



## Climate change, ecosystem services and adaptation in East Africa's semi-arid regions: Early diagnostics of critical knowledge gaps for landscape conservation

Written by Daniel McGahey

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**ASSAR (Adaptation at Scale in Semi-Arid Regions) seeks to deepen understanding of climate vulnerability and adaptation in semi-arid regions, and to help transform current adaptation practice to a mode that achieves proactive, widespread adaptation embedded in development activities.**

ASSAR is a five-year, multi-country research project, which aims to deepen the understanding of the barriers and enablers for effective, medium-term adaptation within the dynamic and socially differentiated semi-arid regions of Africa and Asia. ASSAR will generate new knowledge about how adaptation processes – especially those linked to governance systems, policies and adaptation responses – can be modified or improved upon to achieve more widespread, equitable and sustained adaptation. We are particularly interested in understanding people's vulnerability and, in doing so, exploring the dynamic structural and relational aspects linking vulnerability to social difference, governance and ecosystem services.

*This briefing paper has been produced from early diagnostic research of ASSAR's East Africa Research Team.*



# BACKGROUND

Improving understanding of the barriers and limits to adaptation and transformational change are highlighted as critical knowledge gaps within the Fifth Assessment Report (AR5) of the Intergovernmental Panel on Climate Change (IPCC). Limits to adaptation at the regional level result from the dynamic interaction between biophysical and socio-economic constraints; yet in many socio-ecological contexts these barriers remain poorly understood.

Conventional social vulnerability assessment approaches have contributed little to this knowledge gap, as over time they have often become static assessments paying inadequate attention to the dynamic dimensions of people's vulnerability and wellbeing. This has limited our understanding of the structural and relational factors driving vulnerability of the poor<sup>1</sup>.



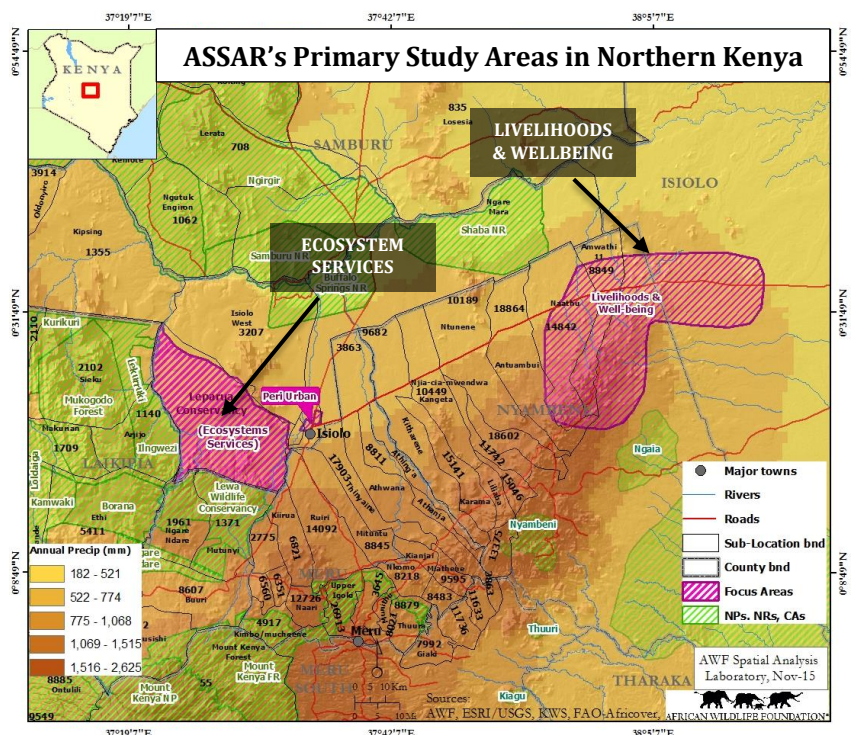
Deepening our understanding of the structural causes of vulnerability and their relation to rising inequality, marginalisation and constraints on ecosystems is also critical to evaluating capacity for transformative change. Demand for this form of knowledge is becoming central to the adaptation agenda as wider recognition that restricting responses to incremental change within existing systems and structures, without considering possible pathways to transformational change, may increase costs, losses or miss valuable opportunities<sup>3</sup>. Moving beyond static approaches to generating knowledge that can guide these pathways towards sustainable futures is also an imperative to inform the post-2015 sustainable development agenda and goals (SDGs). These issues also require urgent attention in order to inform the development of Intended Nationally Determined Contributions (INDCs) that include ambitious measures that can adequately address structural inequalities, yet fall within the limits of societal adaptation and transformational change.



At the same time, while the knowledge base around the likely direct impacts of climate change on biodiversity has developed substantially, most species and site-based biophysical vulnerability assessments fail to incorporate likely human response factors. These oversights lead to systematically biased assessments that could be favouring the implementation of inappropriate biodiversity management actions or poor prioritisation of viable sites for conservation under future climate change<sup>2</sup>.

**Both the conservation and development sectors would therefore benefit from a deeper understanding of the dynamic structural and relational aspects linking vulnerability and social difference to governance and ecosystem services.**

Moreover, greater clarity is needed around the role that ecosystem services play within present contexts of wellbeing and vulnerability, along with the role and limits that nature-based solutions could provide within the adaptation agenda.



# ECOSYSTEM SERVICES AND ADAPTATION IN EAST AFRICA

Our [Regional Diagnostic Study](#) (RDS) reviewed existing risks and adaptation responses, and identified major knowledge gaps needed to develop responses that can ensure widespread, sustained and equitable adaptation across the East Africa semi-arid regions. The RDS reveals several interesting observations related to the current role of nature-based or ecosystem-based responses within what is termed the “adaptation-development spectrum”.

The need to respond to livelihood risks such as land and soil degradation, the erosion of biodiversity and water shortages or floods through approaches centering on ecosystem protection is a strong strand in the region’s grey and academic adaptation literature.


Here we highlight some of our key RDS findings and describe the implications of these findings for the focus on ecosystem services within our long-term research agenda:

- ❖ Many organisations and authors within the region and elsewhere see a route to vulnerability reduction through more sustainable natural resources management and conservation via changes including decentralisation of resource management and recognition of the value of ecosystem services<sup>e.g.,4;5;6;7;8;9</sup>.
- ❖ In East Africa, adaptation initiatives are still very much directed towards sectors rather than specific types of ecosystems<sup>10</sup>, likely a reflection of the sectoral structure of government departments or specific foci of many non-governmental actors working on adaptation.
- ❖ Arid and semi-arid areas are often considered within adaptation planning as homogenous regions, and yet they vary greatly in terms of ecology, social organisation and culture. Many adaptation projects are implemented in one place and then transferred or scaled up to others; however, greater attention to the socio-ecological diversity of semi-arid regions may warrant approaches and interventions that are designed for particular landscapes, rather than specific sectors.
- ❖ There are a wide range of existing resource conservation programmes and initiatives in East Africa – on community wildlife conservation, soil and forest rehabilitation, wetlands protection, and reforestation and conservation of watershed forests – that are often undertaken through collective

labour mobilisation of local communities<sup>11;12,13,14</sup>. The rationale for many of these projects is that healthy, functional ecosystems enhance natural resilience to the adverse impacts of climate change and reduce the vulnerability of people and biodiversity.

- ❖ One approach, so far little used in the semi-arid parts of the region, known as ‘Ecosystem-based Adaptation’ (EbA), uses biodiversity and ecosystem services as part of an overall adaptation strategy to help people and communities adapt to the negative effects of climate change at local, national, regional and global levels<sup>15</sup>.
- ❖ So far the role of ecosystem services in determining the current vulnerability and wellbeing of socially differentiated semi-arid communities remains poorly understood.
- ❖ Similarly the relative trade-offs and limits for nature-based or ecosystem-based solutions to climate change adaptation from a semi-arid community perspective have not been considered in detail.

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- <sup>1</sup> Tschakert, P., van Oort, B., St. Clair, A.L. and LaMadrid, A. (2013) Inequality and transformative analysis: a complementary lens for addressing vulnerability to climate change. *Climate and Development* 5(4): 340-350.
  - <sup>2</sup> Segan, D.B., Hole, D.G., Donatti, C.I., Zganjar, C., Martin, S., Butchart, S.H.M. and Watson, J.E.M. (2015) Considering the impact of climate change on human communities significantly alters the outcome of species and site-based vulnerability assessments. *Diversity and Distributions* 21: 1101-1111.
  - <sup>3</sup> Denton, F., T.J.Wilbanks, A.C. Abeysinghe, I. Burton, Q. Gao, M.C. Lemos, T. Masui, K.L. O'Brien, and K.Warner, 2014: Climate-resilient pathways: adaptation, mitigation, and sustainable development. In: *Climate Change 2014: Impacts, Adaptation, and Vulnerability. Part A: Global and Sectoral Aspects. Contribution of Working Group II to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change* [Field, C.B., V.R. Barros, D.J. Dokken, K.J. Mach, M.D. Mastrandrea, T.E. Bilir, M. Chatterjee, K.L. Ebi, Y.O. Estrada, R.C. Genova, B. Girma, E.S. Kissel, A.N. Levy, S. MacCracken, P.R. Mastrandrea, and L.L.White (eds.)]. Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA, pp. 1101-1131.
  - <sup>4</sup> EAC (2006) Agriculture and rural development policy for the East African Community, Arusha, Tanzania.
  - <sup>5</sup> Leary, N., Kulkarni, J., Seipt, C. (2007) Assessment of Impacts and Adaptation to Climate Change, International START Secretariat, Washington DC.
  - <sup>6</sup> Alterra (2010) Climate change in East Africa: Towards a methodological framework on adaptation and mitigation strategies of natural resources, Alterra. Wageningen.
  - <sup>7</sup> EAC (2011) EAC Development Strategy 2011/12-2015/16, East African Community, Arusha, Tanzania.
  - <sup>8</sup> Mango, L. M., A. M. Melesse, M. E. McClain, D. Gann and Setegn S. G. (2011) Land use and climate change impacts on the hydrology of the upper Mara River Basin, Kenya: results of a modeling study to support better resource management. *Hydrology and Earth System Sciences*. 15(7): 2245-2258.
  - <sup>9</sup> ADB (2013) At the Center of Africa's Transformation: Strategy for 2013-2022, African Development Bank Group, Abidjan.
  - <sup>10</sup> Eriksen, S. and Lind J. (2009) Adaptation as a Political Process: Adjusting to Drought and Conflict in Kenya's Dryland. *Environmental Management* 43(5): 817-835.
  - <sup>11</sup> Brown, D.R., Dettmann, P., Rinaudo, T., Tefera, H. and Tofu, A. (2011) Poverty alleviation and environmental restoration using the clean development mechanism: a case study from Humbo, Ethiopia. *Environmental Management* 48:322-333.
  - <sup>12</sup> Hove, H., Ecevarria, D., Parry, J. (2011a) Review of Current and Planned Adaptation Action: East Africa – Uganda, IISD, Ottawa.
  - <sup>13</sup> Hove, H., Ecevarria, D., Parry, J. (2011b) Review of Current and Planned Adaptation Action: East Africa – Ethiopia, IISD, Ottawa.
  - <sup>14</sup> Hove, H., Ecevarria, D., Parry, J. (2011c) Review of Current and Planned Adaptation Action: East Africa – Kenya, IISD, Ottawa.
  - <sup>15</sup> UNEP (2015) Building Resilience of Ecosystems for Adaptation. Click [here](#).



**Addressing these knowledge gaps will underpin the research design planned within the detailed case study areas under ASSAR’s major phase of research, the Regional Research Programme (RRP; Jan 2015 – Dec 2018). The overall objective is to interrogate types of strategies and governance systems that could enable the equitable and sustainable use of ecosystem services and enhance wellbeing under climate change.**

# BRIDGING THE ECOSYSTEM SERVICE KNOWLEDGE GAP

Our team is concentrating research activity on two primary research sites within comparable semi-arid regions of Kenya and Ethiopia. These are the northern Kenya Isiolo-Meru semi-arid site and the Middle Awash Valley site in Ethiopia. Both sites have been selected to include important peri-urban centres and a range of land-use systems from sedentary farming and agropastoralism, to extensive pastoralism (socio-ecological system with integrated livestock/wildlife populations). In northern Kenya these land uses follow a hydro-meteorological gradient from the higher rainfall zones surrounding Mount Kenya to the semi-arid region occupying the lowland rangelands at lower altitudes.

Through the RRP phase a detailed case study approach will be used to understand how ecosystem services dynamics, social differentiation (in vulnerability or wellbeing and responses to risk), and governance (of natural resources and adaptation) interact at the landscape level. Research synthesis at the regional and cross-regional level will then expose important new knowledge on key barriers and enablers for medium-term adaptation, and appropriate response pathways for enhanced wellbeing or transformative change.

Ecosystem services research within these primary sites will focus on addressing the central question: how can ecosystem services be managed and governed in an equitable manner to support wellbeing in the face of climate change? We note that social differentiation, and

especially gender, is implicit in the term “equitable”, but we are also interested here in equitable access to resources by communities in the face of other (e.g., industrial, commercial, state) demands and use for ecosystem services. The ecosystem services research stream will involve (*inter alia*) analysis around four main questions:

1. What are the key ecosystem services essential for material wellbeing, how are they distributed and who benefits from them?
2. How is the use of ecosystem services governed and what are the consequences for the wellbeing of different social groups and the ecosystem services themselves?
3. What changes in quantity, quality and distribution of ecosystem services have been seen in the last few decades and are expected in the medium-term\* and long-term, and what drives these changes at the study sites?
4. What strategies and governance systems could enable the equitable and sustainable use of ecosystem services and enhance human wellbeing under climate change?

*\*In ASSAR, medium-term refers to the end of 2030 and long-term to the end of 2050. Information on climate projections will, however, be generated over a given period (e.g., 2020-2040) and the mean of that period will be considered as the analytical reference.*

In northern Kenya we will be exploring these issues within a specific ecosystem services case study area that includes people involved in a community-based wildlife management programme supported by a local NGO called the Northern Rangelands Trust. Through this programme, community groups have established a conservancy with the goal of enhancing the conservation of nature and economic empowerment of the member households. The underlying premise is that conservancy members gain legal rights over wildlife and other natural resources within the conservancy boundaries and ultimately gain revenue from employment and tourism income. Within this context we will be exploring the linkages between human needs, wellbeing and ecosystem services. We will investigate how the conservancy model contributes to certain ecosystem services (particularly provisioning services) and the implications and trade-offs associated with these benefits in the context of adaptation at scale within the highly differentiated and dynamic semi-arid socio-ecological system. Ultimately this research agenda will demonstrate the extent to which the conservancy model may offer a viable approach to ecosystem-based adaptation for semi-arid regions.



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