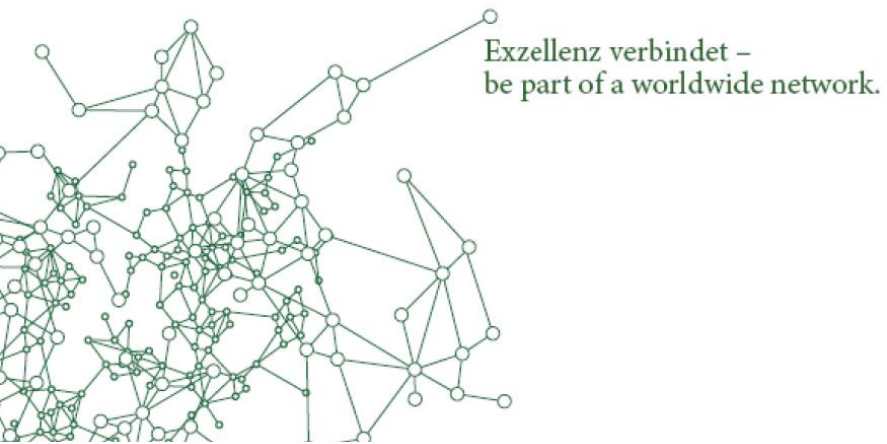# Alexander von Humboldt
## Stiftung/Foundation

# Stipendiatinnen und Stipendiaten 2013/2014

## Internationales Klimaschutzstipendium

# Fellows 2013/2014

## International Climate Protection Fellowship

Exzellenz verbindet –
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## How to apply global climate model simulations to local systems: a case study of the Fergana Valley, Uzbekistan

The Syr Darya and the Amu Darya are two major rivers in Central Asia fed by snow and ice melt from the mountains. They are complex ecosystems that are vulnerable to climate change. Over the years, water diversions to agricultural, industrial and domestic users have reduced flows in downstream regions, including Uzbekistan, resulting in severe ecological damage. Thus, human use of water resources is challenged both in terms of quantity and quality.

In order to maintain its intensive agricultural production under such harsh conditions Uzbekistan needs to adapt to changing climatic conditions. Elyor Alimardonov therefore aims to access German knowledge of using global climate model simulations for hydrological applications and apply it to a case study of the Fergana Valley. By developing climate impact scenarios on the future availability of water resources Mr Alimardonov wants to gain insights which will help decision-makers and stakeholders to design adaptation and mitigation strategies to deal with the hazards of climate change. The results of this study will provide a basis for addressing issues related to water resources management, crop production, food security and environmental protection in Central Asia.

## Alimardonov, Elyor

**Degree:** Master of Science | **Field:** Hydro-Informatics and Water Management | **Affiliation at the time of application:** International Water Management Institute, Central Asia Regional Office, Tashkent, Uzbekistan

**Host Institution in Germany:** University of Hamburg, Meteorological Institute | **Host:** Professor Dr. Valerio Lucarini

## Bioenergy promotion strategies in Iran

Bioenergy derived from organic matter is a carbon-neutral source of energy in comparison with fossil fuels. Moreover, the decay of bio-based residues in conventional disposal systems leads to high greenhouse gas emissionsin the atmosphere which can be mitigated by energy recovery options. Iran's large population as well as its diversity of crops and livestock provide different types of biomass resources. In spite of attempts by the Iranian government to stimulate renewable energies in the country, bioenergy development has only had limited success. Maryam Bakhshi's research aims to evaluate Iran's bioenergy potential. She wants to analyse different strategies to promote bioenergy and thus introduce strategies for greater use of bioenergy. Ms Bakhshi intends to propose a proper legal framework for sustainable biomass utilisation and, finally, to identify opportunities for mitigating climate change by promoting bioenergy in Iran.

## Bakhshi, Maryam

**Degree:** Master of Science | **Field:** Environment, Natural Resources Engineering | **Affiliation at the time of application:** Mona Consultants, Renewable Energy Department, Teheran, Iran

**Host Institution in Germany:** Free University Berlin, Berlin Centre for Caspian Region Studies | **Host:** Dr. Behrooz Abdolvand

## Co-digestion experience of Germany as a model case for efficient use of agricultural wastes in Ethiopia

A huge amount of agricultural and animal waste is produced each year in Ethiopia. However, efficient use of these wastes is not widespread and it is still common practice to burn crop residues or discharge animal wastes in open fields – all of which contribute to environmental and groundwater pollution. The production of biogas mostly depends on the use of animal waste as the only substrate. Currently, this is difficult because the number of animals per household is small, the collection system is inefficient and the households' daily energy demands for cooking and lighting have increased in recent years.

Ashenafi Hailu Berta intends to address these problems. Ethiopia has good potential, but little working experience of farm-based biogas co-digesters and other means of using agricultural wastes efficiently. In collaboration with his German host he will gain experience, knowledge and comprehensive insights into the co-digestion of agricultural wastes with animal wastes in Germany. In this way, Mr Berta hopes to develop strategies for adopting German technology and German techniques for Ethiopian users.



## Berta, Ashenafi Hailu

**Degree:** Master of Science | **Field:** Energy and Environment | **Affiliation at the time of application:** Bahir Dar University, Institute of Technology, School of Chemical and Food Engineering, Bahir Dar, Ethiopia

**Host Institution in Germany:** Beuth Hochschule für Technik Berlin, Fachbereich Maschinenbau, Veranstaltungstechnik, Verfahrenstechnik, Berlin | **Host:** Professor Dr.-Ing. Maria Loroch

## Waste prevention behaviour and fast and frugal heuristics

The justification for this proposal is based on the growing awareness that environmental problems have more to do with the decisions of ordinary people than with those of governments and corporations. Specifically, this proposal argues that the solution for solid waste issues involves not only technical or economic regulations or both, but also real changes in individuals' behaviour. Doing so, requires an empirical understanding of the decision processes that people bring to this issue. Waste prevention policy is a sustainable alternative to avoid solid waste generation. Despite all the advantages, many local governments have not been successful in adopting waste prevention policies. This can be attributed to several causes, but mainly to the lack of comprehension of the psychological mechanisms, which promote motivation to engage in waste prevention behaviour. Traditionally, environmental psychology has employed theoretical models considering the accurate encoding of all relevant information and its processing according to the mathematics of rational choice theory. However, the information, time and processing capacity available for decision-making are usually limited, forcing individuals to rely on simple mental shortcuts – heuristics – to make their decisions. There is empirical evidence and theoretical analyses showing that they can lead to good decisions, sometimes even better than models considered more rational.

Ana Paula Bortoleto's study aims at contributing to the dual goal of understanding how people make decisions and of using this understanding to encourage pro-environmental behaviour. The results will provide more specific information about the underlying structure of waste prevention behaviour. Consequently, a better critical and scientific comprehension of the role and impact of demand-side measures on individuals' behaviour can be developed using fast and frugal heuristic models. The results may provide the much-needed justification to make the municipal authorities, not only in Germany but also in Brazil and other developed and developing countries, apply waste prevention policies as their most important input to reduce environmental impacts from solid waste increasing generation. Ms Bortoleto, finally, hopes to provide stakeholders with an understanding of the nature of human decision-making so that they are able to structure the information in a way that encourages waste prevention behaviour.



## Bortoleto, Ana Paula

**Degree:** Ph.D. | **Field:** Environmental Engineering | **Affiliation at the time of application:** Universidade de Sao Paulo, Brazil

**Host Institution in Germany:** Max Planck Institute for Human Development, Center for Adaptive Behavior and Cognition | **Host:** Dr. Konstantinos Katsikopoulos

## Minimizing flood effects

Rainwater harvesting is one of several productive strategies to manage water resources, which can contribute to minimize the natural disaster effects. In urban areas it also helps to reduce or prevent damage to building structures caused by storm water runoff. Capturing rainwater before hydrological extreme events occur decreases the amount of storm water that needs to be dealt with. In addition, the amount of water quickly running off the land into local streams, which are often scoured in the process, will be reduced, too.

Daniela Helena Brandão Caldeiras' project comprises a detailed study of legislation and case studies on different levels of the German and Brazilian governments with the aim of identifying an appropriate method of integrating rainwater harvesting in the State Water Resources Policy. Ms Caldeira will focus her attention on urban areas. The expected results of the project include a flood mitigation concept for the pilot region of Minas Gerais, recommendations on improvements to current laws and policy instruments and, furthermore, a proposal on how to transfer the project outcome of the model region to other Brazilian states.

## Brandão Caldeira, Daniela Helena

**Degree:** Master in Environmental Law | **Field:** Water Management and Legislation | **Affiliation at the time of application:** Minas Gerais Water Management Institute (IGAM), Belo Horizonte, Brazil

**Host Institution in Germany:** University of Freiburg, Institute for Hydrology | **Host:** Dr. Christoph Külls

## Evaluation of the European centre for medium-range weather forecasts' integrated forecast system (IFS 4) of seasonal hindcasts downscaled by regional climate models over East Africa: Case study Ethiopia

Due to the fact that the Ethiopian economy depends on rain-fed agriculture, the income of the country is directly affected by rainfall variability. The reliable prediction of rainfall prior to the rainy season would have enormous social and economic benefits. In his project, Bedassa Cheneka intends to verify the added value of nesting two or more regional climate models, such as the weather research and forecasting and the COSMO-CLM climate model, run by the European centre for medium-range weather forecasts and its integrated forecast system 4 in the global general circulation model. Mr Cheneka will hindcast precipitation, temperature, annual variability, near-surface temperature, surface circulation, upper circulation, latent heat flux and shortwave radiation over East Africa. It will then be possible to compare the findings with the model nested in the same global model, reanalyze, observe and downscale the data statistically to calculate hindcast models and ensemble hindcast models over Ethiopia.

The goal of this research work is to understand both regional predictability and the capability of two or more regional climate models to simulate the seasonal regional climate within the framework of ensemble hindcasts. By doing so, Mr Cheneka will be able to evaluate the performance of the model in terms of the spatial distribution of errors and the probabilistic skills forecast.

## Cheneka, Bedassa

**Degree:** Master of Science | **Field:** Earth Sciences | **Affiliation at the time of application:** Adama Science and Technology University, School of Agriculture, Department of Natural Resource Management, Assela, Ethiopia

**Host Institution in Germany:** Deutscher Wetterdienst, Offenbach | **Host:** Dr. Barbara Früh

## Decadal climate predictions and projections for integrated forest ecosystem management and climate mitigation in Nigeria

Land use, land-use change and forestry are accelerating deforestation in tropical countries including Nigeria. Yet, current environmental solutions are to address deforestation significantly due to its strong linkages with high time pressures from humans. In Cross River State, Nigeria, the degree of deforestation is alarming, making the country the 7th largest greenhouse gas emitter due to land use, land-use change and forestry. Existing forest management practices based on community partnership, forest legislation and policies in Cross River State have not significantly addressed deforestation, which is precipitating other socio-ecological challenges.

Based on scientific evidence on land-atmosphere coupling, which enhances regional climate prediction, Nsikan-George Emana intends to explore and determine the value of near-term climate predictions and the efficacy of its knowledge uptake for re-inventing forest management in Cross River State. Similarly, climate mitigation efforts through REDD+ will be an integral outcome of this approach. A near-term local climate scenario showing key climatic variables like temperature, precipitation and humidity will be obtained by downscaling regional climate models and considering retrospective knowledge of the local climate in in the region.

## Emana, Nsikan-George

**Degree:** Master of Science | **Field:** Climatology, Ecosystem Management Policy | **Affiliation at the time of application:** Community Rights and Sustainable Development Initiatives (CRISDI), Abuja, Nigeria

**Host Institution in Germany:** Germanwatch e.V., Bonn and Senckenberg Biodiversity and Climate Research Centre (BiK-F), Frankfurt am Main | **Host:** Sven Harmeling and Dr. Julia Krohmer

## Modelling climate change effects on major cash crop productivity and the related impact on the Malawi economy

Global Circulation Models (GCMs) are the primary tool for understanding how the global climate will change in future. However, currently, GCMs do not provide reliable information on scales below 200 kilometres and are not resolute enough to influence planning by farmers at agro-ecological zone level, let alone by agricultural policy makers at national level. Like most sub-Saharan countries, Malawi has an agro-based economy in which cash crops account for nearly 80% of the agrarian sector's contribution to the gross domestic product and nearly 100% of foreign earnings.

Mutisungilire Kachulu will conduct his project by firstly downscaling selected global circulation models/regional circulation models to selected agro-ecological zones in Malawi and then analysing the impact of climate change on the productivity of selected cash crops and the concomitant effects on the national economy. This research will generate both future climate data, which will be made available to agro-ecological zones, and a better understanding of the future effects of climate change on the national economy. It will consequently be possible to guide the planning process at farm and at national level.

## Kachulu, Mutisungilire

**Degree:** Master of Science | **Field:** Agriculture and Climate Change | **Affiliation at the time of application:** Ministry of Agriculture, Climate Smart Agriculture Project, Lilongwe, Malawi

**Host Institution in Germany:** University of Hamburg, Research Unit Sustainability and Global Change | **Host:** Dr. Uwe Andreas Schneider

## Genetic diversity studies on *Acacia senegal* Willd. in relation to climate change in West Africa

Threats to biodiversity caused by human activities and, more recently, climate change inter alia are leading not only to concerns about the conservation status of most important species in Africa's fragile ecosystems; these threats are also resulting in the impoverishment of the future generation on an unprecedented scale.

Lyam Paul Terwase wants to assess the impact of climate change and the extent of genetic diversity on West African arid flora using the genus *Acacia* as a model system. *Acacia senegal* (L.) Willd. is a multipurpose African tree (Mimocaceae) which is highly valued internationally for its economic and ecological importance. During the one year research fellowship at the University of Leipzig, Mr Terwase intends to use different molecular markers in combination with species distribution models in order to evaluate the genetic diversity and structure of *Acacia senegal* and its populations, elucidate the phylogeography, and generate distribution data and projections on the species range. Ultimately, the effect of global climate change on genetic diversity in the arid zones of West Africa will be assessed.

## Lyam, Paul Terwase

**Degree:** Master of Science | **Field:** Botany and Biotechnology | **Affiliation at the time of application:** National Biotechnology Development Agency, National Centre for Genetic Resources and Biotechnology, Apata Ibadan, Nigeria

**Host Institution in Germany:** University of Leipzig, Faculty of Biosciences, Pharmacy and Psychology | **Host:** Professor Dr. Alexandra Muellner-Riehl

## Research on the legislation of the renewable resources recycling system

China is facing severe environmental and resource problems due to its rapid development. The circular economy, meaning the reduction, reuse and recycling of resources, calls for saving-oriented exploitation and effective waste management. In 2008, the „Law on promoting the development of the circular economy" was adopted in the People's Republic of China. However, the rules about renewable resources recycling are still too general and simple. The low status of the existing legislation has a seriously negative effect on the recycling industries, and it has affected the impact of implementation, too. Therefore, it is necessary to research and speed up the legislation process of the renewable resources recycling system. Zhilin Mu intends to conduct research on the renewable resources recycling system by studying advanced legislative and practical experiences in Germany. Mr Mu hopes to accelerate the legislative process in the People's Republic of China by drafting legislative recommendations on the renewable resources recycling system.

## Mu, Zhilin

**Degree:** Master of Laws | **Field:** Environmental Protection and Resources Conservation Law | **Affiliation at the time of application:** National People's Congress, Environment Protection and Resources Conservation Committee, Beijing, China

**Host Institution in Germany:** Humboldt-Universität zu Berlin, Faculty of Law | **Host:** Professor Dr. Martin Eifert

## An investigation into the interactions between international climate initiatives in Ghana

Ghana always prides itself on being the gateway to Africa and the first country to sign the Voluntary Partnership Agreement with the European Union securing Europe as a key market for Ghanaian timber. In addition to the Voluntary Partnership Agreement, Ghana is party to a number of international initiatives including the non-legally binding instruments on all types of forests, the Forest Carbon Partnership Facility, the REDD+ initiative and the Forest Investment Programme. These initiatives are expected to spark a wide range of changes in the forestry sector. However, the rate of deforestation in Ghana is very alarming. The United Nations' Global Forest Resources Assessment Report of 2010 has estimated Ghana's deforestation to be 135.395 hectare per year. This may suggest that the initiatives in the forestry sector are not making enough impact on forest resources. Each of them has its own focus and could impact differently on the national economy, environment and stakeholders. The nature of these impacts is, however, not yet known. Interactions among the initiatives could reinforce or even undermine each other's objectives; the interactions could also have their own effects or impacts, positive and negative, intentional and unintentional.

During his stay in Germany, Patrick Opoku will connect with German forestry experts and learn from their experiences how synergies could be created between the various international initiatives in Ghana. The project is opportune because of the increasing insecurity among donor agencies and policy makers. Mr Opoku seeks to find solutions for aligning different climate and forestry policy instruments in order to prevent the so-called perverse and leakage effects respectively. As a result of this study, valuable insights into the interrelationship between different measures for climate protection in Ghana are to be expected.

## Opoku, Patrick

**Degree:** Master of Science | **Field:** Development Policy, Governance and Forest Management Planning | **Affiliation at the time of application:** Atiwa Biodiversity Conservation Programme, A Rocha International Ghana, Accra, Ghana

**Host Institution in Germany:** Technical University Dresden (TUD), Institute of Forest Economics and Forest Management Planning | **Host:** Professor Dr. Norbert Weber

## A general framework of corporate sustainability strategy

Due to the speed of industrialisation and urbanisation, China has become the top CO2 emitter, which has a great impact on climate change. However, the real cause of the latest developments is that sustainability has long been disconnected from business.

In his project Jiang Shan will address corporate sustainability concepts and the implications on corporate strategy. Multinational corporations are eager to pursue corporate sustainability. However, they often lack the capability to develop an appropriate corporate sustainability strategy, and to implement it systematically. With his host at A.T. Kearney, Mr Shan will apply methods of theoretical research to corporate sustainability strategy as well as empirical research mainly (but not only) for Chinese and German multinational corporations. He seeks to develop a general framework of corporate sustainability strategy that management can implement to incorporate sustainability into business. This is particularly relevant for multinational corporations which face the challenges and opportunities created by climate change.

## Shan, Jiang

**Degree:** Master of Business Administration, Master of Science | **Field:** Information and Media Technology, Business Administration and Management | **Affiliation at the time of application:** China Minmetals Corporation, General Office, Beijing, China

**Host Institution in Germany:** A.T. Kearney GmbH, Sustainability Center | **Host:** Dr. Carsten Gerhardt

## Co-benefit approach to climate change at city scale

Broader public participation and greater cuts in greenhouse gas are essential for establishing regional agreements to ensure a significant impact on curbing emissions. Cities should be seen as the battle-front as they consume about 60% to 80% of worldwide energy production and account for roughly the same share of global $CO_2$ emissions. China's current efforts to respond to global climate change, reducing air pollution and improving local resources efficiency are not aligned with rapid urbanisation, which means cities have to create local innovation capacities in order to scale up innovations. The co-benefit approach refers to the development and implementation of policies and strategies which simultaneously contribute to tackling global climate change, solving local environmental pollution as well as improving resource utilisation.

The aim of Dr Bing Xue's collaboration with his German partners is to develop an integrated evaluation tool to measure the policy and strategic effectiveness of co-benefits. By investigating case studies of German and Chinese cities new insights will be generated. Dr Xue will focus on greenhouse gas emission reduction by reducing local pollutants and improving regional resource efficiency, and vice versa. It is hoped that the outcome will contribute to local policy-making for sustainable development, improve co-benefits research at city scale and enhance capacity building amongst young scientists with the aim of putting scientific outcomes into policy practice.

## Xue, Bing

**Degree:** Ph.D. | **Field:** Climate Change Policy and Sustainability Governance | **Affiliation at the time of application:** Chinese Academy of Sciences, Institute of Applied Ecology, Shenyang, China

**Host Institution in Germany:** Trier University of Applied Science, Institute for Applied Material Flow Management (IfaS) and Institute for Advanced Sustainability Studies (IASS), Potsdam | **Host:** Professor Dr. Peter Heck (IfaS) and Dr. Dr. Mario Tobias (IASS)