Dynamic Drivers of Disease in Africa Consortium (DDDAC)

Post Doctoral Research Assistant in Macroecology
Institute of Zoology, Zoological Society of London

Further particulars

The ESPA programme

The Dynamic Drivers of Disease in Africa Consortium (DDDAC) aims to deliver novel, cutting edge science on the relationships between ecosystems, health and poverty, linked to a range of practical and policy impacts. The Consortium is funded for 3.5 years from 1 January 2012 by a grant from the Ecosystem Services and Poverty Alleviation (ESPA) programme. ESPA (see www.espa.ac.uk) is a major, interdisciplinary programme jointly funded by the UK Natural Environment Research Council (NERC), Department for International Development (DFID) and Economic and Social Research Council (ESRC). Overall ESPA aims are: (a) alleviation of poverty through world class science; (b) generating new knowledge supporting sustainable ecosystem services; and (c) empowering local communities. To date, ESPA has funded a range of preparatory and smaller projects. The programme is now launching a series of large, flagship Consortium projects that will provide its key, flagship initiatives. The DDDAC is one of the first of these, and will contribute particularly to ESPA's Health theme.

The Dynamic Drivers of Disease in Africa Consortium

Consortium partners

Led overall by the STEPS Centre at the University of Sussex, the DDDAC brings together researchers at the University of Edinburgh; University of Cambridge; Institute of Zoology, Zoological Society of London; ILRI and the Stockholm Resilience Centre, with a range of African partners in Ghana (Wildlife Division of the Forestry Commission, University of Ghana), Sierra Leone (Ministry of Health, Njala University), Kenya (KEMRI, ILRI, University of Nairobi), Zambia (Ministry of Livestock and Fisheries Development, University of Zambia) and Zimbabwe (Ministry of Agriculture, University of Zimbabwe). In each country, the team involves environmental, social and health scientists, and is forged as a novel university-government partnership. The UK-based institutions are supporting a series of cross-cutting themes, linked to integrated case study work:

- Disease-ecosystem dynamics – integrated process modelling (Cambridge, IoZ, Edinburgh)
- Macroecology of biodiversity and health (IoZ)
- Local system contexts and interactions (STEPS, Stockholm)
- Social, economic and environmental values (Edinburgh, ILRI, Stockholm)
- Political economy of knowledge and policy (STEPS, Stockholm)

Interdisciplinary working will be facilitated by an 'integration team' with the explicit aim to facilitate trans-disciplinary insights and innovation.

Research focus and justification

The Consortium focuses on zoonotic diseases in Africa which are emerging or re-emerging as public health problems at the people-wildlife-livestock interface. This is of crucial poverty and policy importance globally: More than 60% of emerging infectious diseases over the last few decades have been zoonotic, and while some result in global disease outbreaks (e.g. Avian influenza), many zoonoses affect disenfranchised communities, quietly decimating poor

people's lives and livelihoods. Diseases of poverty, including zoonoses, are often under-measured and therefore under-prioritised in national and international health systems. Yet if unchecked, emerging zoonoses create both current problems and dangerous future threats. This is of particular concern for zoonotic diseases with complex connections to a wider set of ecosystem changes, such as land use change, habitat loss and climate change.

Global and national policy players are now starting to emphasise the importance of once-neglected zoonoses, and there is massive demand for integrated 'One Health' approaches to control them. However, there are significant gaps in the evidence base needed to inform the One Health movement and to enable them to work for the poor. The DDDAC aims to provide substantial evidence to fill these gaps. It will generate vital new knowledge on the impacts of ecosystem change, ecology and the interactions between humans, animals and ecosystems on disease exposure, transmission and emergence, as well as new understanding, measures and models of both disease epidemiology and poverty impacts.

The Consortium will investigate the hypothesis that: *Disease regulation as an ecosystem service is affected by changes in biodiversity, climate and land use, with differential impacts on people's health and wellbeing*, by addressing a series of interlinked questions:

- How do ecological changes (e.g. biodiversity, vegetation and habitat, water) as shaped by human-ecosystem interactions affect pathogen dynamics and hence the likelihood of zoonotic spillover and transmission?
- How do different peoples' interactions with ecosystems (in the use of cultural and provisioning ecosystem services - bush meat, farming, grazing, gathering) affect their exposure to the disease?
- What are the impacts of the disease on poverty and well-being, and the trade-offs for well-being between disease regulation and control, and other uses of ecosystem services?
- How do regional, national and global drivers (e.g. climate, land use, population, urbanisation, economy) shape these local dynamics, with what implications for ecosystem-disease-poverty scenarios across scales?
- How do different actors (local people, government agencies, policy-makers) understand and represent ('frame') ecosystem services and related health problems within a political economy of knowledge, and how does this shape their practices and interventions?

The Consortium will address these questions in relation to and through comparison between four diseases: Lassa fever in Sierra Leone, henipaviruses in Ghana, Rift Valley Fever (RVF) in Kenya and zoonotic trypanosomiasis in Zambia and Zimbabwe. In contrasting ecosystem types from humid forest through forest-savanna transition to wooded *miombo* savanna and semi-arid savanna, each case study disease is affected in different ways by ecosystem change and dependencies on wildlife and livestock hosts, with diverse impacts on people, health and livelihoods.

Overall, it aims to deliver:

- High-level disciplinary and interdisciplinary science, published in a suite of high-impact journal outputs.
- Evidence - for zoonotic diseases of importance in a range of African environmental settings - of the full pathways that link drivers, ecosystem functioning and change, disease regulation as an ecosystem service, people's values and practices, and impacts on the poverty and

wellbeing of different groups - and thus of how ecosystem services can be managed in sustainable ways that reduce disease risks and burdens for the poor.

- Innovative, interdisciplinary theory and conceptualisation of ecosystem service – health dynamics, grounded in integrated modelling approaches, with demonstrated utility and potential for wide application across issues and settings.
- Enhanced capacity in research excellence and inter-disciplinarity for African and European scientists.
- Evidence to identify and stimulate new opportunities for policy, institutions and interventions to help people move out of poverty.

Taken together, we hope these outputs will enable the DDDAC to link cutting-edge, world class science to the potential for development impacts for poor people in African settings and beyond, around ecosystem-health challenges that deeply affect people's wellbeing today, and pose major threats to future generations.

ZSL Institute of Zoology

LIVING CONSERVATION

The Institute of Zoology, Zoological Society of London

The Post Doctoral Research Assistant will be based at the Institute of Zoology (IoZ), Zoological Society of London. The Institute of Zoology is a world renowned research centre working at the cutting edge of conservation biology, specialising in scientific issues relevant to preserving animal species and their habitats. The Institute of Zoology combines fundamental and applied research in four thematic areas: Behavioural & Population Ecology; Biodiversity & Macroecology; Genetic Variation, Fitness & Adaptability and Wildlife Epidemiology (see www.zsl.org/science). The Institute is supported by the Higher Education Funding Council for England (HEFCE), in partnership with University College London (www.ucl.ac.uk). The Institute of Zoology is leading the dynamic drivers modelling theme of the Dynamic Drivers of Disease in Africa Consortium and, together with the University of Cambridge, is co-leading the disease-ecosystem dynamics theme.

Job description

The Post Doctoral Research Assistant will report to Dr. Kate Jones (www.zsl.org/katejones) and be employed full-time (100%) by The Zoological Society of London for one year initially with the possibility of renewing for a further 2 years. S/he will be based at the Institute of Zoology in London within Dr. Kate Jones' research group and will be part of the Biodiversity & Macroecology and Wildlife Epidemiology research themes. The successful candidate will be part of the vibrant multi-disciplinary research community at IoZ and at the Department of Genetics Evolution and Environment at the University College London (www.ucl.ac.uk/gee) and within the wider London academic community (www.ceevol.co.uk).

His/her roles will include:

- Collating historical and current spatial information of cases for four diseases: Lassa fever in Sierra Leone, henipaviruses in Ghana, Rift Valley Fever (RVF) in Kenya and zoonotic trypanosomiasis in Zambia and Zimbabwe. Data collection will be from the literature and also will involve liaising with and visiting our collaborators in Africa and UK partners.
- Designing and developing an online database to store and collate disease case information.
- Collating information for possible ecological, environmental, socioeconomic, anthropogenic and habitat drivers of disease emergence and transmission at different spatial scales.
- Building empirical spatial models of disease emergence and human health with these drivers at different spatial scales.
- Working across the modelling group within DDDAC, linking empirical modelling to participatory and process modelling being carried out by others based at Cambridge,

STEPS Centre and Edinburgh including attending meetings and contributing to ESPA-wide activities.

Person specification

Required skills and experience:

- Doctorate in a relevant discipline (including ecology, macroecology, evolution, spatial epidemiology), ideally with a focus on health/disease and development issues
- Publication record in this field
- Working knowledge of spatial statistics and analysis, R, GIS and SQL.
- Experience in compiling and developing global biodiversity, environmental and socioeconomic datasets
- Knowledge of the 'One Health' policy debate, and the relationships between health, disease, ecosystems and poverty alleviation

Desirable skills and experience:

- Knowledge of process-based epidemiological modelling
- Knowledge of machine learning techniques to model species distributions (MaxEnt, ENFA)
- Experience of working in multi-disciplinary research teams
- Experience of working in Africa, and ability to travel frequently
- Knowledge of some of the key focus diseases (Lassa, Henipah, trypanosomiasis, Rift Valley Fever) and/or zoonoses more generally
- Knowledge of DDDAC research countries (Ghana, Sierra Leone, Kenya, Zambia, Zimbabwe)
- Knowledge of critical debates around ecosystem services and poverty alleviation

Useful References

Jones, K. E., N. Patel, M. Levy, A. Storeygard, D. Balk, J. L. Gittleman, and P. Daszak. 2008. Global trends in emerging infectious diseases. Nature **451**:990-994.

Kilpatrick, A. M., A. A. Chmura, D. W. Gibbons, R. C. Fleischer, P. P. Marra, and P. Daszak. 2006. Predicting the global spread of H5N1 avian influenza. Proceedings of the National Academy of Sciences of the United States of America **103**:19368-19373.

Salary: IoZ pay scale grade 7 (£30,674 inclusive of London Weighting)

Start date: 1st April 2012

How to apply: Please send a CV, covering letter and contact details of three referees to hr@zsl.org Informal enquires can be made to kate.jones@ioz.ac.uk.