# Bioenergy and Sustainability in Africa (COMPETE)

# Guiding Questions

*1. What was the case study's central sustainability challenge or problem?*

The Competence Platform on Energy Crop and Agroforestry Systems for Arid and Semi-arid Ecosystems in Africa (COMPETE) project addressed the interrelated problems of low quality of life, limited energy access, and lack of livelihood opportunities in rural Africa. In concert, these factors lead to a degradation of arid and semi-arid ecosystems through unsustainable land-use practices. Although a significant area of potentially productive land can be identified across the continent, hunger, limited food access, and a general lack of development hinder the productive use of this land. The agricultural sector is dominated by subsistence farming with very low investment, that degrades the land, and is the subject of conflict.

*2. What stakeholders participated in addressing the challenge? How did those stakeholders participate?*

From Wiek et al. 2011: "GIS-mapping and potential analysis was done in all eight countries, including in Botswana, Burkina Faso, Kenya, Mali, Senegal, South Africa, Tanzania, and Zambia. An in-depth socio-economic impact analysis (economic feasibility and quality of life) was performed for an exemplary biofuel project in Tanzania to explore criteria relevant to "socially responsible" investors who plan to launch a bioenergy project in Sub-Saharan Africa (*not* pre-post impact assessment) (Portale, 2010). Participatory research settings were applied at different stages of the project in order to ensure incorporation of traditional knowledge on land use practices and deliberation among stakeholder perspectives (e.g., state departments involved in bioenergy, grassroots stakeholders, farmers' associations, investors, companies, experts)."

*3. What factors supported or impaired the success of the case?*

The biofuels policy debate has evolved rapidly and describes supporting and inhibiting factors of biofuel development. Politicians, the media, and citizens alike have begun to discuss the roles of biofuels in climate change, food price spikes, and competition for land and water (IIED, 2008). Moreover, food security has become major concern, especially availability, access, and stability – ie the political economy of access to land (FAO, 2007). Land, however, is not merely a means for food production. Observers and activists worry that the spread of biofuels may exacerbate existing inequities in land access, compounded, of course, by land's historical, political, cultural, and spiritual value (FAO, IIED, IFAD 2009; FAO, IIED 2008).

*4. What research approach linked scientific knowledge and practical action?*

From Wiek et al. 2011: "Good practice guidelines were produced to assist a balanced assessment of bioenergy projects regarding sustainability. A "Declaration on Sustainable Bioenergy for Africa" was developed in cooperation with high-level decision makers from Kenya, Mozambique, Tanzania, Uganda, and Zambia that identified visions for bioenergy development in Africa, favorable market creation, land use strategies, and initiatives for capacity building (COMPETE Declaration on Sustainable Bioenergy, 2008). The Declaration continues to inform the policy formulation process at national levels (Mozambique, Tanzania, and Mali) and regional levels (SADC Bioenergy Policy Tool) as well as provided inputs to the broader international discussion (Roundtable on Sustainable Biofuels (RSB)."

*5. What scientific and what real-world outcomes were achieved?*

From Wiek et al. 2011: "The project produced knowledge in different formats on current land use and land use changes, potential for bioenergy technologies, improved agricultural practices, sustainability assessment frameworks, and good practices guidelines specific to the respective national and regional context. The mapping and impact assessment identified areas and technologies for bioenergy production that would generate energy for local needs and create livelihood opportunities, while avoiding land degradation and food-fuel conflicts to ensure food security."

# Supplementary Materials

## Overview

Farioli F, Wiek A (2012) Bioenergy and sustainability in africa – case study overview. ICSS 2012 Documents

## COMPETE Summary

Janssen R, Rutz D, Helm P, Woods J, Diaz-Chavez R (2009) Bioenergy for sustainable development in africa – environmental and social aspects. Project Document COMPETE

Wiek A, Ness B, Schweizer-Ries P, Brand FS, Farioli F (2012) From complex systems thinking to transformational change: a comparative appraisal of sustainability science projects. Sustainability Science 7(Suppl):5-24

Yamba F, Janssen R, Woods J, Diaz-Chavez R (2008) COMPETE declaration on sustainable bioenergy for africa. Project Document COMPETE

## COMPETE Land Mapping Module Summary

Watson HK (2009) Understanding traditional and modern land use dynamics in the african context. Project Document COMPETE

Watson HK, Diaz-Chavez RA (2011) An assessment of the potential of drylands in eight sub-saharan african countries to produce bioenergy feedstocks. Interface Focus 1:263-270

## COMPETE Biofuels Projects

Farioli F, Ippolito B (2012) Leguruki energy project – tatedo. ICSS 2012 Documents

Farioli F, Ippolito B (2012) Zambia jatropha oil production of marli investments zambia ltd. ICSS 2012 Documents

Romijn HA, Caniëls MCJ (2011) The jatropha biofuels sector in tanzania 2005–2009: evolution towards sustainability? Research Policy 40:618-636

Sulle E, Nelson F (2009) Biofuels, land access and rural livelihoods in tanzania. International Institute for Environment and Development (IIED).

### Biofuels in Africa Background

Lynd LR, Woods J (2011) A new hope for africa. Nature 474:S20-S21

# Brief background

About 52% of the sub-Saharan Africans live on less than $1US/day. Approximately 43% of urban residents have incomes below $47US/person-month (Woods et al., 2007). Shortage of work does not provide sufficient income to obtain modern, clean, energy supplies. Hence, about 80% of Africans still depend on charcoal and firewood to fulfil their energy needs (African Ministerial Statement, 2001).

According to the WEC (2007) and the FAO (2008), traditional biomass will be the main energy source for sub-Saharan Africans for the foreseeable future. With demand continuing to grow, pressure on the vulnerable arid and semi-arid ecosystems of Africa will only increase. These circumstances leave poor individuals trapped in a cycle of increasingly unsustainable dependence on declining local resources (Janssen et al., 2007).

At least 16% of the world's agricultural land already shows a significant decline in productivity, including about 65% of the cropland and pastures in Africa. Traditional agricultural methods are unable to cope with the mounting stresses of climate change. However, bioenergy systems may be a path forward, provided they are modern, locally adapted, and wisely implemented and planned. Many studies have estimated the potential supply of biomass energy, highlighting ~750 Mha of "unused potential agricultural land" in Africa (Janssen et al., 2007).

# Case Overview

COMPETE's main objective was to stimulate sustainable bioenergy implementation in Africa through the establishment of a platform for policy dialogue and capacity building to identify pathways for the sustainable provision of bioenergy. The desired outcomes of this objective were:

- Improved quality of life and alternative means of income for rural populations
- Preservation of critical arid and semi-arid ecosystem functions
- Equitable exchange of knowledge between the EU and African countries
- Support governmental biofuel development decision-making processes

COMPETE was a EU Networking Project supported and co-funded by the European Commission in the 6th Framework Programme – Specific Measures in Support of International Cooperation from Jan 2007—Dec 2009. It involved scientists, practitioners, companies, and policy-makers from Brazil, India, Mexico, Europe, and Africa. COMPETE was divided into seven major work-packages (WPs), as shown below:

COMPETE's matrix of multi-disciplinary and cross-sectoral WPs sought to:

- Evaluate current and future potential for provision of sustainable bioenergy in Africa, and to compare that potential with existing land use patterns and technologies

- Develop practical, targeted, and efficient policy mechanisms for the development of bioenergy systems that enhance local communities and address gender inequalities
- Establish the Competence Platform to ensure effective knowledge exchange inside and outside the network
- Facilitate South-South technology and information exchange by capitalizing on global bioenergy R&D leaders in Brazil, Mexico, India, China, and Thailand
- Develop innovative tools to provide financing for national bioenergy programs and local bioenergy projects (carbon credits, bi- and multi-lateral funding instruments, and international trade).