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Biogas Production from Industrial Effluents of Food and Agro-allied Companies

In developing countries, few communities are connected to the electricity grid and therefore must rely on fuel wood for energy generation. This is a major cause of deforestation which in turn leads to greater greenhouse gas (GHG) emissions. A more sustainable approach to providing energy to rural communities is needed since the cost of connecting to the national electricity grid is very high and therefore not affordable for most developing countries. Biogas is primarily derived from organic wastes including kitchen waste, waste from animal husbandry, yard waste and agricultural residues. It can either be used as cooking gas or in an integrated co-generation plant to produce electricity. In recent years, food and agro-allied companies in developing countries have been sited far from the urban areas where both the solid and liquid waste generated there can easily serve as substrate for biogas production. The use of food and agro-allied industrial effluents for biogas production will not only help treat waste and thus reduce the negative impact of such waste on the ecosystem. It will also help food industries meet their energy needs and, furthermore, their social responsibility by supplying electricity to rural homes. In relevant literature, there are many studies on biogas production from food wastes, but there is a paucity of information on the anaerobic digestion of food and agro-allied industrial effluents for biogas production. In light of the complexity of agro-allied industrial effluents (which usually contain macromolecular organic matter and various trace metals), the project aims to develop a simple and reproducible technology that is based on either batch or continuous reactors and coupled with pre-treatment technology capable of handling large volumes of industrial effluents for biogas production.



Ayodele, Olubunmi

Degree: PhD | **Field:** Bioenergy, Clean Production and Material Science | **Affiliation at the time of application:** Forestry Research Institute of Nigeria, Ibadan, Nigeria

Host Institution in Germany: Technische Universität Dresden, Institut für Abfall und Kreislaufwirtschaft, Dresden | **Host:** Professor Dr.-Ing. Christina Dornack

Measuring and Comparing Climate Change Vulnerability and the Sustainability of Adaptation Measures in Coastal Areas of Germany and Ghana

Coastal areas worldwide are threatened by climate change effects and their impacts. Ghana's coastal zones are particularly vulnerable to environmental and socio-economic change. Sustainable coastal management strategies are needed to deal with the impacts and enable long-term adaptation. This research aims at assessing and comparing climate change effects and vulnerabilities of the biophysical environment as well as socio-economic needs along the coasts of Germany and Ghana. Adaptation measures in Ghana's coastal areas will be evaluated using indicator-based sustainability assessments. Fati Aziz's project will help to gain a comprehensive understanding of climate change impacts and provide an understanding of the respective need for adaptation and the individual spatial differences. The project will also provide instruments that can be directly used in Ghanaian coastal communities to help raise awareness of the need for sustainable development and long-term adaptation to climate change risks.

Aziz, Fati

Degree: Master of Science | **Field:** Environmental Science | **Affiliation at the time of application:** University of Abomey-Calavi, West African Science Service Centre on Climate Change and Adapted Landuse, Abomey-Calavi, Benin

Host Institution in Germany: Leibniz-Institut für Ostseeforschung, Warnemünde | **Host:** Professor Dr. habil. Gerald Schernewski



Understanding the Governance, Social, Institutional, and Political Economy Factors Influencing the Implementation of the Paris Agreement in South Africa and Kenya

Article 2 of the United Nations Framework Convention on Climate Change (UNFCCC) outlines the objective 'to prevent dangerous anthropogenic interference with the climate system'. This is broadly accepted as meaning limiting global warming to 2°C. The Paris Agreement and the envisaged nationally determined contributions represent the global effort to achieve this goal. Despite the urgent need to transition to 2°C and a compelling techno-economic case, the implementation of policies to achieve this goal is lagging considerably. A significant body of work has focused on techno-economic analyses but research that investigates the political and institutional factors is less established. The objective of this study is to identify the governance, social, institutional, and political economy factors that influence the implementation of the Paris Agreement in South Africa and Kenya. By increasing our understanding of these factors, the study aims to provide useful insights for those involved in the formulation and implementation of climate change mitigation policies and support their progress and implementation.



Boule, Michael

Degree: Master of Philosophy | **Field:** Implementation of climate change mitigation policy | **Affiliation at the time of application:** University of Cape Town, Energy Research Center, Cape Town, South Africa

Host Institution in Germany: New Climate Institute, Berlin | **Host:** Frauke Röser

Assessing the Potential Role of Community Forestry in Climate Change Adaptation and Mitigation Goals

Climate change is an increasingly significant problem for many rural communities across the developing world. This is partly a reflection of their reliance on natural resources, especially agriculture and forestry, for their livelihoods. Community Forestry (CF) is centered on placing the management of forest in the hands of local communities. It has had a positive impact in recent years. A great deal of research is focused on analysing CF as a good forest management model at national and local level. However, there are fewer studies on CF's role in responding to challenges created by climate change. Bui Thi Linh's research aims to demonstrate that CF can boost the adaptive capacity of forest and local communities by synergizing forest-based climate change mitigation and adaptation strategies. Using a governance approach, Bui Thi Linh will conduct a qualitative systematic review to identify, critically evaluate and integrate findings of relevant studies. The work will put forward recommendations to policymakers and development agencies on how to mainstream CF, meet national climate-related targets and support the participation of forest-dependent communities.

Bui, Thi Linh

Degree: Master of Public Management | **Field:** Climate change adaptation and mitigation, Community Forestry | **Affiliation at the time of application:** CARE International in Vietnam, Hanoi, Vietnam

Host Institution in Germany: Technische Hochschule Köln, Institut für Technologie und Ressourcenmanagement in den Tropen und Subtropen, Köln | **Host:** Professor Dr. Johannes Hamhaber



Building Alternative Adaptation Options for Effective Management of Impacts of Climate Change and Variability on Sorghum in Dry Lowland Sorghum Production Areas of Ethiopia

The national economy of Ethiopia is dependent on agriculture, a sector that is critically sensitive to climate change and variability. In addition, Ethiopia's rapidly growing population has further increased pressure on the country's food production systems. From a climate change impact perspective, sorghum is more resilient to climate change and such impacts on crop yields are projected to be minimal. In light of this, this study could do much to help make this particular camel crop a reliable source of food and feed.

The main goal of this study is to quantify the possible impacts of climate change on sorghum and to develop options for adapting to climate change and variability, using crop simulation modelling. By doing so, Fikadu Getachew will support climate change adaptation strategies in the region. As a result, agricultural crop production resilience will be increased and crop yield variability will be reduced in the face of climate variability and extreme events.



Getachew Welidehanna, Fikadu

Degree: Master of Science | **Field:** Climate change and variability | **Affiliation at the time of application:** Ethiopian Institute of Agricultural Research, Melkassa Agricultural Research Centre, Melkassa, Ethiopia

Host Institution in Germany: Leibniz-Zentrum für Agrarlandschaftsforschung, Müncheberg | **Host:** Dr. Marcos Lana

Development of a Method for the Integrated ex-ante Assessment of Renewable Energy and Energy Efficiency Policies in the Context of Tunisia

The development of Renewable Energy (RE) sources and Energy Efficiency (EE) policies is a central aim of energy policies around the world. Abatement of greenhouse gas (GHG) emissions can be achieved primarily by utilizing abundant RE sources and by implementing EE measures. Establishing new regulations and reforming policies can have benefits on different levels, such as achieving energy security, energy independence and long-term socio-economic benefits. Yet, one of the most important steps in this process is estimating their likely future economic, social and environmental impacts. This can help with determining whether policies are effective and additionally provide an opportunity to review, adapt and continuously improve them. Souhir Hammami will develop a method for an integrated ex-ante assessment of RE and EE policies. This will give Tunisia tools and processes for estimating future impacts. The ex-ante evaluation provides information that provides a basis for monitoring policies after they have been implemented. It is an important step toward the appropriate assessment of policy impacts on different sectors and levels. Integrated ex-ante assessment (IA) is a tool that examines and measures the likely benefits, costs and effects of new or changed regulations or policies. IA provides decision-makers with valuable empirical data and a comprehensive framework in which they can assess their options and the possible consequences of their decisions. A poor understanding of the problems can undermine regulatory efforts and results in regulatory failures. IA

is used to define problems and ensure that actions are justified and appropriate. Rationalizing the policy-making process in this way aims to enable decision-makers to choose the policy option with the greatest benefits and lowest costs. IA does not replace the need for political decisions but rather ensures essential information for a good policy development process, well-informed decisions and good governance.

Hammami, Souhir

Degree: Master of Engineering | **Field:** Political Sciences, Renewable Energy, Energy Efficiency, Modelling Impact Assessment | **Affiliation at the time of application:** Regional Centre for Renewable Energy and Energy Efficiency, Cairo, Egypt

Host Institution in Germany: Freie Universität Berlin, Forschungszentrum für Umweltpolitik, Berlin | **Host:** Dr. Klaus Jacob



Climate Protection in Kenya: Risk Assessment, Ecosystems Management and Climate Change in Kenyan Arid and Semi-arid Lands

Climate change, especially in the Arid and Semi-arid Lands (ASALs) of Africa, poses a devastating threat to the communities in these areas which depend on seasonal rainfall for subsistence. Drought occurrence has increased in the recent years resulting in decreased water availability, depleted pasture, livestock deaths, crop failure, and famine. The development of effective early warning systems and weather prediction methods is therefore essential to climate change mitigation and adaptation strategies for reducing negative impacts on communities which depend on rain-fed agriculture. Betty Rono seeks to generate information on drought indices, risk assessment, ecosystems management and climate change in Kenyan ASALs. She intends to obtain findings by estimating the frequency of drought by calculating the drought index in semi-arid Eastern Kenya, determining the outcomes of climate variability and assessing the challenges as well as the opportunities they present for enhancing climate resilience among the ASAL communities in Eastern Kenya, and by evaluating the limitations of early warning systems with regard to their accuracy and dissemination pathways. The results of this project will be relevant to enhancing knowledge for ASALs' adaptation to climate change in Africa in general and Kenya in particular.



Jepchirchir Rono, Betty

Degree: Master of Science | **Field:** Climate Change Adaptation | **Affiliation at the time of application:** Egerton University, Nakuru, Kenya

Host Institution in Germany: Helmholtz-Zentrum für Umweltforschung, Deutsches Zentrum für integrative Biodiversitätsforschung, Leipzig | **Host:** Professor Dr. Aletta Bonn

Characterizing Drought Using Gauge Precipitation, Hydrological Models and GRACE over Ethiopia

Ethiopia has recently experienced its worst drought in 30 years. The country remains caught in a deadly cycle of drought. The country's rain-fed agriculture is highly vulnerable to variations in the amount and patterns of rainfall. The failure of seasonal rains creates heightened stresses in the major crop-producing regions. Drought monitoring and forecasting in Ethiopia is limited by the paucity of reliable ground-based observational data. The very few drought studies done only consider precipitation as a drought indicator. There is a lack of objective information on soil moisture and groundwater conditions, which are useful indicators of drought. Information on hydrological droughts is completely missing. A new approach to drought monitoring has been developed using the Gravity Recovery And Climate Experiment (GRACE)-based Terrestrial Water Storage (TWS) determination in combination with hydrological models and satellite products in other parts of the world. The GRACE satellites observe time variations in the earth's gravity field, which yield valuable information about changes in TWS. This constitutes a new hope for climate change studies. With his research, Tadesse Tujuba Kenea aims to characterize the spatial and temporal patterns of drought, drought severity and timing in all components of TWS and to assess sources of predictability for TWS from global sea surface temperature and pressure indices. Furthermore, this research aims to assess if drought could be forecast sufficiently in advance to enable early warning and preparedness. Advanced post-processing and statistical techniques will be used to achieve these aims.

Kenea, Tadesse Tujuba

Degree: Master of Science | **Field:** Meteorology | **Affiliation at the time of application:** Arba Minch University, Department of Meteorology and Hydrology, Arba Minch, Ethiopia

Host Institution in Germany: Helmholtz-Zentrum Potsdam, Deutsches GeoForschungsZentrum, Potsdam | **Host:** Professor Dr. Andreas Güntner



Climate Change Responsibility Accounting Using Thermodynamic Concept of Exergy Cost Flow

Although the global cap on total greenhouse gas emissions could be set based on climate capacity balances, the allocation of emission reduction responsibilities in a reasonable way remains an unmet challenge. Suggestions have been made by researchers based on producer and consumer points of view. Hossein Khajeh Pour's research aims to define and apply a new method for environmental responsibility accounting based on physical quantities. Failures of developed allocation methods are to be overcome and external environmental damages internalized using the exergy concept. The research is based on the notion that exergy destruction is representative of environmental burdens. The project will be carried out in five steps: system design, gathering of the required data for each country/region, development of a system of equations, system solving, and interpretation of results. It is anticipated that averaged producer and consumer responsibilities will be determined based on the expected results. This will motivate importers (rich nations) to buy from green producers. Simultaneously, it will induce exporters (developing nations) to use greener production methods that will, in turn, reduce their responsibilities.



Khajeh Pour, Hossein

Degree: Master of Science | **Field:** Climate Change Responsibility Accounting and Thermodynamics | **Affiliation at the time of application:** Sharif University of Technology, Sharif Energy Research Institute, Tehran, Iran

Host Institution in Germany: Technische Universität Berlin, Institut für Energietechnik, Berlin | **Host:** Professor Dr. George Tsatsaronis

The Impacts of Climate Change and the Legal Framework of the Marine and Coastal Environment of the Gulf of Guinea

Communities across the Gulf of Guinea sub-region are suffering and will continue to suffer from inherent vulnerability to the impacts of climate change. The change in the climate is generating risks and events that are expected to become more frequent and larger in magnitude. Therefore, it is necessary to enact major adaptive and mitigative mechanisms through the revisiting of the present legal framework for the protection of the marine and coastal environment of the Gulf of Guinea. The study will focus on the importance of having a sub-regional climate protection legal framework, which will be able to help states in the area to go beyond the individual national fight against the impacts of climate change. In particular, it will showcase the imperative need to revitalize and adapt the existing legal framework instead of creating a new one. Thus, this study's focus is directed towards the need to strengthen and adapt the convention for the protection, management and development of the marine and coastal areas of West Africa's Atlantic coast region (1981) to present-day environmental issues. Based on a benchmarking of the Climate Action Plan of the European Union, Sheila Kong Mukwele will develop recommendations for a sub-regional Climate Action Plan for the Gulf of Guinea. The findings from the study will be submitted to all stakeholders concerned with this issue in the respective region.

Kong Mukwele, Sheila

Degree: Master in International Relations | **Field:** International Law and International Relations | **Affiliation at the time of application:** Ministry of External Relations, Yaoundé, Cameroon

Host Institution in Germany: Universität Trier, Institut für Umwelt- und Technikrecht, Trier | **Host:** Professor Dr. Alexander Proelß



Landscape Assessment and Ecological Monitoring of Selected Wetland Ecosystems in South and Southeast Asia using Time Series Analysis of Multi-temporal High Resolution Optical and Microwave Remote Sensing Data

Wetlands cover approximately 6% of the earth's surface. They are among the world's most productive and at the same time most threatened ecosystems. The proposed research focuses on the satellite-based, long-term evaluation of coastal wetlands in South and Southeast Asia. Hundreds of high-resolution satellite scenes from open satellite systems spanning time periods of more than 35 years in combination with the new European Sentinel satellites will be pre-processed and combined in time series approaches. Arun Prasad Kumar will apply change detection methods in order to identify and analyse long-term trends in seasonal inundation patterns as well as anthropogenic impacts on natural wetland systems, e.g. expansion of settlements, agriculture, or aquaculture. Ancillary climate data will be used to investigate the relationship between observed wetland dynamics and global climate change. The research will provide information on long-term and seasonal changes within coastal wetlands in Asia. The spatio-temporal transferability of the approach used here to different regimes will help our understanding of the implications of human impacts and global climate change on highly vulnerable wetlands, with an eye to framing monitoring and conservation strategies essential for policymakers, stakeholders and international organizations.



Kumar, Arun Prasad

Degree: PhD | **Field:** Remote Sensing Applications for Natural Resource Monitoring | **Affiliation at the time of application:** Indian Institute of Space Science and Technology, Department of Earth and Space Sciences, Thiruvananthapuram, India

Host Institution in Germany: Deutsches Zentrum für Luft- und Raumfahrt, Deutsches Fernerkundungsdatenzentrum, Oberpfaffenhofen | **Host:** Dr. Claudia Künzer

Deforestation and Induced Emissions: An Analysis Based on Land Use Change. Case Study of Cameroon

Like many developing countries with a forest patrimony, forests represent a vast heritage in Cameroon. This heritage is increasingly prized, especially given the crucial role forests can play in the fight against poverty. Unfortunately, forests are subject to some pressure, mainly due to the country's fast population growth. In recognition of the enormous contribution that forests can make in the fight against climate change, Cameroon ratified the United Nations Framework Convention on Climate Change (UNFCCC) and is now working to define its national targets for the reduction of emissions based on a strategy to combat deforestation and degradation. Cameroon's challenging task is to define its historical forest emission reference levels. According to the UNFCCC, these are landmarks for assessing the performance of each country in implementing REDD+ activities. However, the Cameroonian government should also take its development plans into account when computing its reference levels. That's why thorough studies are welcome that pertain to the issue and could foster a better understanding and help the elaboration of Cameroon's REDD+ national strategy. With her research project, Adeline Carine Makoudjou Tchendjou aims to compute the forest emission reference levels of Cameroon taking into consideration development plans included in the government's recent roadmap. Policy options which promote emissions mitigation will be identified. The research will also provide useful and relevant recommendations for sustainable land-use changes.

Makoudjou Tchendjou, Adeline Carine

Degree: Master of Engineering | **Field:** Statistics and Economics | **Affiliation at the time of application:** Ministry of Economy, Planning and Regional Development, Yaoundé, Cameroon

Host Institution in Germany: Universität Hamburg, Forschungsstelle Nachhaltige Umweltentwicklung, Hamburg | **Host:** Professor Dr. Uwe Andreas Schneider



Wake up "Boiling Frogs": Research on Animal Husbandry under Climate Change in Northern China

Climate change has adversely impacted on grasslands and local households, particularly in arid and semi-arid regions. Therefore, there is an urgent need for international and interdisciplinary research to explore the impact of climate change on steppes and how local farmers could adapt to such multiple crises. Taking Inner Mongolia in Northern China as an example for her research project, Lijuan Miao aims to figure out the herders' behaviour pattern in response to climate change. Based on her findings, policy recommendations will be developed to encourage herders to adapt their behaviour in ways to enhance sustainability. Lijuan Miao will acquire indigenous knowledge from Irish and German farmers and strengthen the international research collaboration between Ireland, Germany and China. The results of the research will be disseminated to stakeholders including policymakers and farmers to help the search for sustainable land management strategies for adapting and mitigating the climate change.



Miao, Lijuan

Degree: PhD | **Field:** Land Use and Climate Change |
Affiliation at the time of application: Nanjing University
of Information Science and Technology, Jiangsu, China

Host Institution in Germany: Leibniz-Institut für
Agrarentwicklung in Transformationsökonomien, Halle
(Saale) | **Host:** Dr. Zhanli Sun

Social Dynamics of Energy Transitions in India

Energy is a socio-technical system and energy transitions have complex social dimensions. Proposed energy pathways in India which call for significantly increasing the share of clean energy capacity in the country are likely to precipitate a variety of social outcomes including redistribution of economic risks and opportunities; changes in social behaviour and norms; reorganization of labour markets and community mobilization in opposition to certain technologies, amongst other things. This project will examine three influential modelling studies for possible scenarios for India's energy future for their implicit social assumptions and the social outcomes they might produce. Semi-structured interviews with both German and Indian policymakers will help generate an understanding of how Germany's 'Energiewende' facilitated stakeholder engagement and bottom-up social planning for energy policy and what India can learn from this. Emerging energy transitions in India will have to be socially validated. Planning for social outcomes may help increase motivation to take climate action.

Mohan, Aniruddh

Degree: Master of Philosophy | **Field:** Nuclear Energy |
Affiliation at the time of application: Observer Research
Foundation, New Delhi, India

Host Institution in Germany: Wuppertal Institut für Klima,
Umwelt, Energie, Wuppertal | **Host:** Dr. Stefan Thomas



Climate Smart Agriculture: Policies, Practices for Food Security, Adaptation and Mitigation in Tanzania

Current debates among many prominent development actors feature Climate Smart Agriculture (CSA) as the solution to the global challenge of achieving food security and economic development in the face of a changing climate. Paschal Arsein Mugabe intends to examine some of the key technical, institutional and policy responses required to achieve the transformation to CSA. Using Tanzania as a case study, the research will outline a range of practices, approaches and tools aimed at CSA practices. While agriculture is the sector most vulnerable to climate change, it is also a major cause of climate change, directly accounting for about 14% and land-use change, which accounts for another 17% of global emissions (IPCC report, 2007). This project aims to generate the knowledge necessary to design climate smart agricultural systems for agricultural communities in Tanzania.



Mugabe, Paschal Arsein

Degree: PhD | **Field:** Environmental Science | **Affiliation at the time of application:** University of Dar es Salaam, Dar es Salaam, Tanzania

Host Institution in Germany: Hochschule für Angewandte Wissenschaften Hamburg, Forschungs- und Transferzentrum "Nachhaltigkeit und Klimafolgenmanagement", Hamburg | **Host:** Professor Dr. Walter Leal

An Economic Evaluation of Carbon Sequestration and Storage Service: An Example from the Sundarbans Mangrove Forest, Bangladesh

Mangrove ecosystems offer important ecosystem services. The Millennium Ecosystem Assessment (2000) categorizes ecosystem services as provisioning, e.g. food; supporting, e.g. nutrient retention, soil accretion; regulating, e.g. climate regulation, soil stabilization; and cultural, e.g. spiritual values, recreation. The mangrove forest in Bangladesh, locally known as Sundarbans, is the largest continuous intertidal mangrove ecosystem in the world. It was declared a Ramsar site in 1992 and a UNESCO World Heritage site in 1997. Numerous studies have been conducted to assess the economic value of mangrove ecosystem services throughout the world. However, most of the studies focus on provisioning and cultural services that have market value and on the total economic evaluation of mangroves in general. Mangroves function as highly efficient biological scrubbers that can sequester atmospheric carbon and store it in their biomass and in sediments. However, few studies have been conducted to determine the monetary value of carbon sequestration and storage service in particular. To date, no studies have been conducted to estimate the monetary value of carbon sequestration and storage by the Sundarbans in Bangladesh. In collaboration with her host, Mst Karimon Nesha will work on an economic evaluation of the carbon sequestration and storage service of the Sundarbans in Bangladesh using the appropriate methodology.

Nesha, Mst Karimon

Degree: Master of Science | **Field:** Natural Resource Management and Climate Change | **Affiliation at the time of application:** Center for Natural Resource Studies, Banani, Bangladesh

Host Institution in Germany: Technische Universität Dresden, Institut für Städtebau und Regionalplanung, Dresden | **Host:** Professor Dr. Wolfgang Wende



Designing Sustainable Consumer Behaviour: Design Strategies to Reduce the Consumer's Ecological Footprint

The rise of globalization and capitalism fuels an unsustainable trend toward accelerated and shortened product life cycles. Designers function as interfaces between consumers and consumption and thereby directly influence the way in which consumption occurs. Thus, designers play an important role in achieving environment-friendly consumer habits. Over 80% of a product-related environmental impact is determined during the design phase. In her project, Adriana Olaya will focus on persuasive sustainable design strategies (PSD). She intends to gain a deeper understanding of the role that design can play in shifting consumer behaviour towards more sustainable lifestyles. Furthermore, it's hoped to reduce the consumer's ecological footprint by applying behaviour change strategies at the interaction touch points between the user and the service. Consequently, the focus of this research is closely related to food-related services. Current initiatives in Germany and other cities will be examined to study PSD's potential for reducing the gap between environmental protection and consumer behaviour.



Olaya, Adriana

Degree: Master of Science | **Field:** Design for Sustainable Behaviour | **Affiliation at the time of application:** TELL, Communications and Business Storytelling, Bogota, Colombia

Host Institution in Germany: Bauchplan, München | **Host:** Florian Otto

Assessment and Evaluation of the Feasibility of Solid Waste Treatment Technologies Used in Germany in an Indian Scenario

Currently, India generates 60-75 million tons of Municipal Solid Waste (MSW) per year. This is largely driven by an increasing urban population, rising disposable income and rapidly changing consumption patterns. In just one decade (2001-2011), there has been a 50% increase in MSW generation in India. Of the several lacunas in waste management sector, one of them is the absence of proper and systematic MSW treatment technologies. Consequently, large amounts of MSW are disposed through open dumping, land filling and open burning. This is why the waste sector is the second-largest anthropogenic methane emitter and the largest greenhouse gas emitter in India. In her project, Shivali Sugandh will explore and identify innovative possibilities for leveraging from waste management practices in Germany, with a special focus on low-carbon, energy-recovery MSW treatment technologies. The results from the project have the potential to boost innovation and improve governance and decision-making in India's waste sector. The collaborative research is also expected to enhance the exchange of knowledge and the transfer of technology between Germany and India.

Sugandh, Shivali

Degree: Master of Science | **Field:** Municipal Solid Waste Management | **Affiliation at the time of application:** National Institute of Public Finance and Policy, Delhi, India

Host Institution in Germany: Clausthaler Umwelttechnik-Institut, Clausthal-Zellerfeld | **Host:** Dr. Torsten Zeller



Rangeland Enclosures: Barriers or Enablers of Effective Adaptation to Climate Variability and Change among Pastoralists in Kenya

In the past decades, dryland social-ecological systems (SES) in sub-Saharan Africa have witnessed profound transformations which have re-shaped land-use and property rights regimes. While rangeland enclosures have emerged as a successful management tool for the rehabilitation of degraded rangelands, increased privatization of pastoral commons for the establishment of rangeland enclosures has greatly re-shaped existing pastoral property rights and management. Within this landscape fragmentation and transformation approach, John Ndung'u Wairore aims to understand how the spontaneous establishment of rangeland enclosures in East Africa impacts the adaptive capacity and resilience of pastoralists to climatic stressors. On the one hand, enclosures might be barriers to effective adaptation, as traditional coping strategies are part of a tightly coupled SES. Following this line of thought, rangeland enclosures would decouple pastoral livelihoods from natural resource dynamics. On the other hand, enclosures might also be enablers: They are a form of diversification and a coping mechanism, particularly for times of drought, and thus have positive effects on pastoral livelihoods. Major project questions are: To which extent do rangeland enclosures alter connectivity patterns in tightly coupled pastoral systems? How have these alterations impacted on the effectiveness of coping strategies? Would a shift in management and/or property rights present new opportunities for pastoral communities to adapt to climate variability and change? Which institutional ad-

justments have been made to accommodate rangeland enclosures to mediate access to pastoral resources? Finally, John Ndung'u Wairore will provide a sound scientific and technical base regarding the role of enclosures in a changing climate, and inform policy and the scaling up of rangeland enclosures in dryland systems.



Wairore, John Ndung'u

Degree: Master of Science | **Field:** Rangeland Landscape Ecology, Human Ecology | **Affiliation at the time of application:** Finance Innovation for Climate Change Fund, Nairobi, Kenya

Host Institution in Germany: Universität zu Köln, Botanisches Institut, Köln | **Host:** PD Dr. Anja Linstädter
