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# Fellows 2023/2024
## International Climate Protection Fellowship



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# Stipendiatinnen und Stipendiaten 2023/2024
## Internationales Klimaschutzstipendium

# Jordan Energy Data Center for national energy security



**Ola Al-Sarhan**

**Degree:** Bachelor of Science | **Field:** Energy Process Technology and Industrial Engineering

**Home Institution:** Ministry of Energy and Mineral Resources, Amman, Jordan | **Host Institution in Germany:** German Energy Agency, Berlin | **Host:** Dr Karsten Lindloff

**Ola Al-Sarhan wants to create a reliable energy information system for Jordan to develop strategies and policies for future energy efficiency.**

Energy is central to social and economic development. Sustainable energy, in particular, is essential for sustainable global development as production, distribution, and consumption affect our environment. Jordan lacks data on the various energy consuming sectors: the transportation sector, for instance, is the biggest consumer of energy whilst the residential sector heads the list of electricity consumers. However, there is a need for more detailed information to calculate the optimal national consumption and implement policies for sustainable energy consumption.

Ola Al-Sarhan wants to collect the missing statistics and to understand the improvements required to make the individual energy sectors in the country more efficient and sustainable. To do so, she will communicate with different institutions in Jordan such as the Ministry of Energy and Mineral Resources and the Energy and Mineral Regulatory Commission as well as sector-specific institutions. Moreover, she will look at other countries' experiences and practices. German experience in energy efficiency may well offer vital information which will help to create an energy database for Jordan to monitor and improve numerous energy sectors. Ola Al-Sarhan is being supported by the German Energy Agency in Berlin.

# Low-carbon technology transfer, innovation, and how they relate to achieving the United Nations' Sustainable Development Goals

**Dr Anam Azam aims to investigate the effect of low-carbon technology transfer, green energy, and innovations on economic growth and environmental sustainability in the OECD and non-OECD countries.**

Increasing economic growth, resource depletion and concerns about energy security and the climate crisis are a global threat. Therefore, a shift to a more sustainable economy is needed. Energy is crucial for economic development. Yet many energy resources and fossil fuels, in particular, produce greenhouse gases which are responsible for $CO_2$ emissions and are thus the primary cause of global warming. Given the growth of the global population and economy, the Organisation for Economic Cooperation and Development (OECD) expects energy consumption to increase by 80 percent by 2050.

Anam observed the lack of research on the links between low-carbon technology transfer, technological innovation, economic growth, and $CO_2$ emission reductions. Through her research, she wants to understand the impact of energy efficiency on economic and environmental sustainability in the OECD and non-OECD regions and compare their economies with the Sustainable Development Goals. To do so, she intends to apply various methods, including structural decomposition and regression analysis. Her results will provide valuable references for sustainable growth and energy efficiency that may have policy implications and serve as a basis for sustainable development. The Fraunhofer Institute for Systems and Innovation Research in Karlsruhe is supporting Anam Azam's research project.



**Dr Anam Azam**

**Degree:** PhD | **Field:** Economic Policy

**Home Institution:** North China Electric Power University, School of Economics and Management, Beijing, China | **Host Institution in Germany:** Fraunhofer Institute for Systems and Innovation Research ISI, Karlsruhe | **Host:** Prof. Dr Rainer Walz

# Assessing local climate change adaptation strategies for Northeast Brazil



### Dr Ayobami Badiru Moreira

**Degree: PhD** | **Field: Physical Geography**

**Home Institution: Universidade Federal de Pernambuco (UFPE), Recife, Brazil** | **Host Institution in Germany: Deutscher Wetterdienst (DWD), Research Centre Human Biometeorology, Freiburg** | **Host: Prof. Dr Andreas Matzarakis**

**Dr Ayobami Badiru Moreira will assess the urban heat vulnerability of Recife in Brazil to understand its thermo-dynamic variables and support local adaptation strategies.**

The Northeast of Brazil is the country's poorest and second largest region. Most of its urbanised surface is concentrated in its coastal area, including eight out of nine state capitals. One of them is Recife, the capital of Pernambuco. With 1.6 million citizens, it is the centre of the largest metropolitan area in Northeast Brazil and is severely affected by climate change. Increases in extreme weather conditions have made it crucial to understand the area's vulnerability and to foster urban climate adaptation measures.

Ayobami Badiru Moreira aims to investigate the relationship between climate and population. To do so, she will identify risk groups and their location as well as vulnerable areas and relevant adaptation measures. Ayobami will first develop and validate a heat vulnerability index tailored to local particularities. For this, she will work with socioeconomic data and physical properties of the urban landscapes, integrating data obtained from the Digital Surface Model of Pernambuco. In a second step, she will analyse the index's spatial distribution and trace locally based adaptation strategies. Ayobami is being supported by the Research Centre Human Biometeorology at the Deutscher Wetterdienst in Freiburg.

# Determining carbon stocks in mangroves to establish voluntary community blue carbon trade

**Debora Benjamen conducts research to establish blue carbon trade to compensate communities for conserving mangroves.**

Mbweni and Kunduchi are poor fishing villages in the Dar es Salaam coastal area of Tanzania. Socioeconomic development is threatening the regional mangrove ecosystems which protect our planet from emissions by sequestering and storing significant amounts of blue carbon. Thus, in 2016, Aqua-Farms Organization (AFO) implemented a mangrove restoration initiative, replanting seedlings and protecting mangroves. These farms also feature beehives which are essential for local women. To support AFO, blue carbon can be traded to voluntary buyers, compensating the community for conservation.

Debora Benjamen wants to determine carbon stocks and sequestration to launch blue carbon trade in the two villages. This will support local conservation of mangrove ecosystems. For her research, Debora is conducting a biomass carbon stock assessment of trees by collecting soil samples. She will calculate the biomass and carbon stocks in living trees by analysing soil samples for carbon using a high temperature oxidation method. This will allow her to determine the total carbon, nitrogen, and organic carbon content as well as the total ecosystem carbon stock density of the local mangroves. The Leibniz Centre for Tropical Marine Research in Bremen is supporting Debora in her research.



### Debora Benjamen

**Degree: Master of Science** | **Field: Physics, Chemistry, and Biology of the Marine Environment**

**Home Institution: Aqua-Farms Organization (AFO), Dar es Salaam, Tanzania** | **Host Institution in Germany: Leibniz Centre for Tropical Marine Research, Bremen** | **Host: Priv. Doz. Dr Tim Jennerjahn**

# Gaps in collaborations within the Indian governance system for effective implementation of the climate action plan and achieving net-zero emissions by 2070



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**Ratna Priya Bysani**

**Degree:** Master of Science | **Field:** Political Science

**Home Institution:** Janaagraha Centre for Citizenship and Democracy, Bengaluru, India | **Host Institution in Germany:** Institute of Political Science, Technische Universität Darmstadt, Darmstadt | **Host:** Prof. Dr Markus Lederer

**Ratna Priya Bysani investigates the gaps in collaborative approaches of India's governmental agencies to tackle climate change.**

India produces 6.7% of global greenhouse gas emissions. The country is thus the third largest emitter worldwide. And it is one of the top ten countries most affected by climate change. Along with other nations, the government signed the Paris Agreement in 2015 and many climate-friendly practices have been applied successfully since then. Yet, they often fail to achieve their goals because the remit is limited to individual ministries in the union government. They are frequently blocked by counteractive development policies and a lack of supporting policy instruments from other ministries.

In her research project, Ratna Priya Bysani aims to understand and highlight the causes behind these gaps in the communication between sectors. To this end, she studies policies and political discourses amongst agencies within the current government. First, she will identify the climate action gaps which she will compare to the system in the EU and other national governments. She will then collect primary data by interacting with bureaucrats and other organizations supporting Indian policy making. After this, she will analyse the data collected and extract the gaps identified before possibly coming up with recommendations which would allow the government to tackle climate action in an efficient, collaborative, and coherent way. Ratna Priya Bysani will conduct her research with the support of the Institute of Political Science at Technische Universität Darmstadt.

# Improving CO2 hydrogenation to methanol and catalyst activity by 3d-transition metal intermetallic compounds

**Dr Arjun Cherevotan House explores the synergies between 3-d transition metals and strategic catalyst design to improve CO2 hydrogenation to methanol.**

Fossil fuels and their extraction enhance our living standards but also deplete our resources and emit carbon dioxide ($CO_2$). It is well known that the latter is a cause of global warming. $CO_2$ hydrogenation to liquid fuels can ameliorate global warming and our overdependence on fossil fuels. This process can generate methanol which is a sustainable energy carrier. However, $CO_2$ is the most oxidised form of carbon. $CO_2$ hydrogenation thus requires enormous amounts of energy which can be reduced by chemisorption on heterogeneous catalysts. Currently, 4-d and 5-d transition metals are used but they are expensive and associated with an unwanted chemical reaction called the Reverse Water Gas Shift (RWGS) reaction.

Arjun Cherevotan House wants to investigate the potential of 3-d transition metals to hydrogenate $CO_2$ to methanol. These metal-based intermetallics are economically cheaper and have optimised $CO_2$ dissociation ability. Using them would avoid the unwanted RWGS reaction and enhance the hydrogenation and product distribution. Through his research, Arjun intends to improve catalyst design, conversion rate, and oxygen vacancy – in short, to enhance $CO_2$ hydrogenation to methanol. His research is being supported by the Fraunhofer Institute for Interfacial Engineering and Biotechnology in Straubing.



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**Dr Arjun Cherevotan House**

**Degree:** PhD | **Field:** Reaction Kinetics and Catalysis

**Home Institution:** Jawaharlal Nehru Centre for Advanced Scientific Research, Bengaluru, India | **Host Institution in Germany:** Fraunhofer Institute for Interfacial Engineering and Biotechnology, Straubing | **Host:** Dr Arne Roth

# Distributional impacts and relevant strategies for emerging initiatives on carbon markets

**David Colin**

Degree: **Bachelor of Science** | Field: **Economic Policy and Applied Economics**

Home Institution: **MÉXICO2, Mexico City** | Host Institution in Germany: **International Carbon Action Partnership, Berlin** | Host: **Stefano De Clara**

**David Colin analyses greenhouse gas (GHG) mitigation policies and distributional effects of carbon markets to elaborate alternatives for developing countries to avoid negative distributional impacts.**

Compliance carbon markets may represent a path to effective climate change mitigation. Here market participants can reduce emissions in their operations and contribute monetarily for each tonne of CO2 emitted. In the EU, this process has been established under the Emissions Trading System (EU ETS). Within this system, the installations participating are allocated a limited allowance of GHG emissions. Surplus allowances can be traded. But such systems bear a risk of negative distributional effects. For instance, poorer households tend to pay more and receive fewer benefits. There are alternatives to avoid the negative impact of distributional effects whilst still working towards climate goals. Such measures usually mean changing the rules of the market and redesigning the revenue recycling mechanism.

David Colin wants to identify which aspects of the carbon markets are critical regarding distributional impacts and how sensitive sectors are affected. To do so, he will review the literature on distributional impacts on carbon markets, analyse the EU ETS and Western Climate Initiative, and identify significant design elements in relevant market alternatives to avoid negative distributional impacts. In the final step, David will report on his main findings and their applicability for early-stage markets in developing economies such as the Mexican market. He is being supported by the International Carbon Action Partnership in Berlin.

# Mitigating climate warming effects by improving water reservoir management

**Dr Mohsen Dehghani Darmian aims to devise hybrid reservoir management strategies to adapt to climate change and reduce emissions.**

Water reservoirs have been built for drinking water, flood protection, and energy generation. However, they are not used efficiently. Of the 530 German reservoirs studied, half of them are only used for a single purpose. Moreover, 1.3 percent of the world's annual human-caused greenhouse gas emissions derive from reservoirs. The water collected there can push against the banks, causing plants to die and decompose, which produces methane and CO2. Municipalities, industries, and agriculture contribute to water pollution by dumping heavy metals and other waste in the water. Eutrophication, the biological way a body of water responds to a high concentration of nutrients, changes the balance of organisms, grows algae, depletes oxygen, and degrades water quality.

This is why Mohsen Dehghani Darmian wants to investigate the Rappbode Reservoir in Saxony-Anhalt. He will analyse the relationships between hydrological processes, thermal stratification, eutrophication, oxygen depletion, and hydrochemical reactions using a novel hybrid surrogate model. His research will allow him to evaluate reservoir management strategies, such as selective water withdrawal, to mitigate the effects of climate change. His work is being supported by Technische Universität Darmstadt.

**Dr Mohsen Dehghani Darmian**

Degree: **PhD** | Field: **Hydrogeology and Hydrology**

Home Institution: **Water Research Institute, Teheran, Iran** | Host Institution in Germany: **Institute of Hydraulic Engineering and Water Management, Technische Universität Darmstadt, Darmstadt** | Host: **Prof. Dr Britta Schmalz**

# Implementing bicycle sharing systems in Nepal

### Nivesh Dugar

**Degree: Master of Science** | **Field: Traffic and Transport Systems; Intelligent and Automated Traffic Systems**

**Home Institution: Cycle City Network Kathmandu, Nepal** | **Host Institutions in Germany: Faculty of Civil and Environmental Engineering, University of Kassel, Kassel** | **Host: Prof. Dr Angela Francke**

**Nivesh Dugar explores bicycle sharing in Germany and how it can be implemented in Nepalese cities.**

Half of the population of Nepal now lives in cities. Urbanised areas are growing, mobility needs changing, and emissions are increasing. The volume of greenhouse gas emitted in Nepal has doubled since 2000/2001 and transportation accounts for more than a third of the total emissions. Various cities have demonstrated that bicycle sharing systems significantly reduce both carbon dioxide and nitrogen oxide emissions as well as the amount of fuel used. Bicycle sharing also has positive effects on traffic and health, including a decrease in stress thanks to traffic calming, reduced obesity, and flexible mobility. Bicycle sharing systems thus align with the Sustainable Development Goals promoting health, innovation, and environmental sustainability.

By investigating bicycle sharing in Germany, Nivesh Dugar wants to develop recommendations for implementing such systems in Nepal. In his research, he will consider the current situation in Nepalese cities, especially Lalitpur, the potential of different stakeholders, and the impact of bicycle sharing on urban mobility and the environment. Methods like Life Cycle Costing will help him understand the sustainability of bicycle sharing. This will allow Nivesh to develop specific guidance for federal agencies in Nepal to encourage bicycle sharing systems and support the national target of the Sustainable Development Goals 2030 Agenda. Nivesh is being supported by the University of Kassel.

# Encouraging pro-environmental behaviour and environmental identity in Nigerian youth

**Dr Temidayo Enetanya studies environmental identity shifts from interactions with degenerated land and forests.**

Nigeria is experiencing extreme deforestation, losing 450,000 to 600,000 hectares of forest every year. This causes land degradation and a significant loss of biodiversity. Encouraging people's environmental identity has been shown to inspire pro-environmental motivation which affects how we perceive and act towards our natural and non-natural environments. It can be achieved through outdoor education, personal transformation and significant outdoor experiences.

To address biodiversity loss in Nigeria and mitigate climate change globally, Temidayo Enetanya believes it is important to understand and improve Nigerian young people's environmental identity. In her research, she will engage with twelve young volunteers who are all Nigerian migrants living in Germany. Combining qualitative and quantitative methods in her field study, Temidayo aims to understand how the participants interpret their experiences, how they construct their environments and what meaning they attribute to their experiences. This will allow her to explore her participants' emotional attachment, relatedness, competence and pro-environmental motivation. Her research is being supported by the Center for Environmental Systems Research at the University of Kassel.

### Dr Temidayo Enetanya

**Degree: PhD** | **Field: Educational Socialisation and Professionalism Research**

**Home Institution: Twinkle the Earth Initiative, Abule Egba, Nigeria** | **Host Institution in Germany: Department Consumer Behaviour in Bio Economy, University of Hohenheim, Stuttgart** | **Host: Dr Laura Henn**

# Monitoring Decades of Climate Change and Land Surface Dynamics in Lake Chad Basin, Sahelian Africa

### Dr Reeves Fokeng Meli

**Degree: PhD | Field: Environmental Geography and Geoinformatics**

**Home Institution: University of Bamenda, Cameroon | Host Institution in Germany: German Aerospace Center (DLR), Weßling | Host: Prof. Dr Claudia Künzer**

*Dr Reeves Fokeng Meli wants to achieve a better understanding of the environmental dynamics and their interaction with the changing climate of the Lake Chad Basin.*

The Lake Chad Basin (LCB) is the largest drainage basin in Africa, spanning eight countries and including large parts of Chad and Niger. It is a UNESCO World Heritage and Ramsar site with an estimated population of 47 million people. However, dam construction, increased irrigation, climate change, droughts, and reduced rainfall are constantly shrinking the basin. In the 1960s, areas of open water and swamps accounted for 22,000 km²; in 2015, only 2,500 km² remained. This drastic shrinkage provokes resource conflicts and terrorism with adverse effects on food and water resources.

Only a few studies have investigated the long-term trend dynamics of climate variables and land-cover changes in the LCB. Reeves Fokeng therefore intends to fill this research gap, investigating decades of climate change and land surface dynamics in the LCB area. For this, he will use multi-source Earth Observation data to examine spatiotemporal trends, vegetation responses to climate change, land and surface water dynamics, aridity and droughts, soil erosion, and biomass burning. He will then utilise time series analysis techniques to understand their interaction. Reeves will share the results of his research with other scientists as well as with politicians and crucial decision makers. He is being supported by the German Aerospace Center in Wesseling.

# Climate Change Adaptation Approaches to Informal Settlements in Nairobi

*Caroline Jepchumba Kibii aims to study the climate risks threatening Nairobi's urban poor and adaptation approaches for reducing their vulnerability.*

Roughly half of Kenya's urban population lives in informal settlements, also called urban poor or slum areas. They occupy less than five percent of the entire land and are often located in endangered areas that are extremely vulnerable to climate risks. The massive flooding in 2021, for instance, led to several deaths and property destruction in Kibera and Korogocho slums. To protect the people, governmental measures have included slum upgrading initiatives. However, such approaches neither shield people from climate risks nor target other slum issues successfully.

To improve climate adaptation and risk mitigation, Caroline Jepchumba Kibii aims to study three slum areas in Nairobi. Firstly, she will determine the people's exposure and their vulnerability to climate hazards. She will then assess the adaptation approaches already employed in the three slum areas selected. Her third step will include a comparative analysis of Nairobi's slums with the well-researched participatory slum upgrading project in Villa 20, Buenos Aires. Her project will serve as a basis to develop a conceptual climate adaptation and risk mitigation policy framework to support urban poor areas in Nairobi. Caroline's research is being supported by the United Nations University in Bonn.

### Caroline Jepchumba Kibii

**Degree: Master of Arts | Field: Human Geography and Environmental Planning and Management**

**Home Institution: Gretsa University, Thika, Kenya | Host Institution in Germany: United Nations University UNU-EHS, Bonn | Host: Dr Simone Sandholz**

# Urban Transport: Climate Mitigation and Promoting Physical Health

**Dr Chenxi Lu**

**Degree: PhD | Field: Economic Policy and Applied Economics**

**Home Institution: Harvard University, Boston, United States |
Host Institution in Germany: Institute of Landscape Architecture and
Environmental Planning,Technische Universität Berlin, Berlin |
Host: Prof. Dr Felix Creutzig**

**Dr Chenxi Lu studies
transportation mitigation
measures and health
co-benefits in the urban
passenger transport
sector.**

Climate change is a threat to global health with increasing urbani-sation, energy consumption, and demand for urban transport. The latter causes a rise in carbon emissions, air pollution, and deaths: Road traffic alone is responsible for 1.2 million deaths annually and the concomitant physical inactivity leads to an additional 1.9 million deaths every year. A transition to low-carbon transport would thus benefit both the environment and public health. Health co-benefits include a reduction in mortality and morbidity rates linked to air pollution and an increase in physical exercise.

To improve public health in the context of the transport sector, Dr Chenxi Lu will analyse four possible future transport scenarios for reducing emissions and generating health co-benefits in four cities: London, Berlin, Shanghai, and Delhi. She will study business as usual, green transport (walking, cycling, public transit), vehicle electrification, and a mix of green transport and electric vehicles. Chenxi will combine different models according to age and gender to estimate the potential reduction in emissions and the health co-benefits resulting from more physical activity in the respective scenarios. She will then compare the health co-benefits. This will allow her to make suggestions for mitigation policies for the various transportation modes. Chenxi Lu is being supported by the Institute of Landscape Architecture and Environmental Planning at Technische Universität Berlin.

# Systemic innovation and finance for nature-positive cities

**Maria Mejia studies
climate innovations to
transform Latin Ameri-
can cities into hubs of bio-
diversity and resilience.**

Latin America is the second most urbanized region in the world and hosts close to 50% of global biodiversity. The benefits of urban biodiversity not only include disaster risk reduction, improved water management and long-term food security but also improved physi-cal and mental health, greater social cohesion as well as new jobs and investment opportunities. The global initiative BiodiverCities therefore aims to make biodiversity a central element of urban plan-ning and development, increasing resilience and improving the lives and well-being of the residents. Similarly, the NetZeroCities project promotes climate-neutral smart cities and, thus, supports the goals of the EU's Green Deal. Both projects aim to achieve climate resil-ient cities by 2030.

To help Latin American cities reach their goal, Maria Mejia will con-duct qualitative research on the recently launched NetZeroCities Consortium, focusing on its methodology and adaptive learning. Her aim is to produce research which facilitates action, enabling cities to advance their sustainability goals. To do so, she will study portfoli-os, contextualise the roles of actors and resources in the initiatives, develop scenarios, conduct interviews with the stakeholders in Net-ZeroCities and explore shared future visions. Her research will help cities to become climate resilient by 2030. Maria is being supported by the European Institute of Innovation and Technology in Berlin.
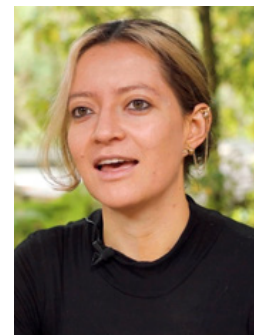
**Maria Mejia**

**Degree: Master of Science | Field: Ecology and Biodiversity of Plants and
Ecosystems**

**Home Institution: Alexander von Humboldt Biological Resources Research
Institute of Colombia, Bogotá | Host Institution in Germany: European
Institute of Innovation and Technology, Berlin | Host: Nikhil Chaudhary**

# Threatened Lakes of Kyrgyzstan – Lake Status and Interactive Lake Dashboard

**Gulbara Omorova**

Degree:  Master of Arts | Field: Hydrogeology and Hydrology

Home Institution: National Academy of Sciences of the Kyrgyz Republic, Bishkek | Host Institution in Germany: Helmholtz Centre Potsdam – GFZ German Research Centre for Geosciences, Potsdam | Host: Dr Jens Mingram

**Gulbara Omorova wants to develop a comprehensive database on Kyrgyz lakes.**

Lakes provide drinking water, food and water resources for agriculture and industry. Climate change and our economy, however, overexploit lakes causing them to shrink and dry out. This can lead to the demise of entire landscapes. Increasing settlement pressure and tourism further pollute lakes and impair water quality. Kyrgyzstan has more than a thousand lakes, most of them in the mountains. Some have already been investigated but on many of them there is little precise data.

To better understand climate fluctuations and how they affect Kyrgyz lakes, Gulbara will help to develop a broadly-based investigation and monitoring system combining all available information on the lakes in Kyrgyzstan: she will monitor lake levels and streamflows via the smartphone app "Crowdwater" and translate the app into Kyrgyz to make the information available to local actors. She will also investigate important water-chemical parameters to assess water quality and changes in water quantities. In a third step, Gulbara will develop a remotely controlled echo-sounder system to map the morphology of smaller lakes and determine water volumes. Her work will help to predict lake status and water availability more accurately under a changing climate. She is being supported by the Helmholtz Centre Potsdam – GFZ German Research Centre for Geosciences.

# Renewable Energy on the High Seas

**Prof. Dr Violeta Radovich wants to improve the environmental regulations and the governance of renewable energy platforms.**

The ongoing climate change crisis is putting pressure on governments all around the world to generate more resources for renewable energy. Recent advances in technology are raising the prospect of using renewable energy platforms on extended continental shelves and on the high seas. However, current regulation and governance of platforms of this kind are underdeveloped in public international law. What are the respective environmental regulations governing renewable platforms on the high seas? Are static and mobile platforms governed by the same legal regime? Who should grant the licences to instal platforms on the high seas? In her research project, Violeta Radovich wants to find answers to these questions.

Violeta will firstly analyse existing international regulations such as the 1994 UN Convention on the Law of the Sea and the draft binding agreement under this Convention regarding conservation of biodiversity in marine areas beyond national jurisdiction. She will draw upon papers from disciplines such as oceanography, climatology, biology, engineering, political science and relevant court cases. In a second stage, she will try to discover whether there are any similarities and synergies with seabed mining regulation in marine areas beyond national jurisdiction that may be applied to regulate renewable energy production on the high seas. Based on her findings, she will then draw up recommendations for improving existing regulations. Violeta is being supported by the Walther Schücking Institute for International Law at the University of Kiel.

**Prof. Dr Violeta S. Radovich**

Degree: PhD | Field: Public International Law

Home Institute: Universidad de Buenos Aires, Instituto de Investigaciones Juridicas y Sociales, Argentina | Host Institution in Germany: Walther Schücking Institute for International Law, University of Kiel, Kiel | Host: Prof. Dr Nele Matz-Lück

# Future Changes of Compound Climate Events and Population Exposure Across South Asia



### Dr Farhan Saleem

**Degree: PhD | Field: Meteorology**

**Home Institution: Nanjing University of Information Science and Technology, China | Host Institution in Germany: Helmholtz-Zentrum Hereon, Climate Service Centre Germany (GERICS), Hamburg | Host: Dr Torsten Weber**

**Dr Farhan Saleem analyses extreme climate events in South Asia to evaluate the risk of climate impacts.**

South Asia is extremely vulnerable to extreme weather and climate events including heatwaves and droughts. The population on the continent is estimated to double by 2050, growing at significant speed. Climate change causes increasing numbers of compound events (CEs), which mean a combination of multiple climate events, and these events are becoming more and more severe. Heatwaves, for instance, have increased in their intensity, frequency, and duration, threatening human health.

Dr Farhan Saleem aims to study projected changes in CEs across South Asia by the end of this century. For his research, he will use a multimodal ensemble of newly released climate projection programmes that will allow him to investigate projected changes towards the end of the century and the co-occurrence of CEs in South Asia. He intends to combine these projections with population projections for different population growth scenarios which will enable him to estimate the number of people exposed to and threatened by such events. Farhan will then assess the relevance of different change factors. As a result, essential actors will be able to revisit climate change adaptation plans, furnished with effective mitigation strategies to reduce the risks and impacts of CEs. Dr Farhan Saleem is being supported by the Helmholtz-Zentrum Hereon and the Climate Service Centre in Hamburg.

# Coastal mangroves in Benin and their vulnerability to climate change and population growth

**Dr Corine Sinsin wants to develop an artificial intelligence assisted model to study West Africa's mangroves and their vulnerability.**

Mangroves are special wetland ecosystems. Not only do they store large amounts of carbon dioxide, they also protect coasts from erosion and are one of the most productive ecosystems in the world. Estimates say that they generate between $US 2,000 and $US 9,000 per hectare every year. However, they are severely threatened by population growth in coastal areas and climate change. Previous research has primarily focused on the impact of and vulnerability to climate change, water salinity and mitigation potentiality.

Since limited data make it difficult to distinguish between the effects of coastal development and the effects of climate change, Dr Corine Sinsin aims to study mangrove ecosystems in West Africa in more detail. Her overall objective is to establish an artificial intelligence assisted dynamic framework for assessing West Africa's mangroves and their vulnerability to climate change in order to find meaningful indicators for vulnerability assessment. Corine will then build an integrated model for assessing mangrove vulnerability which will be used to determine the state of Benin's mangrove ecosystems. Corine is being supported by the Leibniz Centre for Tropical Marine Research in Bremen.
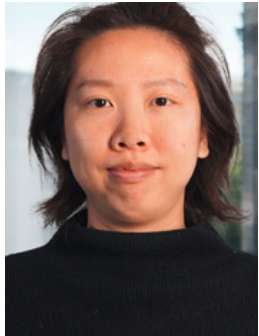


### Dr Corine Sinsin

**Degree: PhD | Field: Ecology and Biodiversity of Plants and Ecosystems**

**Home Institute: Faculté des Sciences Agronomiques, Université d'Abomey-Calavi, Benin | Host Institution in Germany: Leibniz Centre for Tropical Marine Research, Bremen | Host: Prof. Dr Martin Zimmer**

# Tackling Environmental Challenges through Climate Education in China

### Xiaodan Yuan

**Degree:** Bachelor of Arts | **Field:** Journalism and Communication Studies

**Home Institution:** Beijing Energy Network, Beijing, China | **Host Institution in Germany:** Department of Community Energy and Adaptation to Climate Change, Technische Universität Berlin | **Host:** Prof. Dr Boris Heinz

**Xiaodan Yuan explores climate education as an effective climate change mitigation strategy.**

China is the biggest producer of greenhouse gas emissions worldwide, producing roughly twice the CO2 emissions of the USA each year. In 2021, China's net emissions totalled 11.47 billion metric tons. Germany, by comparison, emitted 0.7 billion. Technological innovation and climate cooperation are, therefore, priorities on China's agenda for achieving carbon neutrality by 2060. Amongst the climate action measures discussed, climate education has rarely been perceived as a major approach. But research shows that it can be an effective and powerful mitigation strategy in developing citizens' pro-environmental attitudes and behaviour.

Xiaodan Yuan wants to provide evidence and create opportunities for active citizen engagement in the green transition. With the help of her podcast platform, Environment China, interviews, and discourse analysis, she intends to identify practical challenges to citizens' participation in climate actions. She will also study various climate education initiatives she experiences in Germany and Europe. Her research will then allow her to develop initiatives and strategies to address the challenges of climate education in China. Her research is being supported by the Department of Community Energy and Adaptation to Climate Change at the Technische Universität Berlin.

# Power Sector Regulation: Establishing a well-functioning Emission Trading Scheme in Kazakhstan

**Dauren Zhalgabay investigates Kazakhstan's energy market for an effective national Emission Trading Scheme.**

Kazakhstan launched its mandatory Emission Trading Scheme (ETS) in 2013 requiring the energy, oil and gas, and industrial sectors to purchase allowances for their emissions and gradually reduce them. The ETS should be an incentive to modify production and consumption to produce less carbon-intensive products. However, the country has abundant, cheap coal and, thus, low electricity prices. Together with the ETS' low allowance prices, this does not encourage firms to switch to cleaner technologies and, consequently, hinders effective emission reduction and the shift to a low-carbon path. This explains why most of Kazakhstan's emissions come from the power sector. To reduce emissions and achieve climate goals, the energy sector needs to be reshaped.

With a view to a well-functioning ETS in Kazakhstan, Dauren Zhalgabay will analyse national regulation and the market structure of the energy sector and how they impact the effectiveness and functionality of the country's ETS. He will analyse international experience of dealing with higher carbon costs around the world and what elements of other energy markets can potentially be implemented in Kazakhstan. Dauren's research aims to reform the energy industry, regulations and investments and to improve elements of Kazakhstan's ETS to achieve the climate goals. He is being supported by the International Carbon Action Partnership, Berlin.

### Dauren Zhalgabay

**Degree:** Master of Science | **Field:** Applied Economics and Economic Policies

**Home Institute:** International Green Technologies and Investment Projects Center / JSC SWF "Samryk-Kazyna", Astana, Kazakhstan | **Host Institution in Germany:** International Carbon Action Partnership (ICAP), Berlin | **Host:** Stefano de Clara