

## What works at the nexus?

### The Nexus Network annual conference

09:30-17:30, Thursday 27 November 2014

Coin Street Neighbourhood Centre, 108 Stamford Street,  
London SE1 9NH



### Poster Session 13:30 – 14:00, 3<sup>rd</sup> Floor

In July 2014, the Nexus Network funded 13 'think-pieces' with the remit of scoping and defining nexus approaches, and stimulating debate across the linked domains of food, energy, water and the environment. These think-pieces will be published on the Nexus Network website over the coming months. Posters will be displayed in the coffee areas on the 3<sup>rd</sup> Floor throughout the day, and authors will be on hand over lunchtime (from 13:30 – 14:00) to talk about their work.

### Abstracts:

#### **1. The bottom-up approach to Nexus inter-linkages of energy, food and water security in the ECOWAS region: how do field experiences and practices influence regional and national policies?**

Subhes Bhattacharyya, De Montfort University and Nicola Bugatti, Hannes Bauer, ECOWAS Regional Centre for Renewable Energy and Energy Efficiency.

The Economic Community of West African States (ECOWAS) comprises 15 countries from 6 different climatic zones. A review of existing national and regional policies related to water-energy and food security nexus was undertaken for the ECOWAS region and a stock-taking and mapping exercise of field-level activities undertaken by practitioners was conducted. This thought piece presents the results of the above exercises. The purpose of this work is to provide structured information that forms the knowledge baseline for future Nexus initiatives in the region and provides a clear direction for policy initiatives by identifying the gaps, weaknesses and inconsistencies and suggesting any potential for synergies and integration to facilitate the policy-making process. We find that ECOWAS region has made good progress at the regional level in terms developing an integrated agenda, particularly for water which has adopted a nexus approach. The member states are also moving in the right direction but the silo mentality still prevails, particularly in terms of project decisions, prioritisations and resource allocation. The decentralised decision making has not deepened in many states and authorities have not been appropriately delegated. Various stresses have resulted in the region as a consequence of weak integration of nexus approach. Yet, micro-level initiatives are emerging which showcase innovative approaches to deal with the challenges. Rapid replication such experiences through dissemination and cross-learning, and provision of enabling conditions can make a major difference.

#### **2. Imagining a sewerless society.**

Ben Martin, Peter Cruddas, Paul Hutchings, Cranfield University.

Conventional sewer systems weigh heavily on the stress nexus of water, energy, food and the environment. Large water demands increase water scarcity whilst also requiring energy for the conveyance of huge volumes of diluted sewage, which overload the current infrastructure and frequently discharge

raw sewage directly to the environment. The stress could be reduced on all fronts by the provision of sustainable, sewerless sanitation. Water use is reduced by a third if none is used to flush toilets or convey human waste to a centralised sewage treatment works. With no sewers, the energy burden of centralised wastewater treatment could be eliminated, as no power would be required to move wastewater from source to treatment site, and new technologies are capable of recovering energy from waste in individual household units to power on site treatment. New technologies that are capable of recovering nutrients from human waste at source provide resource recovery and opportunities for greater food security, reducing the reliance on imports of phosphorus fertilisers from volatile markets. Global concern about closing the nutrient cycle loop is growing, with predictions that peak phosphorus is likely to occur within the next few decades, and the fertiliser industry already acknowledging the decreasing quantity and quality of natural reserves. Additionally, the chemical and biological quality of natural systems would be improved by preventing the release of untreated waste – a problem for both pit latrines and centralised treatment during high rainfall events. Already, the developing world is introducing new technologies and social structures to not just ‘leapfrog’ existing technology, but actually define the future model for sanitation to provide an attractive alternative for conventional sewers. This think piece will imagine a sewerless society, and what technological, social, political and economical changes would be required both to address the vast sanitation challenges in the developing world, and to change the paradigm of sanitation in the developed world.

### **3. How can we ensure better use of organic waste materials for food, energy production and water use in Sub-Saharan Africa?**

Euan Phimister, Jo Smith, Paul Hallett, Pete Smith, Hilary Homans, Anke Fischer, University of Aberdeen; Hutton Institute, Aberdeen.

This paper considers the use of organic resources in rural areas of sub-Saharan Africa (SSA), and their impact on basic human requirements for energy, food and water. Organic “wastes”, include crop residues, food waste and excreta, and are of such value that many authors refer to them as organic “resources”. Here we refer to residues from other processes as “organic wastes”, and distinguish them from organic resources that have been grown or collected specifically for their primary use. This distinction is important, as it means that organic wastes represent a pool of resources that might not otherwise be used. Finding new ways of using them can help deliver the Millennium Development goal of poverty alleviation and economic development by extending access to clean energy and water and increasing sustainable agricultural production.

### **4. Governance of the nexus: from buzz words to strategic action.**

Christian Stein and Jennie Barron, Stockholm Environment Institute (SEI), University of York; Timothy Moss, Leibniz Institute for Regional Development and Structural Planning (IRS), Germany.

In this think piece, we develop the foundations for a strategic action perspective on the governance of the nexus. Our enquiry into the governance dimension of the nexus incorporates three propositions. First, it acknowledges that nexus challenges cannot be separated from the perceptions, interests, and practices of actors associated with a nexus. Second, our approach builds on a relational understanding of nexus governance as arising from relationships between actors (actor networks) and ideas and interests (issue networks) across multiple domains. Third, our approach emphasizes the need for addressing nexus challenges by working with and through existing governance arrangements. The think piece is structured in two sections. In the first section we develop the conceptual foundations for a strategic action perspective on nexus governance. In the second section we illustrate the potential of this approach by presenting the results of an empirical study of a water-food-energy-environment nexus in Ethiopia. We conclude with some reflections and possible ways forward for a research agenda on the nexus.

## **5. Energy/food/water nexus in a changing climate: a critique of competing demands for UK land**

Maria Sharmina, Claire Hoolohan, Alice Bows-Larkin, Paul Gilbert, Kevin Anderson, Tyndall Centre for Climate Change Research, University of Manchester; Paul Burgess, Jerry Knox, Cranfield University; James Colwill, Loughborough University; David Howard, Centre for Ecology and Hydrology.

Land is a valuable and finite resource that provides a wide range of goods and services to society. Both the ability of land managers and the capacity of the land to provide goods such as food, bioenergy and clean water become more difficult as the population continues to grow and climate variability increases. This raises questions over how the multiple demands placed on land can be managed both now and into the future. Whilst the importance of land to national economies appears obvious, in recent years numerous policies and planning trajectories with competing and contradictory implications for land management have emerged in the UK. Examples include the expansion of housing to sustain a growing population; increased production of bioenergy for a low-carbon energy system and the stagnation in arable yields across Western Europe. The aim of this working paper is to explore the interdependencies at the energy/food/water nexus, and to question how these are currently addressed within policy. The paper also considers a framework for more coherently prioritising 'land-use' among competing demands. Here, the lens of land use is taken to consider this topic and the policy environment from a UK-centric perspective. The paper explores how current land uses and their related policies affect the UK's resilience in the medium to long term (e.g. out to 2050) and asks thought-provoking questions for land-use management, policy and modelling aimed at one or more components of the nexus.

## **6. Systems thinking in environment-people science.**

Kit Macleod, Mags Currie, Sue Morris, Kate Irvine, Jose Munoz-Rojas; James Hutton Institute and Pete Falloon, Met Office Hadley Centre.

The aim of our working paper was to stimulate thinking about the nexus of connections across water, energy, food and environment around why such approaches are needed, what existing approaches are there and what they provide to our thinking, and how such approaches can be conducted. The word nexus originates from the Latin for "a binding together" and has two related meanings "a connection or series of connections linking two or more things" and "a central or focal point." Advancing the theory and practice of working across the water, energy, food and environment nexus requires understanding, viewing and managing these connections holistically, rather than treating them in isolation when considered through only a water, energy, food or environment lens. In this working paper we build on existing theory and practice of systems-based thinking in human-environment interactions to synthesize existing knowledge and diverse perspectives across a community of researchers, policy makers and practitioners to advance our collective understanding and ability to manage connected challenges across water, energy, food and the environment nexus (and more broadly). We do this through considering the following three questions:

- 1. Why are nexus approaches required from across research, policy and practice perspectives?*
- 2. What are the existing nexus approaches and related integrative frameworks and framings, and what do they provide to nexus thinking on water, energy, food and environment?*
- 3. How do we carry out nexus approaches as teams of researchers and non-research stakeholders?*

In this work we have used 'approach' as a verb i.e. 'start to deal with (a situation or problem) in a certain way' and as a noun i.e. 'a way of dealing with a situation or problem'.

## **7. Services and Slums: rethinking infrastructures and provisioning across the nexus.**

Tatiana Thieme, Eszter Kovacs, University of Cambridge.

This piece contributes to the debates and research concerning the structural and infrastructural challenges facing contemporary cities in the Global South, by focusing on the diverse geography of 'slums' and their inadequate forms of provisioning. We deploy and reposition the lens of a NEXUS approach in order to conceptualise the linkages between four critical spheres of provisioning: Water, Food, Energy, and crucially, Waste. Unplanned and makeshift infrastructures in slums have resulted in particularly close spatial and practical intersection of water sources, urban agriculture, food preparation, access to off-grid energy, but also waste streams and open sewers. There is a compelling case for extending and challenging current directions of the 'nexus' literature through reviewing past and present opportunities in rural and urban slum spaces *across* the resources spectrum of energy-water-food *and* waste. Considering that this "think piece" is an intervention in its own right, we also emphasise the importance of better integrating the narratives and experiences of those *depending on* nexus services alongside more traditional provider accounts and perspectives, especially where formal or recognised institutional support is irregular and unreliable.

## **8. Politicising the Nexus: nexus technologies, urban circulation, and the co-production of water-energy.**

Joe Williams, Stefan Bouzarovski, Erik Swyngedouw, University of Manchester.

Drawing on a diverse range of theoretical and ontological approaches, we argue for an understanding of the nexus framework that goes beyond the technology-focussed interpretations that currently pervade the discourse, to one that is both technical and social, material and political. With particular reference to urban political ecology, the water-energy nexus is presented as being emergent, and developing through an historical process of coproduction. Building on this political ecology perspective, we mobilise science and technology studies (STS) and assemblage thinking as complementary approaches to understanding the emergence of nexus structures as fundamentally processual and socio-technically heterogeneous. In writing this contribution, our aims are twofold: first, to provide a comprehensive review of existing scholarship on the interrelations between water and energy; and second, to demonstrate the urgent need for, and potential future direction of, more critical, theoretically informed, perspectives on the nexus. The paper begins with a critical analysis of the current state of the discourse. In particular, we challenge an emerging consensus in the literature, which posits that integrated management of water and energy will necessarily lead to more sustainable management of both. Fundamentally, this is a call for purely efficiency-based solutions to tensions and trade-offs between energy and water, and one that is entirely consistent with market-based approaches to environmental governance. The concept of 'integration' has become a panacea for the negative aspects of the nexus, an ultimate solution that forestalls more politically informed discussions. This assumed logic ultimately implies that the serious challenges posed by the nexus framework, do not in fact require real political change. Part two of the paper develops a critical approach to understanding the water-energy nexus, and proposes some theoretical and methodological tools for doing so.

## **9. Fast Moving Circular Goods 2025.**

Fiona Charnley, Ksenija Kuzmina, Dale Walker, Cranfield University.

The aim of this project is to develop a vision for the future of the Fast-moving Consumer Goods (FMCG) industry in a circular economy and through the creation of a set of provocative, compelling stories encourage a shift from incremental to transformational conversations about the future. A qualitative scenario development methodology, involving the participation of circular economy and FMCG industry experts in workshops and interviews, was utilised. During the process current trends were analysed and six themes were identified and informed the creation of a set of four stories of the future. The four stories are titled: Connected Communities, Let's Get Personal, The Circular Supermarket and Packaging Reinvented. The stories are not intended to be prescriptive, but rather give an indication of what the transition to a

circular economy could hold for the FMCG industry. It is hoped that the stories will provide the catalyst for the further research, conversations and collaborations necessary to drive us towards a circular future.

## **10. Financial Markets and the Green Economy: Combining 'Impact Investing' and 'Nexus Thinking'**

Frederik Dahlmann, Warwick Business School, University of Warwick.

In this report I investigate the extent to which the financial community is aware of and integrates the notion of the 'energy-water-food nexus' in its decision-making and investment processes. Specifically, the research explores the views and opinions of a variety of stakeholders on whether the financial community already employs suitable frameworks and metrics or whether other, more innovative investment criteria, data and information are needed to support a nexus-based investment approach.

This think piece aims to make two key interrelated contributions. First, it comes as a direct response to research questions raised during a recent ESRC workshop on 'Sustainable Prosperity' and the role of the green and ethical investment movement in particular<sup>6</sup>. It therefore addresses the broad themes of interest to funding bodies and policy makers.

Second, the more practical goal of this think piece is to develop a better understanding of the views and needs of the financial community regarding the nexus with the anticipation that this could lead to a more comprehensive and detailed academic study in a future research project. In doing so, this think piece starts involving the financial industry in the nexus network with the long-term goal of developing clear guidelines and measures enabling the financial community to optimise its impact investment strategies.

## **11. Exploring the Nexus through citizen science.**

David Slawson, Roger Fradera, Imperial College London.

As global population increases, the connections between food, water, energy and the environment at global and regional scales become ever more important. The complexity and inter-connectedness of these relationships challenge policymakers, scientists, businesses and citizens to find acceptable ways forward, but there are no easy solutions. This is the nexus. Citizen science can provide a powerful mechanism to help tackle these environmental and social challenges. In this thinkpiece we draw on the experiences of citizen science practitioners, particularly from the environmental sector. Some of the generic challenges to successful citizen science will be heightened in the context of understanding and dealing with nexus issues. These include extending citizen science (which is normally conducted at local levels) to regional and global scales, optimising the collection of data through better coordination between practitioners, empowering citizens and businesses to take more control of the conception and design of citizen science activities, and understanding the motivations, attitudes and practices of all participants.

## **12. Transdisciplinary environmental research: a review of approaches to knowledge co-production**

Frances Harris, Kingston University and Fergus Lyon, Middlesex University.

The challenges of ensuring food, water and energy security while mitigating environmental change require the involvement of a range of stakeholders. Issues such as climate change, land use, agri-environmental management, renewable energy and water use are complex, and addressing biophysical challenges is compounded by the need for economically and socially viable solutions. These challenges require research that cuts across traditional boundaries. Not only is there a desire to cut across academic boundaries (what can be termed interdisciplinary research); there is a need to cut across the boundaries between academia and professional practice. This paper therefore sets out to review the motivations for undertaking

transdisciplinary research, and the theoretical, methodological and practical challenges inherent in such an approach.

### **13. A nexus for the nexus: How a self-organised science community can help deliver sustainable intensification for agriculture in the UK.**

Andy Whitmore, Rothamsted Research, Hertfordshire and Sue Hartley, University of York.

The global population is expected to reach 9 or 10 billion before the end of the 21st Century. The critical conjunction of needing to feed an expanding population in the face of climate change and a declining resource base has focused minds on the potential threats to our agricultural systems. We need to continue to intensify production, but the depletion of natural resources, on which these systems partly depend, cannot continue indefinitely. In response to these threats, the idea of Sustainable Intensification (SI) has evolved. SI can be thought of as the means to produce more from the same area of land while reducing the negative environmental impacts and at the same time increasing contributions to natural capital and the flow of environmental services. Arguably what policy (and industry) requires in order to solve a multi-faceted problem such as SI is a coordinated response that consists of sufficient expertise from the appropriate number of genuine experts. An interface is needed between the problem-holders, the funders (not necessarily the same body or bodies as the problem holders) and the knowledge holders (or those with the research capability to discover knowledge). Such an interface would need to be self-organising, solutions-based and in order to command the confidence of its membership it must be non-excludable and non-rival in nature. It will intensify the links between people, concepts and infrastructure.