modelling exercises. However, in these exercises, it is typically assumed that aggregation proceeds in one direction and that the process in non-reversible. This is an important assumption, because usually the primary, unaggregated particles will have significantly greater ecotoxicity compared to the aggregated systems. This study examines the validity of this assumption, by exploring whether changes in environmental paramaters including pH, temperature, and ‘kinetic environment’ could result in disaggregation of ENP aggregates. Results so far suggest that environmentally relevant changes in environmental paramaters can result in disaggregation of ENP of selected ENPs. Existing exposure modelling approaches may therefore need adapting to account for this reversibility of the process.

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Posters to be presented as follows:

Zakiya Al-Afifi: Ecosystem Services Value for Mangroves in Oman : Case studies from Qurum, Sawadi and Mahout (Poster 19)

Mangroves are the only salt-tolerant trees inhabiting the intertidal zones of tropical and subtropical latitudes on Earth. These unique ecosystems contribute valuably to the welfare of humans through their ecological, economic and cultural values. This research aims to explore the role of mangrove ecosystems in Qurum, Sawadi and Mahout for human welfare in Oman. Each mangrove ecosystem in this study is characterised distinctively from the others. Qurum is a natural reserve since 1975 made by the Royal Decree No75/38, while Sawadi has been under restoration and afforestation since 2003. The Mahout ecosystem is one of the naturally existing forests in Oman and experiences interactions with local people and the ecosystem itself. The key objectives of the research are to: 1) Identify and highlight the contribution of the study areas to community wellbeing based on the 2005 Millennium Ecosystem Assessment framework for ecosystem services. 2) Valuate the services offered by these ecosystems using different techniques applicable for each location, for instance the Total Economic Value Approach. 3) Identify the drivers for environmental change for these mangrove ecosystems. 4) Recommend for sustainable management of mangroves forests at the national level in Oman. The research uses mainly secondary data as well as primary data from interviews, questionnaires and possibly economic valuation techniques.

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Rosa Mato Amboage: Information Challenges in Cost-sharing Policies for Invasive Species Management (Poster 25)

The introduction of invasive species can potentially have large economic costs, including ecosystem impacts, changes in the production and consumption economy, and costs of eradication and control. The development and implementation of emergency response arrangements to manage the invasion in its early stages may enable a consistent and coordinated approach to deal with damages; and has been defined as the most cost-effective response. However, national governance plans usually struggle to account for the complex interactions stakeholder's private decisions, and also often fail to engage agents to internalize the social costs of invasion damages. The provision of biosecurity measures to prevent biological invasions is considered a public good, and thus private efforts will be underprovided. As a result, the responsibility to set socially optimal levels of biosecurity lies in national governments. Among the series of policy instruments available to incentive private undertaking of prevention measures, there is increasing interest in cost-sharing policies, which divide the responsibility for damages between the public and private sector. Nevertheless, even cost-sharing preventive management plans, such as the Australian Emergency Plant Pest Response Deed, are limited in their adaptability with regards to unexpected ecological and economic impacts. At the center of this problem is the paucity of biosecurity related information as well as poor communication between affected partners. The goal of this thesis is to understand and evaluate the role of uncertainty, asymmetry, and scarcity of available information in national cost-sharing invasive species emergency plans. Results in this field will be of relevance for policy making, as it would provide useful insights on how best to implement cost-sharing emergency plans for invasive species management.

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Jan-Justus Andreas: Impact of the Economic Crisis and Austerity on the transition towards sustainable energy systems in Europe (Poster 17)

The two contemporary crises of the environment and the economy are arguably intertwined. Although the narrative of a 'double crisis' has evolved over the past years, in which it is believed that these crises are not only related in causes but also bear the potential to be resolved as one, the

wider debate continues to be cast largely in terms of trade-offs between economic growth and environmental protection. A central response to the economic crisis has been the introduction of austerity measures by governments in order to consolidate their budgets. One of the key areas caught between the two sides, focused on environmental sustainability on the one hand, and the need for immediate growth on the other hand, is energy as a resource and a driver for growth. The thesis assesses the impacts that the economic crisis and austerity measures in particular have had on energy and related environmental policy. As part of a wider project on the impacts of austerity on the environment in Europe, the study conducts four national case studies within the EU. It will also assess EU policy itself in order to provide a comprehensive analysis of differing approaches on different political levels and according to varying economic and political preconditions. The thesis also aims to provide an assessment of the energy industry and its response to both crises over the past years, as well as the industry's impact on policy making on various levels (lobbyism) and vice versa. It will therefore contribute to the academic debate on the two crises, depict the interplay of various political and private (industrial) actors, their actions and intent, as well as portray shifts (or the lack thereof) in growth models by some or all actors.
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Karla Beltrán: Effects of climate change on the Ecuadorian Moors ecosystem and the implications for the sustainable management of key ecosystem services (Poster 8)
The Andean Moors is a natural ecosystem that functions as giant sponge, storing and releasing water during the year, thereby ensuring the provision of water for dry periods in Andean regions. This natural ecosystem not only stores much more water in its soil than glaciers, but also provides important environmental services for all Andean. Due to its vulnerability to precipitation and temperature changes, and the fact that in the tropics, warming is amplified with height, this fragile ecosystem is likely to be severely affected by climate change. In Ecuador, moors have suffered significant deforestation due to land use change, which has had a major impact on the capability of the ecosystem to resist or adapt to external forces such as climate change. As a result, ecosystem services have been severely affected, including a decline in carbon storage, which has resulted in the release of large amounts of CO2 to the atmosphere. This research project is focused on the analysis of the effects of climate change on Ecuadorian Moors and the implications for the sustainable management of key ecosystem services. The research will analyze potential impacts of climate change on three important ecosystem services - water availability, carbon storage and food security. In addition, the project will suggest public policies that could be effective in reducing or preventing potential catastrophic consequences for Andean people that depend directly on the ecosystem services provided by the moors.
Email: kebv500@york.ac.uk, Supervisor: Piran White

Jennifer Chapman: Striking a balanace: the environmental and socioeconomic tradeoffs of water and terrestrial chemical exsposure (Poster 22)
Both socio-economic benefits and environmental impacts are derived from the use of chemicals by society. Environmental impacts of economic activity can damage resources as well as result in human chemical exposure and negative health effects. In this study, we investigated the question: how do we balance the environmental and socio-economic tradeoffs of chemical stressors in terrestrial and aquatic ecosystems? We conducted a systematic review of cases where environmental and socio-economic tradeoffs have been evaluated relative to anticipated chemical impacts on both terrestrial and aquatic ecosystems. Risk-risk assessments, risk-benefit assessments, integrated modeling, ecosystem services valuation, cost-benefit and cost-effectiveness analyses methodologies are presented. We provide recommendations for their further application, in particular to emerging chemicals of concern to the natural environment such as pharmaceuticals and veterinary medicines.
Email: jlc571@york.ac.uk, Supervisor(s): Alistair Boxall, Murray Rudd

Burcin Demirbilek: The impacts of European Union (EU) on Turkish Water Policy (Poster 23)
Turkish water policy has been evolved throughout the century since the foundation of Republic. Since, EU negotiations started, Turkish water policy was tried to adapt to European regulations. In this study, I am going to investigate the question: what are the impacts of Europeanisation on Turkish water management? Turkish government has made significant effort to adapt its policy. These efforts are going to be analyzed descriptively. Barriers that need to be tackled and positive benefits of it are going to be revealed.
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Xiu Gao: End users and new pollution technologies (Poster 4)
While a number of novel technologies already exist, uptake by the end user sector is slow due to the burden of regulated methodologies and related issues associated with technologies developed by the academic community which do not meet the needs of end users. At the same time it is critical to enhance pollution monitoring in cities in order to prevent and control the adverse impact of urban pollution on human health and the environment. To better understand the needs of end users would help to develop more effective pollution monitoring technologies but also to ensure that new devices are capable of producing usable and useful data. This project aims to establish the needs of end users. The research begins with a review of the statutory requirements for pollution monitoring in three case study cities: York, Berlin and Seoul. Through surveys and interviews, the study will identify which workplace practices may have to change to accommodate the use of new technologies and data generated, and how established practices might implicate design choices and practical accommodation. The study will involve analysis of recent experiences in implementing new pollution regulations and monitoring requirements to determine which aspects were successful and unsuccessful.
Email: xg679@york.ac.uk, Supervisor(s): Charlotte Burns, Darren Reed

Ruby Grantham: Using the Ricardian Model in an Inland Fisheries Context (Poster 27)
Inland capture fisheries (ICF) face increasing threats from population growth, development and climate change (Welcomme et al. 2010). Utilized by hundreds of millions of people globally for subsistence, commercial and recreational purposes, ICF are a socially and economically valuable resource (FAO, 2011). Recognising this value is crucial for the sustainable management of ICF but is hindered by limited understanding (Mils et al. 2011). This research sets out to develop a novel economic model to value ICF. Based on the agricultural Ricardian Model, the new model captures fisher's adaptation when valuing the impacts of changing fishery resources and hydrological regimes. The research is supported by a review of the existing body of literature on the economic value of ICF. The review highlights knowledge gaps and disparities across existing studies, indicating the need for a standardized approach to valuing ICF. The proposed model is demonstrated using a case study of the Lower Mekong Basin. With the potential for widespread application the model is able to contribute towards developing a comprehensive understanding of the economic value of ICF and how this may change under future scenarios.
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Dayang Siti Maryam Binti Mohd Hanan: The Cumbrian Coastline: An Open–Air Laboratory for Sea Level and Coastal Changes (Poster 5)
To date the Cumbrian coastline has not been the subject of a systematic investigation into sea level fluctuations that have occurred during the Late Devensian and Holocene. However, its location in close proximity to both the Lake District ice mass and Irish Sea ice lobe, means that sea level change along this coastline is a product of both eustatic and isostatic effects giving rise to a complex series of transgressions and regressions. Presently very fewSLIPs exist for Cumbria (Huddart et al., 1977; Tooley, 1978; Zong and Tooley, 1996; Lloyd et al., 1999; Shennan and Horton, 2002; Lloyd et al., 2013). Studying the Cumbrian coastline is challenging as erosion of the

glacial deposits and coastal barriers may affect the sea level record. Tidal amplitude may also have altered in the past and give rise to some discrepancies with SLIPs and within the models. Additionally, the Late Holocene record has been affected by anthropogenic activity. This study will look at the past and present relative sea level changes, and make future projections of sea level changes in Cumbria. Sea level trends will be established through detailed geomorphological mapping, field surveying, biostratigraphical analyses and radiocarbon dating.
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Alejandro Lome Hurtado: Modelling the usage of scientific research by policymakers in the area of conservation science, at the global scale. (Poster 28)
Recently there is a discussion about the impact of the work by research community in the decisions taken by the policymakers, in the area of conservation science. These groups most of the time are working separately. There is therefore a gap between the information that the society requires to improve their environmental issues and the research made by the scientific community. To have effective implementations and management actions it is necessary for policymakers to get the proper scientific information. This study examines 450 research questions at the global scale, obtained in the last and most important work published related with conservation science and policy. Most of these academic papers have conducted “big questions” exercises and workshops with researchers and policymakers. Besides, this study conducts surveys and interviews with scientific community and policymakers regarding their particular interests, at the global scale. Then, we will analysis both inputs with qualitative (Nvivo, latent cluster, etc) and also quantitative (Hierarchical Bayesian, econometrics, modelling, etc.) methods in order to measure and understand the impact of the work by the research community in the policy issues. The expected results of this study will be important for both groups in order to reduce the gap.
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Rebecca Kariuki: Modelling Past, Present and Future Ecosystem Dynamics and Human Interactions in East Africa Savannas (Poster 26)
Savannas occupy a large proportion of the land surface in East Africa. They are formed by the interaction between changing climate, human population, fire and wildlife. Studies have shown a strong connection between human beings and the ecosystem. Further, savannas have changed immensely over time due to urbanization, sedentarization, human population growth and climate change among others. Modification in savannas leads to modification of critical ecosystem services thus reconstructing past and present human-ecosystem interactions is vital for predicting future interactions. The main objective of my research is to assess the past and present response by societies, landscapes and ecosystems in East Africa savannas to climate change. Other objectives include assessing the link between population growth, socio-economic development and ecosystem services in savannas and developing methods of assessing the best way developed models can be used in East Africa environmental forecasting. Both field and satellite data for East African savannas will be used. This research will provide a clear exposition on changes in the provision of ecosystem services in East Africa savannas due to climate change and how these changes affect human-ecosystem dynamics. It will also produce predictive scenarios that will be used to define future environmental, social and economic changes.
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Sarah Knight: The Impact of Natural Capital on Subjective Well-Being (Poster 1)
The World Health Organisation defines health as a “state of complete physical, mental and social well-being and not merely the absence of disease”. Improving human well-being is a governmental priority globally and may in fact be a more accurate measure of a nation’s success than gross domestic product (Costanza et al. 2014). The impact of social and economic capital on human health and well-being is relatively well understood, for example unemployment and inflation rates

are directly related to levels of low human well-being. The contribution of natural capital is still poorly explored, previously hindered by a lack of disaggregated well-being data, geographic extent and absence of census data. This project will examine the relative contribution of the physical environment on self-reported quality of life. The research questions this project seeks to address include: a) to what extent are the espoused relationships between the physical environment and well-being causally linked? b) How does the effect of natural capital on well-being compare with the impact of economic and social capital? c) Are there regions that are particularly disadvantaged when it comes to environmental endowments? and d) Are there certain categories of respondents (e.g. young or old) where access towards environmental amenities matters more?
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Magdalena Kruza: Monitoring and modelling exposure to emerging indoor air pollutants (Poster 14)

Since the 1970s, increasing attention has been paid to indoor air quality, led in part by the emergence of building related symptoms such as headaches, allergy and eye irritation. Indoor air pollutants are generated through activities such as cooking, cleaning or smoking, as well as emitted from building materials, paints, carpets, furnishing and cleaning products [Carslaw et al., 2012]. They can also ingress from outdoors, and consequently, indoor environments often contain higher concentrations of air pollutants than outdoors [Wolkoff et al., 2013]. There is increasing evidence that indoor secondary air pollutants may be responsible for some of the observed health effects indoors [Terry et al., 2014]. Further, such secondary pollutants are a by-product of the use of cleaning agents and air fresheners commonly used as household products [Nazaroff et al., 2004]. The goal of the study is to measure and model emerging indoor air pollutants under different indoor conditions. It is currently unclear which of the secondary pollutants are responsible for the observed health effects. Modelling studies are necessary to further our knowledge in this area, in order to inform focused measurements. An indoor chemical model (INDCM) will be used to identify species that reach relatively high concentrations indoors following cleaning activities or air-freshener use [Carslaw, 2007].
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Juan Trujillo Lora: The effect of differential exposure to exogenous risk for urban pluvial floods in developing countries: Case-study of Barranquilla, Colombia (Poster 7)

Barranquilla is the fourth largest Colombian city. During periods of heavy rainfall, significant volumes of water flowing at high speeds through the streets of the city form "urban creeks" making the affected areas high-risk zones. The risk of flooding is increased by the presence of homes, businesses and infrastructure in high-risk areas adjacent to the creeks. The consequences of these events are reflected in the damage to infrastructure networks and urban services, as well as paralysis or disruption of vehicle and pedestrian traffic. These affect not only the overall economic activity of the city but also the residents who suffer occasional destruction of their homes and lost lives. In addition, it has been foreseen that by the year 2050 Barranquilla will be the world’s second city with most physical damages due to the increasing floods caused by climate change. Thus, the main public policy is controlling these urban creeks. The city is split into six economic divisions according to the household’s income, with division 6 being the households with the highest income and 1 being the lowest. In turn, there are currently 10 creeks considered extremely dangerous. Each economic division is affected by the presence of at least one of these creeks. Due to the impossibility of building a pluvial drainage system, because of the costs it would entail, a Sustainable Urban Drainage System (SUDS) had already been recommended by a panel of experts of the World Bank. The objective of this study is to quantify the households' economic value of controlling pluvial creeks with a hypothetical implementation of SUDS. The study will test the hypothesis that willingness-to-pay (WTP) values for the risk reduction are directly affected by the variations in the levels of exogenous risk –determined by the distance of a household to the nearest

creek– across the 6 households' divisions. The results of this study will serve as a theoretical and empirical framework for the local environmental policymakers to verify the benefits of a potential application of SUDS.
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Eric Marr: Food Production or Biodiversity Protection: Competition for Agricultural Land in the United Kingdom and Canada (Poster 2)
In 2050 the world's population is projected to surpass 9 billion people which will require global food production to increase by 70 per cent in order to meet the nutritional needs of this rapidly growing population. At the same time, farmers are increasingly expected to provide more than an adequate supply of food but also ensure range of other ecosystem services including provisioning, regulating, supporting and cultural services. In particular, the ability to produce an adequate food supply as well as ensure space for biodiversity protection comes into question with the multitude of demands placed on a finite agricultural land base. This study will explore this issue within two regions of comparison, Canada and the UK, first by conducting a comparative analysis of agricultural land use policies supplemented by semi-structured, in-depth interviews with policymakers/stakeholders and secondly by conducting in-depth interviews with farmers to better understand the motivations that result in decisions to produce food and/or set-aside land for environmental purposes. Overall, the aim of this research is to support the creation of land use policies that better achieve the goals of food production and biodiversity protection on agricultural land by understanding the motivations behind farmers' land management decisions.
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Kate Massarella: Knowledge and idea flows within conservation and development programmes (Poster 13)
In recent decades, a range of programmes aiming to tackle both conservation and development have been implemented in Tanzania's forests. Empirical research into such programmes tends to focus on the impacts and outcomes, with evidence suggesting that success is often limited and in many cases negative outcomes have occurred. It is suggested therefore that more emphasis be given to the exploration of the systems, processes and actors involved in the design and implementation of such programmes, in order to better understand why they are created as they are and to offer insight into alternative approaches to conservation and development. Drawing on development ethnography, science and technology studies (STS) and normative theories of social justice, this research project aims to investigate how knowledge and ideas flow between actors and across actor networks in Tanzania's forest conservation and development programmes, and how this system recognises and incorporates the perspectives and experiences of diverse stakeholders involved. A range of research techniques will be used including Q-methodology and ethnographic techniques such as observation, oral history interviewing and semi-structured interviews.
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Katie Morton: Assessing the role of on-farm biosecurity and surveillance in controlling livestock diseases at a national scale. (Poster 3)
Many endemic diseases, e.g. paratuberculosis and bovine viral diarrhoea, remain stubbornly persistent, posing ongoing problems for UK livestock. To minimise associated risks farmers are encouraged to practice biosecurity; a set of precautions designed to protect a farm from initial infection and reduce spread of pests and diseases. The goal of this project is to explore how relatively small changes to biosecurity at individual farm level might be coordinated to reduce persistence and prevalence of endemic disease at national scale. Work to date has focussed on developing generic mathematical models suitable for representing on-farm disease dynamics across a range of livestock disease systems including varying disease characteristics, e.g. life-long or transient immunity, and the role of external factors such as immigration and emigration. To assess

the utility of the tools currently available these models have been analysed using a range of different mathematical and numerical approaches including deterministic and stochastic simulation, analytical calculation of the basic reproductive ratio, fixed point analysis and moment closure methods. The next step is to develop spatial models that can explicitly track disease spread across a heterogeneous landscape of farms, accounting for variability in the elements of disease transmission relating to biosecurity, e.g. susceptibility and infectivity.
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Olajide Olawoyin: Building the capacity for the management of transboundary air pollution in West Africa (Poster 10)

Studies indicate that Africa contributes a significant amount of global emissions of air pollutants which may be transported to other locations. Of particular interest is particulate matter, ozone and its precursors due to their properties and lifetime. The framework of the Convention of Long-Range Transboundary Air Pollution in Europe has demonstrated success of regional cooperation in preventing air pollution. Africa is seeing rapid increases in urbanisation and industrialization leading to large increases in air pollution; therefore it would seem timely to extend such transnational approaches of air quality management to this continent to understand how domestic air quality management affects, and is affected by, imported/exported transboundary air pollution. This project will focus particularly on West Africa to: (i). assess the current state of air quality and its management in the region; (ii) use scenarios to assess the likely future projections of air quality and (iii) use regional/global models to understand the effects of imported and exported air pollutants in West Africa and global air pollution loads. Ultimately, the project will enhance the capacity for improved air quality management in the region and promote local, regional and international cooperation to prevent and control air pollution in West Africa.
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Verena Riedl: More ecology for environmental risk assessment of chemicals (Poster 24)

The application of pesticides on agricultural products translates to a regular introduction of chemical agents into the environment with potentially negative effects on ecosystems at the individual, population and community level. These impacts are generally assessed in single-species regulatory tests which provide data on the relative sensitivity of different non-target organisms. Nonetheless, these predictions are insufficient to be extrapolated on whole ecological communities since an evaluation of effects on species' interactions, essential for the understanding of the stability and the recovery of ecosystems, is lacking. Multi-species test systems have proofed to be a good tool for the evaluation of chemicals in semi-natural environments, however, the main drawbacks that are often encountered are related to the large size and long test duration of test systems. This project aims at the development of small and highly reproducible test systems that enclose species of different trophic levels and allow the assessment of pesticide effects on species' interactions for the collection of high frequency measurements. These data will be used for the development of models in order to improve ecotoxicological risk assessment.
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Jean-Paul Skeere: Awesome is the new Green (Poster 15)

This poster is meant to encapsulate the hypothesis of my research, which is about how automakers are changing their approach to battery electric and plug in hybrid cars. I argue that the re-imagining of these vehicles is mostly due to the technology within them coming of age and competing with and even outperforming the internal combustion engine. Initially we are seeing the trickle down of hybrid technology from Formula 1 racing to luxury supercars. The expectation is that these innovations will diffuse throughout manufacturers' entire model line-up as the business argument for this technology continues to be made. Gone is the 'green' gimmickry as the performance

numbers speak for themselves. Awesome is the new green
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Sarah Spooner: Give me a sign: A study into the effectiveness of zoo information signs on learning (Poster 11)

In a modern world, with access to digital media and animal documentaries, zoos face increasing pressure to justify their purpose. One of their biggest claims is their role in education. However, few studies have provided evidence to demonstrate that learning is occurring. This study examines the role that 2D animal information signs play in learning by investigating what information the public are reading and whether knowledge about animals increases after having read a sign. A total of 234 visitors were surveyed; with 118 individuals having read the information boards and 116 acting as a non-reading comparison group. The questionnaires investigated knowledge of animal facts based on the 1st, 10th and end line of each sign. Questions were also asked about the first statement of 'did you know?' signs, animals' habitat, appearance and IUCN threat status. Responses were coded as correct (1) or incorrect (0). Binomial GLMs were used to compare the responses between the two (reading and non-reading) groups for each of the sign questions. A significant difference was found between those who had read and those who had not read the signs for the 1st and final lines of the sign, animals' appearance, IUCN threat status and habitat. This suggests that visitors were learning from 2D information signs, but that learning is influenced by the position and amount of information on the sign.
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Kyle Stevens: Environmental specimen banking for understanding urban contaminant issues (Poster 9)

Environmental specimen banks (ESBs) have been developed in Europe, North America and Asia to systematically and opportunistically collect and store samples for chemical monitoring and research purposes. Many ESBs collect biotic and abiotic samples from environments ranging from pristine to those with a large amount of anthropogenic activity and store samples at low temperatures (<-80c). These samples have proven to be extremely useful for identifying spatial and temporal contaminant trends in many different regions of the world. Due to the long-term nature of most programs, quality-assessable data generated from ESBs are invaluable for assessing both national and international regulatory action, voluntary industrial action, and public chemical use trends. Although biotic and abiotic samples vary greatly by institution, few banks employ passive sampling strategies, and no EBSs exist that solely focus on the impacts of an urban environment. Additionally, contaminant trends are routinely studied using biological samples (ex. Fish tissues), yet few ESBs have investigated biological effects in relation to associated contaminant trends. The work presented here fills these gaps by developing novel ESB methods, and working with global ESBs in order to answer contaminants questions in the context of urban impacted environments.
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Shuo Sun: Linking metabolic defence in marine microbes to ocean-atmosphere halogen biogeochemistry (Poster 21)

Microbe is one of the significant parts in driving the Earth's biogeochemical cycles (Falkowski et al., 2008). However, people's understandings on the mechanisms that underlie microbe participation in elemental cycling are very poor (Falkowski et al., 2008). In order to predict what will happen to Earth's system due to climate-change, molecular and cellular-scale processes, which drive these biogeochemical cycles, need to be identified, quantified and parameterized. It is stated that halogen (bromine, iodine) transfer from the ocean to the atmosphere has significant impact on tropospheric ozone depletion (Simpson et al., 2007; Carpenter et al., 2013), new particle formation (O'Dowd et al., 2002) and cloud evolution (Vogt 1996). Recent work has reported that climate induced changes have resulted in reduced sea-to-air bromine emissions from the western Antarctic Peninsula

(Hughes et al., 2012). Nevertheless, the major controls on sea-to-air halogen transfer still remain unknown and how this could change in the future also has big uncertainties.The overall aim of this study will be to establish the occurrence, the physiological and biogeochemical importance of haloperoxidases in marine diatoms through studies from molecular to regional scales.
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Sophia Whitlock: Assessing the exposure risk of emerging contaminants in the environment to wild birds (Poster 18)
In a world of increasing drug consumption, more and more pharmaceuticals are being literally ″flushed out″ into the environment through our sewage, where they pose a risk to ecosystem health. It is only in the last decade that modern analytical chemistry techniques have been sensitive enough to detect the very low concentrations of pharmaceuticals present in the environment. However pharmaceuticals are, by their very nature, designed to have high impacts at low doses. To date, there has been little research on the effects of this medical pollution on higher vertebrates. Birds often sit in high trophic levels in food webs and are thus useful sentinels for ecosystem health. Therefore, this project will investigate the effects of a chosen pharmaceutical(s) on wild birds. The focus will be on terrestrial habitats, as relatively little work has been done in this area compared with aquatic systems. Sewage sludge (bio solids) spread on agricultural land may affect the birds which live and forage there. The aims are to both assess the exposure risk for wild birds by looking at different pathways and to study some behavioural aspects which may impact this. The chosen drugs are likely to be psychoactive, thus further behavioural work on the effects of environmentally relevant concentrations may also be investigated.
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Joanna Witton: Effect of pesticide exposure on non-target arthropods (Poster 16)
Non-target arthropods (NTAs) provide important ecosystem services (e.g. biological pest control, aesthetic). The potential for NTAs to avoid exposure to pesticides and thus toxic effects is of key interest to better understand and assess risk of pesticides to NTAs. We will study implications of spatial variability of pesticide exposure in crop and off crop on a scale relevant for NTAs, by measuring spatial heterogeneity of exposure in a field study and modelling its population level consequences. We will study experimentally if NTAs (mites, lacewings) can avoid pesticides (active ingredient and formulations). Model simulations will explore different levels of patchiness in different landscapes and investigate consequences of interaction of spatial heterogeneity of exposure, toxicity and avoidance behaviour.
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Hie Ling Wong: The impacts of pesticide usage on birth outcomes (Poster 6)
Uses of pesticides have long been concerned for their impacts on human health. This study aims to identify the impacts of pesticide usage on different birth outcomes for nearby residences. Pesticide usage data from Fera will be combined with established modelling and risk assessment methods to determine changes in risks to human health. The major trends in pesticide usage over the last 25 years, major drivers for these changes and effectiveness of pesticide regulation and the EU review process in reducing these risks will be identified. In this study, the impacts of the pesticide usages on birth outcomes will be identified for different proximities of the residence from the application sites for different types of pesticides and crops. Inhalation exposure of pregnant women is chosen as the most important route to affect fetus development in the womb. Thus, the volatilization of the pesticides from the foliar would be the main source for the inhalation exposure as it is assumed that 95% of the pesticide volatilization occurs from the foliar within 24 hours of pesticide applications (Pesticide Safety Directorate, 2010). The pesticide exposure estimates, toxicological thresholds and health statistics will then be quantified for any association between pesticides and birth outcomes. The approaches of the study can then be extrapolated to assess risks to human health in other

situations, including developing countries.
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Hannah Wynne: Driving Towards Safer Pesticide Use?

Pesticides are an integral part of agricultural systems but there are major concerns over the undesirable effects that have been documented upon environmental and human health. Through European and UK legislation, tighter controls have been enforced over the types of pesticides which can be used and their application in order to mitigate negative impacts. The Food and Environment Research Agency have collected detailed data on pesticide use in commercial crops for over 20 years. Despite yearly analysis, there has been little investigation into the major trends over longer timescales or any quantification of whether the chemicals and practices are actually safer for our environment. Using 2010 pesticide data for winter wheat in Eastern and Yorkshire regions of England, we demonstrate how the major drivers for pesticide usage can be assessed using an ecological dissimilarity index. The need to assess pesticide usage safety is prompted by concerns over newer pesticide classes such as neonicotinoids, which are thought to play a significant role in pollinator declines, and to determine if policy is driving safer practices. Assessing policy effectiveness will enable better decisions to be made for the benefit of the environment and farmers, and help identify where further improvements could be made.
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