INTECOL SYMPOSIUM REPORT

Ecosystems contributing to poverty alleviation
INTECOL 2013, Excel Centre, London, UK, 18-23rd August 2013

Description of the event and objectives

Ecosystem services are the benefits that people derive from ecosystems. Their quality and reliability depend critically upon the ecological processes in the ecosystem at any particular time, and the biophysical environment. Increasingly, as ecosystems come under pressure to meet the needs of a growing and resource-hungry human population, some people are more at risk from the loss of ecosystem services than others. The talks at this symposium introduced new developments in this area. The lead speaker (Professor Kate Brown) is an international expert in environmental resilience from a social science perspective. She is experienced in working with resilience concepts at the interface of environmental and development science, with a particular focus on coastal communities in the developing world.

The five talks illustrated the range of approaches being taken in ESPA projects, including studies in neotropical forests, Indian arid lands and rangelands in China. The speakers were selected because they have results from the first tranche of projects that explored new ways to address the complex interactions between people and the environment in a range of developing countries where environmental change and ecosystem processes seem to present particular challenges for the poor.

Speakers and abstract presentations (key summary points of each presentation)

Programme available online: http://www.intecol2013.org/4_Programme.html

1. **Professor Katrina Brown (lead speaker) (k.brown@uea.ac.uk)**
   Environment and Sustainability Institute at University of Exeter
   Ecosystems in a development context

This paper makes the case for case for disaggregated analysis of ecosystem services and multi-dimensional wellbeing to elucidate the relationship with poverty and identify the intervention points for effective poverty alleviation. It presents findings from participatory research with coastal stakeholders in Kenya that expose and explore the trade-offs associated with different management actions, and how these affect different social actors. It discusses the nature and

implications of these trade-offs for developing effective policy on ecosystem services and poverty alleviation.

2. **Dr Bhaskar Vira (**bv101@cam.ac.uk**)**
Department of Geography, University of Cambridge
The political economy of negotiating ecosystem services for poverty alleviation

This paper focuses on the trade-offs that emerge in the context of implementing ecosystem service based interventions for poverty alleviation. Drawing on research in the Western Himalayas in India, it focuses on insights associated with negotations surrounding the establishment and negotiation of a 'Payment for Ecosystem Services' scheme, implemented to secure water supplies for a small mountain town. It highlights the importance of understanding why and how PES negotiations take place at the local level, how choices are made by different stakeholders and their differentiated impacts, and how the implementation of PES schemes reconfigures local power relations. Drawing on these field insights, this paper reflects more broadly on the need for a grounded political economy approach to ecosystem services for poverty alleviation, which takes into account the winners and losers from interventions at different scales.

3. **Professor John Dearing (**j.dearing@soton.ac.uk**)**
Department of Geography, University of Southampton
Extended timescales for ecosystem services reveal complex links with poverty alleviation

Understanding of the nonlinear dynamics of complex social-ecological systems is needed for the design of sustainable management strategies that can help avoid unexpectedly rapid, irreversible or costlychanges. But the development of complexity science-based models for resilience, system stability and critical transitionsover the past decade has not been matched by their application and operationalization to real world social-ecological systems. Here we develop and apply an empirical, evolutionary approach to studying the nonlinear dynamics of a rapidly changing region in eastern China. We find increasing trends in provisioning ecosystem services within the lower Yangtze basin over the past 60 years that reflect economic growth and successful poverty alleviation. But these trends are paralleled by steep losses in a range of regulating ecosystem services mainly since the 1980s. Water quality services have already passed critical transitions in several areas. The trade-off between provisioning and regulating services can no longer be viewed as part of an acceptable development model. Relationships between economic growth and ecological degradation show no sign of decoupling as demanded by sustainable economic development. Taken together, the evidence points to the 1980s as the period when the region passed through a regional macro-scale tipping point into the current transient

phase. Current land management strategies need to recognize and act upon the implications of these long-term social-ecological system dynamics.

4. **Dr Wouter Buytaert (w.buytaert@imperial.ac.uk)**
Department of Civil and Environmental Engineering, Imperial College London
Do-it-yourself simulation: bridging the gap between scientific modelling and decision-making

Mountains harbour many of the world's biodiversity hotspots but they are naturally fragmented. Any perturbation, ranging from localized land-use changes to global climate change, will therefore have a disproportionate impact on the local ecosystem dynamics. At the same time, the complexity, fragility, and knowledge scarcity of mountain ecosystems contrast sharply with their importance as providers of ecosystem services. Not only do mountain regions often host people in poverty in remote mountain communities, who depend on natural resources and functioning ecosystems for their livelihoods, but they also provide ecosystem services that extend far beyond the uplands. Mountains are often considered water towers of the world, while their biodiversity provides crop-wild relatives of major food crops such as potatoes.

In these environments, it is paramount to generate locally relevant knowledge about multiple ecosystem services and how they impact local livelihoods. This is often problematic. Existing environmental data collection tends to be geographically biased towards more densely populated regions, and prioritised towards strategic economic activities that bypass the poor. Data may also be locked behind institutional and technological barriers and monopolised by the better educated or politically connected. These issues create a "knowledge trap" for data-poor regions, which is especially acute in remote and hard-to-reach mountain regions. In such conditions, there is a strong need for a bottom-up, interactive and multidirectional approach to knowledge generation in an ecosystem services context.

Here, we present results of experiments to implement participatory monitoring of rainfall and riverflow in the tropical Andes, as well as a vision on how new technologies can be leveraged to foster relevant knowledge generation on the ecosystem services they support. Our setup consists of a network of microcatchments equipped with simple hydrometeorological sensors. The catchments are selected such that the monitoring provides information relevant for local decision-making on land planning and ecosystem management. For example, this information provides inputs for water availability for home use, agriculture and hydroelectricity. Additionally, we develop models that help understanding ecological-hydrological links, such as the impact of management on grazing lands status and biodiversity.

In order to facilitate interaction between the various partners (local communities, NGOs, scientists), we have implemented Environmental Virtual

Observatories (EVOs): decentralised and open technology platforms for knowledge generation and exchange that enable participation of marginalised and vulnerable communities bypassed by the traditional mechanisms. We have successfully tested this approach in a previous pilot develop for the Peruvian Amazon, where turtles are an economic resource for indigenous communities. Monitoring hydrological changes helps them identifying habitat quality for nest locations, turtle sex ratios and hatching success.

Through these case studies, we analyse how EVOs can facilitate (1) the involvement of local communities in the research design, data generation and interpretation process (citizen science) (2) open and transparent data sharing and knowledge generation; (3) continuous feedback and interaction between the involved actors.

5. **Professor Guy Poppy (**g.poppy@soton.ac.uk**)**
Department of Biological Sciences, University of Southampton
Managing ecosystem services for food security and the nutritional health of the rural poor at the forest-agricultural interface

Achieving food security in a perfect storm is a grand challenge for society. Climate change and a rapidly expanding global population act to make global food security even more complex and demanding. Since food and the millennium development goal (MDG) to eradicate hunger is coupled to many other MDGs, it is imperative that we offer solutions which are complimentary and don't oppose one another. Sustainable intensification of agriculture has been proposed as a way to address hunger whilst also minimizing further environmental impact. However, the desire to raise productivity and yield has historically led to a degraded environment and reduced biodiversity. This paper proposes that an ecosystem services approach embedded within a framework such as Drivers-Pressures-States-Impacts-Responses (DPSIR), can allow food security to be delivered alongside an ecosystem which provides many other valuable services to humankind. Too often, agroecosystems have been considered as different from other ecosystems and not managed in a way in which services can flow to and from the agroecosystem to surrounding ecosystems. Highlighting recent research in a large multidisciplinary project (ASSETS), we illustrate the ecosystem services approach to food security using case studies from the Zomba district of Malawi and Amazon in Colombia

6. **Dr Caroline Howe (**c.howe@ucl.ac.uk**)**
Centre for Biodiversity and Ecosystem Research, University College London
A meta-analysis of ecosystem service interactions: synergies and trade-offs in the real world

Ecosystem service-based conservation is often applied under the assumption that it delivers win-win outcomes. However, although the ecosystem services framework offers the potential for developing approaches that simultaneously provide ecological stability and livelihood security, there are often trade-offs associated with the pursuit of multiple objectives, by multiple stakeholders, across multiple spatial and temporal scales. Using methodology from the Centre for Evidence-Based Conservation, we carried out a systematic review of the literature on where ecosystem service interventions had the potential to, or had resulted in, synergies and trade-offs. Of 1092 potentially relevant articles highlighted using our search terms, 213 were selected for the review. We find there is a wealth of research literature on trade-offs in ecosystem-based conservation, and that the literature covers a diverse number of research fields, geographical areas and ecosystem services. However, there is little evidence that this is facilitating an informed dialogue, or even closer collaboration between specialist disciplines. We also demonstrate that despite the diversity of research fields, trade-offs tend to fall into two main categories: trade-offs arise between services (biophysical trade-offs) and between benefits from services (trade-offs between stakeholders). Service versus service trade-offs occur due to biophysical constraints that may or may not be manageable and vary in time and space. Benefit versus benefit trade-offs result from different ecosystem service values between stakeholders, differential access to ecosystem services and differential levels of power. Trade-offs therefore ultimately arise because of a biophysical constraint, because of maximising one service at the expense of others or because there is no management but therefore the use or division of ecosystem services is not effective nor efficient. The question we need to ask next is whether the trade-off is insurmountable or not? Is it inevitable? We analyse why these different trade-offs occur and discuss the economic and policy implications.

Summary of the event

This symposium stimulated discussions at the intersection of ecology, environmental change and sustainable development. As we approach 2015, the date at which the Millennium Development goal targets are due, there will be increasing interest in the links between poverty eradication, poverty alleviation and environmental management. ESPA will be one of the first science-based programmes to examine this issue systematically and by 2013 first results from individual studies, and of emerging syntheses will be available.

This topic was of broad interest, involving the development community and illustrating links between ecosystems and people through the lens of the world's poorest people. New approaches to the measurement of both ecosystem services and of multi-dimensional poverty are being applied in the programme, alongside novel approaches to ecosystem assessment.

The event was well attended and questions ranged from specific details regarding the projects presented to general discussions on linking ecosystem

services to poverty alleviation programmes. Throughout there was significant interest on Twitter and at the end of the event there was a call for the British Ecological Society (BES) to establish a specific interest group for those researching at the interface between poverty alleviation and the environment, particularly with reference to ecosystem services. BES have been informed of this interest, however, at this early stage we do not currently have an update on the progress of this request.