

# IMEP

YEARBOOK2020  
TRAINING THE WORLD'S ENVIRONMENTAL LEADERS

Duke Kunshan University · Environment Program  
International Master of Environmental Policy  
Environmental Research Center



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NICHOLAS SCHOOL OF THE ENVIRONMENT



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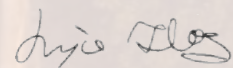
# Forward 2020.

**W**e have just completed the most challenging academic year since the establishment of the Environment Program at DKU. The outbreak of the novel coronavirus during the Chinese New Year dramatically changed our teaching and research practices. Thanks to the tireless efforts of iMEP faculty and staff, we were able to move the spring semester online in a very short period. The faculty and students adapted well, and we completed the semester with high student satisfaction. The graduation ceremony for the iMEP Class of 2020 was also moved online, which was an unforgettable experience for all of us.

The Environmental Research Center (ERC) has successfully passed the first Third-Year Review. The DKU Academic Committee spoke highly of the ERC's progress in the areas of academic publication, research grant acquisition, outreach activities, and non-degree education. The achievements of the ERC can be attributed to the high quality of the faculty who are actively engaged in designing and implementing academic programs. Given that the ERC is a young and developing research center at a new joint-venture university, we should be very proud of what we have achieved since its inception.

Nevertheless, the Environment Program at DKU faces significant and unique challenges to the regular operations of the research and education programs during the pandemic. Many new opportunities are emerging at the same time. In particular, the iMEP program is successfully removing barriers for potential applicants and the ERC has gained experience in organizing online academic events. Looking forward, I am confident that the Environment Program will emerge stronger in the post-pandemic era.

Sincerely,



Junjie Zhang  
Director of the iMEP Program



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### IMEP FACULTY & STAFF



Duke Kunshan University Campus



Duke University Campus

## About International Master of Environmental Policy

**T**he international Master of Environmental Policy (iMEP) program at Duke Kunshan University (DKU) is a collaboration between the Sanford School of Public Policy and the Nicholas School of the Environment at Duke University. This two-year professional degree program trains students to be global environmental leaders with the knowledge and experience to inform evidence-based environmental policy solutions.

Through this program, students not only benefit from small classes, one-to-one interaction with world-class faculty, a cutting-edge research center and unparalleled career opportunities, but also earn an advanced degree from world-renowned Duke University. iMEP students have the opportunity to immerse themselves in a variety of fields, including but not limited to economics, statistics, energy, climate change, water management, conservation biology, environmental health, environmental law and governance.

iMEP students develop their expertise on a specific topic through an internship and a one-year Masters Project. For students around the world who care about the environment and want to make a difference, the iMEP program based at DKU is a place where they can meet their mentors and friends, and greet new challenges and discoveries.

# Two Campuses, Two Countries

iMEP students spend three semesters at DKU in Kunshan, China with an option to spend one semester at Duke University in Durham, NC. iMEP students gain knowledge and experience in both the Chinese and U.S. environmental policy landscapes.

## CURRICULUM

### YEAR 1 FALL

Environmental Economics  
Statistics and Program Evaluation for Environmental Policy  
Environmental Policy Analysis  
1 Elective

### YEAR 1 SPRING

Environmental Science  
Environmental Policy Practicum  
Environmental Policy Process  
1 Elective

### YEAR 2 FALL

Master's Project Capstone\*  
Environmental Law, Governance and Regulation  
2 Electives

### YEAR 2 SPRING

Master's Project Capstone\*  
3 Electives  
*Option to study abroad at Duke University, North Carolina, U.S.*

### SAMPLE OF ELECTIVES COURSES

Environmental GIS  
Key Topics in International Environmental Policy  
Modeling for Energy Systems Analysis  
Planetary Health and Environmental Epidemiology  
Building an NGO Toolkit: From Design to Monitoring  
Climate Change Economics and Policy  
Natural Resources and Protected Area Management  
Research Methods

\* Under faculty supervision, small groups of students will work with clients to develop solutions to real-world environmental policy challenges. Courses are subject to change.

## Binbin Li

Assistant Professor of Environmental Sciences



Dr. Li received her PhD in Environment from Duke University in 2017. Dr. Li's research focuses on loss of biodiversity, endangered and endemic species conservation, priority setting and management of protected areas, and promotion of innovative technology, markets and policies to solve conservation problems and local community development.

She also studies the impacts of One Belt One Road on biodiversity, giant panda conservation and management via Footprint Identification Technique (FIT), impacts of oil palm and rubber plantations on biodiversity in Southeast Asia, and the influence of national environmental policies on human-wildlife conflicts. She is devoted to using photography, social media, drama, and other art formats to promote conservation science in the public.

### STUDENT PERSPECTIVE

## Elle Xu's Masters Project Directly Supports Panda Conservation

By Jingjing (Elle) Xu

**M**y Masters Project (MP) in the international Master of Environmental Policy (IMEP) program looks at giant panda behavior in response to livestock presence. I worked in collaboration with the China Conservation and Research Center for giant pandas. I conducted experiments at Shenshuping Panda Base for two months in the summer of 2019. This base is the largest, most dynamic and most self-sustaining base for giant pandas in the world, located in Wolong National Nature Reserve, Sichuan, and the very first natural reserve established in China.

The most thrilling part of this project for me was that I had intimate experiences with pandas! Five volunteers I recruited conducted observation experiments with me, and each of us was in charge of one panda. Very quickly, we were each able to recognize our own panda, not only from appearance, but also from their personality. For example, Lanzai, a male panda, is more active than others, while Wugang is a slow eater. Our mornings started with cleaning the pandas' enclosures, waking the pandas up, then taking out leftover bamboo for breakfast, and finally shoveling panda poop and weighing it. Normally, an adult giant panda intakes 35-40kg of bamboo and produces more than 10kg of poop every day. Enclosure cleaning work is never an easy task.

Four hour observations are the key to this research. My fellow volunteers and I trained in recording panda behavior, such as eating and drinking, moving, stereotypic



behavior, marking, excreting, etc. The outside enclosure area was divided into different buffer zones to better record the pandas' location. We also need to feed the pandas bamboo, carrots, nutritious "panda cakes," and sometimes fruit, and that is the moment we have the closest interactions with them, which is a rare and valuable opportunity for all of us. We have to always keep an eye on them as they may show aggressiveness given the fact that they are real bears. Although they are not as fierce as wild pandas anymore, their attacks can still hurt people severely.

According to Professor Binbin Li and Professor Stuart Pimms' research, overgrazing in the giant panda's habitat is one of the most serious problems for panda conservation. Research shows that pandas utilize less of the bamboo forests where livestock visit. In my research I analyze the reasons behind this phenomenon from a behavioral and ecological perspective. To conduct one

experiment we needed livestock feces collected from free-range cattle and horses. To complete the mission of collecting this material, we needed to hike to above 2500m (8202 ft) to find the livestock. A complex ecosystem of mountains, valleys, streams and meadows makes up the fabulous scenery in Wolong. There are more than 4,000 plant species, 300 bird species, and 96 mammal species in Wolong, which makes the journey of searching for livestock feces more remarkable.

The full immersion in nature combined with the work with captive pandas is a perfect balance for studying conservation in field and lab. I feel grateful that I spent my summer in Wolong with pandas, as nobody can resist their cuteness, and at the same time, I feel the responsibility of conserving this species and the great biological diversity of their habitat. I hope the findings of my research will provide scientific evidence for making a better grazing policy inside the Giant Panda National Park.



## The Blue Pioneer Program (BPP)

BPP is a non-degree professional program founded in 2016 at Peking University and later established at the Environmental Research Center (ERC) of DKU in 2018 by Professor Kathinka Furst. With the joint support of the David and Lucile Packard Foundation of the US and the Paradise Foundation of China, the goal of this program is to cultivate the skills of mid-career professionals working in Chinese marine conservation NGO's. The BPP program recruits a new cohort every year who participate in courses, seminars, field trips, and a research project to receive a certificate.

In August 2019, Blue Pioneers from all over China gathered at DKU to begin their four-month training program. They completed intensive training courses in the following topic areas: Marine science and pollution control; Construction and management of marine-protected areas in China; Resource economics and sustainable fisheries; Law, technology, and media in environmental policy; The role of foundations and think tanks in solving environmental problems; and public welfare and internet innovations. During the Ocean NGO Forum hosted at DKU in October, the Blue Pioneers presented their research projects, each related to the theme of marine protection.

## Zero Garbage into the Sea Hackathon

A Hackathon typically brings together computer programmers and other people involved in software development, such as graphic designers, interface designers, and project managers for the purpose of challenging a technical problem or developing a software or hardware. Microsoft, Google, and Apple invite hackers to participate in Hackathons to test the latest desktop systems. Our Blue Pioneers held a "Zero Garbage into the Sea" Hackathon using Internet of Things technology to solve the problem of floating garbage!

In a two-day closed R&D competition, the "hackers" were challenged to develop a new water management system that would most successfully intercept garbage before it enters river inlets. Hackers needed to design details

# Marine Conservation Thrives at DKU



of the system, such as sewage outlets, diversion outlets, drainage outlets, etc., referring to data collection and statistics of current systems. The rules of the hackathon require that a new system must not violate natural processes and must be easy to promote. The winning system will be used for pilot operation and promotion.

## If I Owned an Island...

Have you ever wondered what you would do if you owned an island? The Blue Pioneers have! The 2019 BPP cohort made a "Five Year Plan" for their island, which included essential policies and practices on infrastructure, ecological restoration, and sustainable development. Here are their recommendations:

- Build a central station where you can oversee the development of a new ecological supervision system
- Gather a scientific conservation team, which will conduct a survey report of local species
- Build a space for scientific research and education
- Complete the restoration work of basic habitats and carry out bird recruitment
- Create a new educational base: cultivate talent through educational programs and train experts in island ecology management and restoration
- Regularize and institutionalize ecological restoration and explore new ideas for ecotourism

## Kathinka Furst

Assistant Adjunct Professor of Environmental Policy



Dr. Furst received her PhD degree at the Faculty of Law, University of Amsterdam. Prior to joining DKU, Dr. Furst worked as a consultant on program management and evaluation on environmental governance projects in China. Dr. Furst is the founder of the Blue Pioneer Program at DKU's Environmental Research Center. She recently received a dual appointment as a Faculty Fellow at Duke's Nicholas Institute.

Her research generally looks at environmental regulation and justice in China. She is now working on several projects including: Mapping and analyzing the effect of environmental public interest litigation and tort litigation in China; Examining the Jing-Jing-Ji air pollution reduction policies from an environmental, economic and social justice perspective; and Smog Art in China.



# 2019 China Ocean NGO Forum – Technology and Marine Conservation



**On October 29th, 2019 the Blue Pioneer Program hosted the Science and Marine Conservation Sub-forum of the third China Ocean NGO Forum to discuss how to use technology to solve marine environmental protection issues. In addition to presentations from the Blue Pioneers, experts in the marine and environmental protection fields attended to share their experiences.**



**Eric Solheim**

Chairman, REV Ocean  
Winner of the UN Earth Guard  
Former Executive Director of the UN Environment Programme

As the chairman of REV Ocean, Mr. Erik Solheim shared the strategy, experience and challenges of the organization in the development of marine protection technology. The non-profit organization REV Ocean was established in 2017 with the overall goal of returning an unhealthy ocean to its natural state. Among the many possible solutions, REV Ocean chose to develop better technology to solve the problems caused by technology. REV Ocean has four major development directions: marine scientific research vessels, a world ocean center, an ocean data platform, and a plastic revolution.



**Larry Crowder**

Edward Ricketts Provostial Professor of Marine Ecology and Conservation and Senior Fellow at the Woods Institute for the Environment, Stanford University

Professor Crowder advocates solving marine conservation problems using a dynamic, holistic development lens, which considers the entire ecosystem, including human beings, in the management of marine ecosystems. Compared with traditional space management, dynamic ocean management can better match ecological processes and human activities in space and time, and can maintain the ecosystem in a healthy, productive and resilient state.



**Maren Hjorth Bauer**

CEO, Katapult Ocean

Ms. Maren Hjorth Bauer is the CEO of Katapult Ocean, which is a non-profit that helps fund startups with marine-friendly agendas. The ocean plays an important role on the planet that we live on. If we can solve ocean-related issues, other challenges generated from climate change, including food shortages, the development of clean energy and alternative transportation options, will also begin to find more solutions. From a global perspective, Ms. Bauer inspires entrepreneurs who care about the marine environment on how to solve ocean-related problems.



**Meng Zhou**

Chair Professor and Dean, Shanghai Jiaotong University School of Oceanography

In the past 50 years, science and technology have made great progress, from human to unmanned, from manual to automatic, from single parameter to multi-parameter, etc. These changes make ecological and climate monitoring possible. GPS can not only monitor illegal fishing, but also monitor fish distribution; temperature and salinity sensors can monitor the marine environment and fish distribution; fish finders can be used for quantitative estimation of biomass. These scientific and technological methods have taken marine management one step further. However, policy-makers must address difficulties such as inconsistent government support and geopolitical games. The marine environment requires long-term attention and continuous investment to be better managed and protected.



**Junjie Zhang**

Director, iMEP Program and ERC  
Associate Professor of Environmental Economics

Professor Zhang reported on new data that could change the way policy makers think about fish population assessment, behavior within the fishing industry, and the effectiveness of marine protected areas. The traditional method of calculating the catch rate of fish greatly overestimates the carrying capacity of the marine environment and maximum sustainable production. Meanwhile, seasonal fishing closures encourage fishermen to increase fishing intensity. These two oversights have led to overly optimistic policy forecasts. Increasing local employment opportunities should be part of fisheries management. In addition to the benefits of protecting habitats and protecting the number of populations, the establishment of marine protected areas also helps to reduce catches outside the protected areas.



View of Duke University Marine Lab, Beaufort, NC

## IMEP AT THE DUKE MARINE LAB

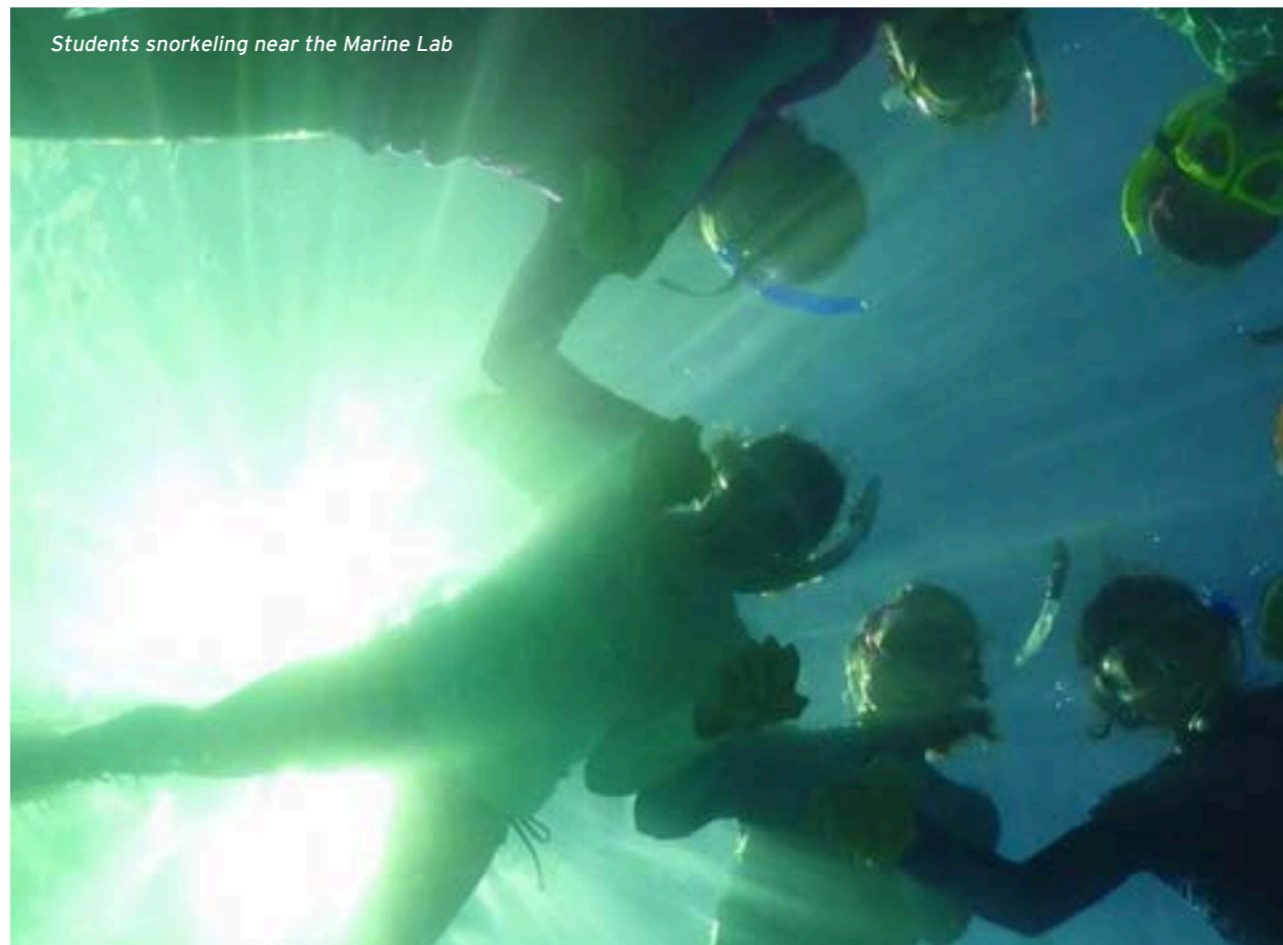
The Duke University Marine Laboratory (DUML) is a satellite campus of Duke University and a unit within the Nicholas School of the Environment. It provides interdisciplinary educational and research opportunities addressing an area of vital concern - the quality of the Earth's environment and the sustainable use of its natural resources. Ocean studies are central to the resolution of global environmental problems related to the impacts of humans on ecological systems, biodiversity, climate change, coastal land management, environmental quality, and environmental health.

**IMEP students may spend their entire Duke semester at DUML if they plan to focus on marine conservation in their electives and Masters Project.**

Learn more about DUML by visiting the website: [www.nicholas.duke.edu/marinelab](http://www.nicholas.duke.edu/marinelab)



IMEP '20 student Yumin Wang



Students snorkeling near the Marine Lab

### CONNECTWITHCOMMUNITY

## IMEP Students Clean up the Beach

by Yidan Chu, iMEP '20

You cannot imagine how much marine waste is out there if you don't take a closer look. On International Coastal Cleanup Day, iMEP students, together with many other volunteer students from the Nicholas School of the Environment, formed several groups to pick up coastal waste near Beaufort, NC waterfronts. Among the many types of waste we found were a desk, fishnets, and much more, but the majority of the waste we found was used plastic products. According to the Ocean Conservancy, every year, about 8 million metric tons of

plastic enter our ocean on top of the estimated 150 million metric tons that currently circulate our marine environments. Many marine species suffer from mistakenly eating plastic as food. We know that we cannot make significant changes to global ocean pollution by simply picking up marine waste on a single day. But we must make our personal contributions, show our determination to protect our oceans as often as possible, and try to use less plastic products whenever possible. In this way, we hope that small contributions can lead to a big change.

### STUDENTPERSPECTIVE

## Kameron Schroeder's Semester by the Ocean

by Kameron Schroeder, iMEP '20

Spending my semester at the Duke University Marine Lab was a wonderful experience. The location on an island off the coast of North Carolina made it easy to gain real world experience with the marine conservation subjects I learned about in the classroom. In fact, there were many times when I had been learning about dolphins in class and looked out the window to see local dolphins swimming on the surface of the water in pods. I learned about the biology and behavior of dolphins and the specific policies the US uses to protect them with the Magnuson Stevens Act in my Marine Policy course. It was my favorite course at the Marine Lab because it combined my love of learning about environmental policy systems with my love for the ocean and the marine creatures that inhabit it.

The experience has greatly enhanced my iMEP studies. Hands-on learning combined with small class sizes facilitated my ability to interact with my professors and my classmates on an individual level. I have made many connections that will help me as I continue my studies and pursue my career. I am constantly linking what I've learned about environmental policy in China to my marine-centric studies at the Marine Lab. While the Marine Lab almost entirely focuses on US policy, there have been a few links made in the classroom to Chinese policy. For example, we learned about different regulations surrounding offshore aquaculture and compared the policies used in the US with major aquaculture producing countries in Asia, such as China.

## The Blueprint for China's Carbon Market Design: Research Series from Professor Zhang's Environmental Economics Group

Translated by Xin Zhang

**C**utting-edge research in environmental economics is essential for solving many of China's most pressing climate change challenges. The Environmental Economics Group (EEG), led by Professor Junjie Zhang with the support of the Energy Foundation, conducted a series of research studies on the Economic Analysis of China's Top-level Design of Carbon Pricing to offer policy ideas on carbon pricing that can help do just that. The EEG successfully completed the project with a closing symposium held in Beijing on April 10, 2019. Here are some of the takeaways.

The study focused on short and long-term pathways for climate solutions in China, and analyzed top-level design needs on carbon pricing. Carbon pricing is an economic method of pricing the negative externalities caused by carbon emissions. All greenhouse gas emission control policies use explicit or implicit carbon pricing, requiring carbon emitters to bear the cost of societal welfare losses caused by their emissions, to achieve the regulatory goal of addressing a root cause of climate change.

In the context of China's competing pressures for continuous economic growth and radical new climate solutions, the top-level design of carbon pricing is very important. On the one hand, the Chinese government promises to reach peak carbon dioxide emissions by 2030 or before. The government's responsibility for reducing emissions and international pressure are both increasing. On the other hand, in order to achieve the goal of the *Two Centenaries*<sup>1</sup>, China must maintain the current mid-to-high-speed economic growth trend into the middle of this century. In order to ensure simultaneous economic growth and climate mitigation goals, China urgently needs effective carbon pricing policies that balance greenhouse gas emission reduction, economic impact and social equity.

China's existing carbon pricing mechanism still has shortcomings and deficiencies. While the country has made significant progress, carbon pricing in China still lacks a solid legal foundation and currently fails to offer an effective long-term emission reduction constraint. Although some regions have executed pilot carbon markets, their market-based emission reduction effects are limited. They have not fully achieved market equilibrium, reducing market effectiveness. Moreover, even if these effectiveness issues are improved, using markets to drive China's low-carbon transition may ultimately bring equity issues in the areas of labor and the distribution of effort that will need to be addressed.

<sup>1</sup>The *Two Centenaries* is a set of goals advanced by President Xi Jinping to guide China's economic growth for the two milestone years 2021 and 2049.



**Professor Zhang's research group believes that the top-level design of carbon pricing should adhere to the two principles of rule of law and marketization.**

The first principle states that the compulsory and stable nature of the rule of law is necessary to guarantee the success of proposed climate solutions. The proposed design of carbon pricing aims to form a long-term expectation of a low-carbon transition, and to ensure efficiency and fairness of carbon pricing through the rule of law.

Marketization uses the explicit carbon price to make use of the market's role in allocating climate capacity resources. It improves the cost effectiveness of carbon emission reduction policies by reducing emissions more efficiently than measures instituted to comply with top-down government regulations. In addition, marketization can avoid international trade frictions caused by disputes over inequitable "government selection of winners" and administrative subsidies.

**The first is to establish stable and effective emission reduction constraints through the coordination of legislation and policies.**

**Based on the principles of rule of law and marketization, the top-level design of carbon pricing should address four key issues under the dual guidance of international climate solutions and domestic economic development goals.**



Carbon pricing policy needs to form a mid-to-long-term emission reduction roadmap through legislation. It also needs to pay attention to the establishment of coordination mechanisms with complementary policies such as energy and environment policies. As an example, a pollution permit platform can provide supervision of greenhouse gas emissions. This policy would make full use of limited government resources by creating synergy with environmental supervision.

**The second is to achieve maximum cost reduction by choosing the right carbon pricing tools.**

After the beginning of active trading in China's national carbon market (likely in late 2020), the short-term task of policymakers is to increase market vitality by improving the property rights system and the market mechanisms of the national carbon market. The EEG study provides detailed recommendations for how the reform of China's property rights system can better clarify the asset attributes of carbon emission rights. The study also names financial tools that will improve the functioning of China's carbon markets, such as a commissioned auction

mechanism. The Environmental Economics Group hopes that Chinese authorities will recognize the advantages of the legalization and marketization of a carbon tax, and introduce a carbon tax mechanism at the right time. The parallel practices of enforcing a carbon tax and building a carbon market can expand the number of industries that carbon pricing policies regulate. The carbon market mainly regulates industries with a large volume of emissions and low regulatory costs. The carbon tax mainly regulates small and medium-sized emission sources with high costs.

**The third is to reduce the macroeconomic impact of emissions reduction policies through supporting fiscal and tax reforms.**

In order to mitigate the impact of carbon emission reduction on the macroeconomy, carbon pricing policies should adhere to the principle of "neutral fiscal revenue" to avoid the counter-cyclical phenomenon of economic slowdown, reduced corporate profits, and increased tax burden. A well-designed carbon pricing system may bring about a "dual dividend" of greenhouse gas emission reduction and optimization of fiscal and taxation structures. To achieve this goal, China should establish a tax rebate mechanism in coordination with the development of carbon pricing legislation to make full use of the income cycle effect of carbon pricing.

**The fourth is to balance the income distribution effect of emission reduction policies through social policies.**

Due to the low elasticity of demand for fossil fuels and the relatively high proportion of low-income groups' consumption of fossil fuels and high-carbon goods, when carbon pricing increases the cost of fossil fuels, low-income groups and less developed regions face larger cost burdens than higher income groups. The top-level design of carbon pricing needs to make sure policy instruments work within the scope of their functions and duties. Carbon pricing should be highly efficient, social policies should govern fairness, and the issue of carbon pricing fairness should be solved through means such as social services, tax relief, and special financial and technical support.

If pursued in concert, these recommendations could help China achieve its dual goals of dynamic economic growth and accelerating declines in its greenhouse gas emissions.

### ATTENDEES OF CARBON PRICING SYMPOSIUM:

- **Zhaoli Jiang**, Deputy Director General, Department of Climate Change (DCC), Ministry of Ecology and Environment (MEE)
- **Ding Ding**, Director, Division of Domestic Policy and Compliance, DCC, MEE
- **Feng Liu**, Deputy Director, Division of Domestic Policy and Compliance, DCC, MEE
- **Jinnan Wang**, Present, Chinese Academy for Environmental Planning, MEE
- **Xiliang Zhang**, Director, Institute of Energy, Environment, and Economy, Tsinghua University
- **Xinye Zhang**, Dean, School of Applied Economics, Renmin University of China
- **Ji Zou**, President, Energy Foundation China
- **Shuang Liu**, Program Director, Low Carbon Economic Growth, Energy Foundation China



## Energy Evolution: the Fourth Annual Energy Week at Duke



iMEP students in the Class of 2020 spent their Fall 2019 semester at Duke University in Durham, North Carolina. Perfect timing for attending the events of Duke's Fourth annual Energy Week, a series of student-organized events which bring students, faculty, and industry professionals together on Duke's campus in November to discuss the many issues surrounding alternative energy solutions from the perspectives of energy policy, technology, and business.

This year's theme was Energy Evolution

Climate Change and the Future of Energy. All industry energy stakeholders face both growth opportunities and complex challenges. Under the fast pace of evolution within production, distribution, storage, and technology, businesses will have to adapt quickly in order to make the most of new opportunities, implement effective strategies, and avoid being disrupted by others.

We're highlighting the main events of Energy Week here, so you can learn more about the iMEP experience at Duke.

### Energy Innovation Showcase

The Energy Innovation Showcase is the most popular event every year during Energy Week. It is an evening for participants to explore the leading ideas in the energy space while interacting with different innovators in the field. Students have the opportunity to communicate one-on-one with start-up company representatives, researchers, inventors, and investors on the cutting edge of energy in technological, financial, and policy fields.

**"I learned several fantastic cases that companies or Duke students have been working on such as the application of portable solar energy devices in India, AI technical application on electricity distribution, and the electricity consumption situation in main academic buildings on Duke campus.**

- Yeyi Bao, iMEP '20

**"It was quite worthwhile to go to the Energy Innovation Showcase during Energy Week! I finally met the Duke Electric Vehicle team who made the World's most fuel-efficient vehicle. In fact, I not only met people from our campus but also people who are working in energy-related fields outside of school. For example, staff from North Carolina Clean Energy Technology Center, and people from local innovative firms. Meeting these people facilitated my further understanding of what people are doing with energy-related work!"**

- Yidan Chu, iMEP '20



### The Energy in Emerging Markets Case Competition

The Energy in Emerging Markets Case Competition (EEMCC) is also a highlight every year. The competition addresses real energy challenges affecting the developing world by bringing together creative teams in quest of unconventional business-based solutions that expose unrecognized opportunities with positive social and environmental impact.



The 2019 Case Competition focused on Aspire Power Solutions (APS), a company based in Lagos, Nigeria. APS develops intelligent hybrid solar systems for residential, small business, commercial and industrial customers. The participating teams addressed unique business challenges and proposed strategies for developing an interconnected, distributed energy marketplace in Nigeria. In total, the top three winning teams won \$15,000 in prizes to support further research at their universities.

**"The Energy in Emerging Markets Case Competition (EEMCC) allowed me to have a glance at the plan, which aimed to address real energy challenges affecting the developing world. I participated in the discussion about the possible unconventional business-based solutions. This Duke University flagship energy event connected me with other students, academia, and industry in pursuit of unrecognized opportunities with positive social and environmental impact.**

- Miao Hu, iMEP '20

**"Thanks to the Duke University Conference, I not only got the chance to know more information about the energy systems of the U.S., but also gained deeper insight about the relationship between energy and climate change. I was very worried that no one is willing to step away from fossil fuel, but when I saw how actively the attendees of this conference are trying to find better solutions other than sticking to fossil fuel, I feel very relieved about our future.**

- Siqi Liang, iMEP '20

### Energy Mix

Energy Mix is the big social event of the week when all participants can exchange their ideas in the most relaxed and effective way. It is always easier to make inspiring and insightful conversations with food and drink provided. Students in energy studies have an excellent opportunity to network at this event and benefit from the experiences of professionals at the forefront of real cutting-edge energy issues.

**"Energy Mix provided me a good chance to share electrifying conversation with students, faculty, and energy professionals from Duke (and far beyond!)."**

- Tianqi Wu, iMEP '20



### 11th Annual Duke Energy Conference

The theme of the 2019 Duke Energy Conference was "Capitalizing on Energy Evolution." The speakers discussed the intersection of energy and transportation, finance, technology, and resources. The conference explored the trending ideas in the industry with students, faculty, thought leaders and business partners from both inside and outside Duke University.



## ENVIRONMENTAL ECONOMICS

society, such as health, environment, politics, and so on. During the three-day conference from January 3 to January 5, 2020, San Diego, California was sunny and comfortable. Every day from 8 a.m. until nighttime, the main venues were crowded by numerous scholars who exchanged their creative ideas. The events covered a broad range of topics from country-specific issues to international cooperation. ASSA appointed academic chairs for each topic area, who gave comments on each presentation directly. Each paper discussion was composed of 20 minutes of the speaker's presentation, five minutes of commentary feedback, and five minutes of free questions and answers.

related happiness expressions. On the other hand, it was not easy to establish a convincing causal relationship, but Professor Moon Joon Kim provided support through the whole process. On the second day of the conference, I presented my research as the only graduate student presenter in the Social Costs of Air Pollution topic area. I was very nervous, but by the end I felt very honored to receive valuable comments from Prof. Patrick Baylis, Assistant Professor from the Vancouver School of Economics, and many other experts.

My paper "The Impact of Ambient Air Pollution on Chinese Expressed Happiness through Social Media" talks about the relationship between air pollution and people's expressions of happiness on Chinese Weibo. I based my research on the analysis of a mega database on social media. On the one hand, this data set was a convenient way for me to obtain people's self-reported environment-

Later that day, I listened to the presentation given by Professor Kim in the American Economic Association (AEA) Health Care Systems section. His talk was entitled "Unintended Impacts of the Abolition of Copayment on Outpatient Utilization in South Korea: Evidence from a Regression Discontinuity in Time." I also had the chance to listen to environmental-related voices from sub-sections such as the Chinese Economists Society, Association for Comparative Economics Studies, and the Middle East Economic Association.



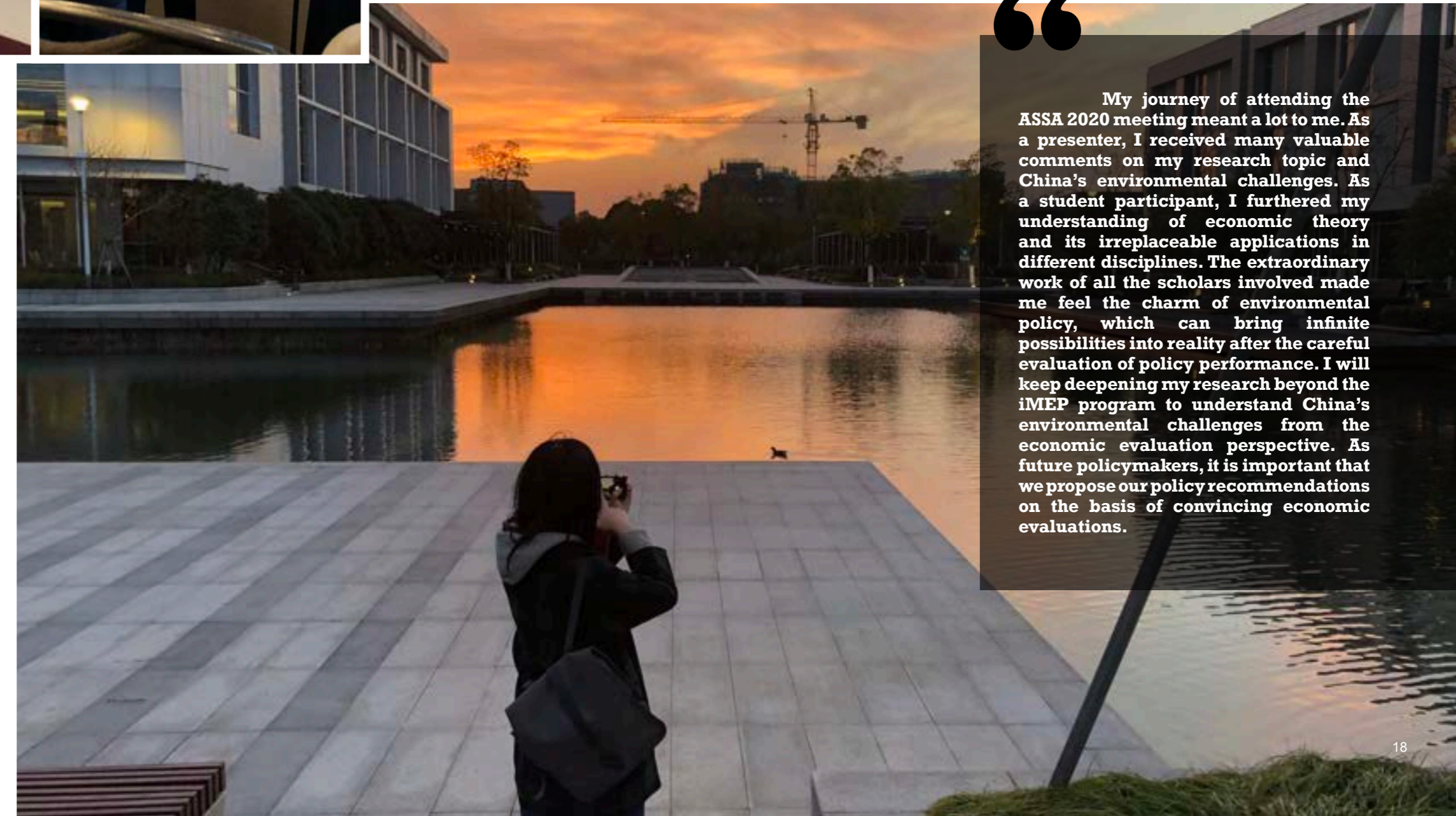
**My journey of attending the ASSA 2020 meeting meant a lot to me. As a presenter, I received many valuable comments on my research topic and China's environmental challenges. As a student participant, I furthered my understanding of economic theory and its irreplaceable applications in different disciplines. The extraordinary work of all the scholars involved made me feel the charm of environmental policy, which can bring infinite possibilities into reality after the careful evaluation of policy performance. I will keep deepening my research beyond the iMEP program to understand China's environmental challenges from the economic evaluation perspective. As future policymakers, it is important that we propose our policy recommendations on the basis of convincing economic evaluations.**

### STUDENT PERSPECTIVE

## Yiren Wang: From Classroom to Conference

**A**s an international Master of Environmental Policy (iMEP) student at Duke Kunshan University who started in engineering in my undergraduate studies, I never thought that one day I would attend the Allied Social Science Association (ASSA) 2020 annual economics event. My study of environmental economics in my first year of iMEP core courses bridged the gap between my engineering background and my ability to participate in this conference. I submitted an abstract of my research project from my Environmental Economics II class at the encouragement of Professor Moon Joon Kim, and my paper was selected for the Social Costs of Air Pollution topic area under the Association of Environmental and Resource Economists (AERE) section. It was my first time sending a draft to any conference. Even now when I recall my memories at ASSA 2020 in San Diego, it still seems like a daydream.

The ASSA annual meeting is a platform to discuss global social and economic concerns through the lens of social science quantitative methods, which scholars apply in all areas of



FACULTY SPOTLIGHT

**Jackson Ewing: Connecting Students to the Policy World**



Jackson Ewing has been leading the development of the iMEP program on Duke's campus in Durham since January 2018 after developing his career at the Asian Society Policy Institute. We wanted to get his insider perspective on the iMEP program as it relates to real world policy-making.

**Q: What did you do before you joined iMEP, and how have you brought that experience and expertise into the iMEP program as the iMEP Faculty Lead based at Duke?**

**A:** The iMEP program is a wonderful opportunity for me. I came from a think tank called the Asian Society Policy Institute, where I had been working for years on China and greater Asia's international climate change policy-making, and specifically on efforts to create carbon trading systems. So already having some awareness of what was going on in those spaces and connections to a wide network of policymakers and expert practitioner colleagues in China allowed me to step into the iMEP program with some value to contribute right away. I've learnt a lot from my colleagues in iMEP, not just about the issues of the day, but also as we work together to build a relatively young program, we're always learning how to serve our students better and how better to integrate iMEP into the wider Duke community, which is very exciting to me as well.

**Q: What are the unique features of the iMEP program that prepare students for working in the policy-making field?**

**A:** The iMEP program is designed explicitly to set students on career paths forming and influencing policy. It marries environmental science, environmental economics and environmental policy-making, and attempts to expose students to core environmental challenges, as well as the processes by which these challenges are solved. We design coursework with these goals in mind while setting students up to pursue projects outside of the conventional classroom. The best examples of this are the Masters Project and internship requirements, where students work directly with clients or employers on critical environmental challenges and work to come up with pragmatic potential solutions. This innovative curriculum will develop their understanding of policy challenges and solutions, and bring them into contact with practitioners out in the world whom they can learn from and potentially get important opportunities from in the future.

Outside of the classroom, faculty members are actively involved in the policy arena, and can bring students into that work both formally and informally. Many of the faculty members both at Duke Kunshan and at Duke University that students are learning from work alongside people in government, the private sector, NGOs and IGOs on a regular basis. They bring their expertise and experience from that into the classroom.

**Q: The Belt and Road Initiative (BRI) is a very popular topic in China. What does environmental policy-making look like within the Belt and Road? What do you think of the potential opportunities for iMEP students to study Belt and Road projects?**

**A:** The BRI is by many accounts China's most important

foreign policy initiative, and the largest international infrastructure investment program since WWII reconstruction. It has the potential to reshape infrastructure in developing countries in Asia, Africa, Latin America and beyond, as well as fundamentally shift China's relationship with these countries, and shift China's role politically as a major founder of infrastructure. This is not a hypothetical program; this is very much in motion as we speak. So the ripple effects environmentally are quite substantial, and quite varied. China takes the approach that it will abide by the local environmental government policies that exist in any given destination for its investment. However, given deficits in environmental governance in many of those destinations, China has faced backlashes and problems as a result of its planned or operational BRI investments. This is leading to a growth space in recipient countries, in inter-governmental organizations, such as the UN, and in China, about how we can attempt to make the BRI investments more sustainable and make environmental considerations a higher priority.

My main objective in working on the BRI is to help build the case that it is in China's strategic interest to invest more in non-fossil fuel energy both in China and in recipient BRI countries. It is in China's interest because it will help them to build up those industries domestically and more rapidly transition away from the energy systems of the past, particularly the use of coal. This will also help recipient BRI countries build energy systems that will not create the same sort of public health challenges that China has often experienced as a result of urban air pollution. It will make these countries more vibrant partners, improve their people's quality of life, and improve their ability to engage in productive commerce with China in the future. This approach would also benefit the global climate.

Building this case takes many different forms. I think there are three arenas where policy influencers can be productive. One is geared toward Chinese policy makers and entities, and how they could try to achieve that sort of result. There are also efforts that can be affective in shifting the investment environment in recipient countries to make it more conducive to bringing in renewable energy and non-fossil fuel energy as opposed to traditional fossil fuels. And finally in international forums, including places like the UN's framework for conventional climate change and the discussions on responsible investment among the G20. Conversations in all these arenas can enhance the potential for greener BRI investments.

For our students, I think Duke is a wonderful place for them to get exposed to some of that thinking and activity, given we have people across the campuses at Duke University and at Duke Kunshan in multiple disciplines who are actively thinking about these challenges and involved in some of the work to help solve them. Given the wide range of work being done at Duke, students have a lot of options for where they could potentially engage.

**Studying the Belt & Road Initiative at Duke and DKU**

In 2013, the Government of China announced its vision for the creation of the 21st century Silk Road, later renamed the Belt and Road Initiative (BRI), and momentum around this massive international infrastructure development program has been building ever since. Total estimated investment in BRI projects are reportedly on the scale of US\$1 trillion dollars. Research on the BRI and its effects on environmental conservation efforts requires an inter-disciplinary and international approach. In the iMEP program, Jackson Ewing, Junjie Zhang, Erika Weinthal, and Billy Pizer, plus other iMEP visiting faculty, all contribute to BRI research efforts.

Under the auspices of the Center for International and Global Studies at Duke and the Environmental Research Center at DKU, Duke and DKU faculty and students have organized a central hub for gathering scholarship on the BRI that includes information on multi-disciplinary projects, research news and events, and scholar contact information. This BRI hub has created increased opportunities for communication and cooperation between researchers from different disciplines and from across the world. iMEP students have a wealth of opportunities to get involved in events, research, and ongoing faculty projects.

See more information here: <https://igs.duke.edu/initiatives/belt-and-road-initiative>





**FACULTY SPOTLIGHT**  
**Getting to Know Coraline Goron,**  
**From Fieldwork to Policy Making**

By Glory Agun

As iMEP's newest Faculty member, Coraline Goron joined the iMEP faculty in August 2019 as an Assistant Professor in Environmental Policy. She obtained a double Ph.D. degree in Political Science from the University of Warwick and the Université Libre de Bruxelles.

**Professor, could you tell us about your work and what you do here at DKU?**

There are two parts of my life here at DKU: teaching and research. These two intersect in several ways because I'm also learning through teaching and this opens new ideas for research, and my research work is also a great input into what I'm teaching. Currently, I teach a class with Professor Patrick Ward on Environmental Policy Analysis, where we train students to think about complex environmental problems and to understand, analyze and project possible policy solutions. Students choose concrete issues, such as overfishing, desertification, water pollution, etc. and analyze policies being made to solve these issues.

**“We explain that finding quick fixes does not truly solve these problems, rather we should think about the sources of these environmental problems. Then we can weigh the cost and benefits of solutions for societies and how to spread them around different groups so there will be equity.”**

**You mention equity and perspective in environmental issues in some of your work. Can you expand on this?**

I have no one set of solutions, but I do focus in my work on these issues in several ways. For example, I published a paper in 2017 on the role of regulatory institutions in establishing an emissions trading system (ETS) in China. Many of our students are interested in the ETS, because it is a major policy for addressing climate change that has been implemented in some parts of the US and Europe, and China is trying to implement it as well. A lot of actors see this as the most cost-effective way of implementing a carbon pricing mechanism that would redirect the market to more energy efficient investments and cleaner technology and away from coal and fossil fuels.

What I did was to look in detail at local institutions in China that would oversee implementing these policies. However, some of these did not exist in China. They had to be built from scratch and be embedded in the local government system, which was not prepared for it. For example, for a carbon trading system to function, you need to have transparent market information. Also, the local government had to play a role as a regulator in the market rather than an actor intervening in the market. I also found evidence of price control and bargaining between these industries and the government. This shows that when repurposing environmental policies from one country to another, it is vital to consider and adjust to local circumstances.

Another piece of work that I've done focuses on citizen science from the perspective of Chinese college students participating in a program organized by an NGO that sent

them to rural areas to test the quality of drinking water. The students take samples and measurements using portable instruments, while carrying out surveys of local residents. Are the wells near the cattle? How clean are the sources? Do they boil the water before drinking, or do they just drink from the source? Are there frequent cases of water-borne diseases?

My research focused on how the students view their fieldwork as being a responsibility to understand the situation and problems of water quality in rural areas and how they could provide solutions. My questions included how they interacted with local communities, the elderly, minorities, how they handled cultural shocks, language barriers, generation gaps and so on. I used this research to provide advice to the NGO on how they could empower students to take situations into their own hands with local authorities and villagers and provide practical solutions that they can use. This entails working with the community rather than imposing a top-down solution.

**How important do you think going out into the field to do research is in addressing environmental issues?**

For me it's absolutely essential. It depends on the type of research, but in every case you need context to work with. So many times I have had some ideas before I go to the field, and my views changed after I've been there. To give you an example, I went out to the field with one of the student teams I mentioned previously. When we arrived, we discovered that the township combined two Hui minority villages and four Han people villages. Then we discovered that the local authorities had started distributing barrels of purified water, and that the Hui received four barrels per household, while the Han received only two. Perhaps a reason for this was that the Hui villages were the closest to the polluting factory, but all used the same water source. In any case, the Han found it unfair. That discovery was puzzling, as it contradicted what we might expect about the treatment of religious minorities.

**You spoke about media and information, and I read one of your papers on dissemination of information in China. How efficient are current systems of media in providing information?**

Part of this work on citizen science is under the big umbrella of my postdoctoral research project, in which I looked at environmental information. Going into this, I disassembled the concept of information: is data information? Information informs people, but data doesn't necessarily inform people because if you don't understand the data, it does not inform you.

So I started to look at how data transparency and disclosure obligations were creating new politics of hiding and showing. One branch of this research agenda has been to look at how local environmental authorities use social media like Weibo. I am currently working on two related pieces of research, for which I just hired student workers at DKU. In

one province we are researching, an entire network of 176 environmental offices created microblogs down to the most local level of government. This kind of thing does not exist outside of China. Many would say this is great because common people can tag government authorities with their request to solve environmental problems without having to go through the very cumbersome administrative procedures. Officials may feel compelled to answer because the tags are public and their ignorance might be readily identified and criticized. We collected all the information and began analyzing and what we found was a surprise. We discovered that these microblogs posted a lot of propaganda and a lot of information that had little or nothing to do with the environment. Most of the environmental information they posted was also mainly about air quality which was already accessible information without the app. In my follow-up research, I aim to disentangle what happens online and offline and the dynamics going on behind the scenes.

**What are some of the skills you endeavor to equip students with who take your courses?**

I think one main thing we do is to equip students with critical thinking to be able to recognize and deal with complexity, deal with people who have different views, people that they need to convince, people that they need to include in decisions about environmental policy, and people they have to work with to achieve environmental protection goals. Environmental policy has a lot to do with working with others.

**What are the new issues you see coming up for the next generation of Environmental Policy graduates?**

I think debates on environmental issues are becoming more confrontational than before, even though most people recognize the need to address them. Nationalism is rising in countries across the world and it could affect how we govern globalized environmental issues. There's a trend of looking more inward and this is the opposite to the portrait I just gave you, of people who are confident enough in themselves to be open to others. I think societies right now are lacking self-confidence and, as a result, are closing off from others and excluding them from their concerns and solutions. I think the next generation will have to stand in positions between nations or other actors who hold different ideologies. Creating bridges nations is a big challenge that this generation will increasingly face. Also, creating equitable solutions to environmental problems that will not require some people to lose their livelihood or have to give up the hope to reach or maintain a more comfortable lifestyle is also very important.



STUDENT PERSPECTIVE

## Rocky Guzman: From Birdwatcher to Environmental Lawyer

By Tan Hao

**“In order to practice applying knowledge to real issues, the courses in the iMEP program pay more attention to the case study as an educational tool.”**

In the unique education system of the Philippines, students have to decide their undergraduate major before 13 years old. Rocky's father chose political science for him. At the age of 14, Rocky became a member of a birdwatching organization. In his leisure time, Rocky went hiking to search for different kinds of birds under the instruction of older members. This experience inspired his love for nature and made him more sensitive to the effects of climate change.

Combining this passion with the knowledge he was gaining in his major, Rocky established a student group called the Environmental Law Society during his undergraduate studies. He worked with his fellow students outside the classroom to research the relationship between law and environmental conservation. While Rocky successfully completed law school after graduation, his passion for nature never faded away. He attended an expedition held by OCEANA, the international marine conservation foundation, during which he witnessed firsthand the sea pollution caused by human activities. Seeing the destruction of the ocean moved Rocky deeply, and this feeling has since been a driving force behind his work. Once he graduated from law school, Rocky seized the chance to become a lawyer at OCEANA, and he officially started his career as an environmental lawyer.

Although his undergraduate studies and law school experience gave him solid knowledge in the area of law, he had to face people in business and scientists from different fields in his work. In order to have a better understanding of the laboratory reports and business sheets, Rocky decided to go back to school. The interdisciplinary iMEP program became his top choice. Rocky's work experience helped him figure out his academic focus and the courses and educational methods in the iMEP program fit his needs.

Besides providing solutions to prescribed questions, Rocky said that it is more important for students to learn to form the questions themselves by "finding a problem" in class. For example, in one of his classes, each team chose their own problem to research and solve. One team chose the overfishing problem in the Bohai Sea, another chose desertification in Indonesia, and one student from Hebei province in China decided to explore the pollution of groundwater in his hometown. Rocky said, "Apart from finding a problem, we also have to prove why it is a problem." This process of identifying and describing problems helps train students to collect and analyze relevant data, then communicate the issues effectively. As Rocky points out, the use of case studies in the iMEP program not only trains students how to write excellent research papers, but also how to take action in the real world.

Solving complex environmental issues requires not only entrepreneurs with scientific backgrounds and scientists with environmental ethics, but also lawyers who understand environmental science and business analytics. The iMEP program succeeds in training interdisciplinary professionals. "I am the only lawyer in the class, and most of my classmates have a background in science and economics," Rocky says. "I have really learned a lot from them."



FACULTY SPOTLIGHT  
**John Ji: Connecting  
Environmental Data  
and Human Health**

Professor John Ji joined the iMEP faculty in 2017 as Assistant Professor of Environmental Health Science, and Associate Director of the iMEP program. Environmental Health is a hot topic in the environmental policy field, and we wanted to hear about his work in his own words.

**Hi, Professor Ji. Please give us a short introduction of yourself.**

Hi, I'm John Ji. My research focuses on the intersection between environment and human health, looking at how the environment can affect populations and lead people to live healthier or unhealthier lives. My studies include air pollution, the built environment, and how the environment and human genes may interact with each other. Some of my prior training includes neuroscience and epidemiology.

I teach a few classes in the iMEP program. One of them I want to highlight is Planetary Health and Environmental Epidemiology. Planetary health is a relatively new concept that explores human effects on the natural environment. Climate change, biodiversity, nutrition, and ecosystems around the globe are so interconnected that if human



beings change them too much, they can ultimately lead to the destruction of civilizations. In this class, we take a broad look at key global environmental changes and how they intersect with human health. I taught this class Fall 2019. In Fall 2020 I will be teaching the statistics core course, and a research methods course.

### What are some highlights of your work in 2019?

One of my main interests right now is the aging population in China. People are getting older and living longer. I'm trying to look at the environment and see what causes people to live longer and what causes them to not live as long. Previously there have been some hypotheses that some people were born to live longer due to certain genetic markers. We would like to test these ideas and see what in the environment can activate these genetic markers, if it's possible.

Air pollution is often the most visible pollutant in developing countries that people can see and feel. It is very well studied and has been proven to accelerate mortality rates. The World Health Organization lists air pollution as one of the greatest contributors to disease globally, and it affects the heart, lungs, brain, and a range of other organs and bodily functions. I study how you can mitigate these effects. In "Residential Greenness and Air Pollution Mortality Using the Chinese Longitudinal Healthy Longevity Survey: A Longitudinal Analysis", we

clearly anecdotal evidence, and people believe that green space may mitigate the effects of air pollution.

We set off to do the first study in China, and the first study done in a developing country, to see if this is true. Looking at 22 different provinces in China, we can see that yes, air pollution causes people to die younger. And yes, if you have more green space, on average you will live longer and the impact is actually large.

### Where does most of the data in your research come from?

I use survey data. Most of my research right now is built upon the data sets of predecessors who have looked into these issues in the past. What I really like to do is to come up with a new research question that people have not thought of before and use an existing dataset. The research I just told you about is utilizing a dataset that was created in 1998 - quite some time ago - that studied retirement policy in the aging Chinese population. It was started by a Duke University senior professor. I took the

addresses of participants and layered them with NASA satellite images of air pollution. I got really lucky and found clear correlations. The key is to look at the existing evidence and data, ask novel questions, and approach research that way, so you can have the highest impact in the shortest amount of time, I hope.

At other times, my research team and I do smaller studies where we collect our own data. Together with some iMEP students, I am investigating whether exercising in the presence of air pollution is bad for health. For this project we are planning to look at students at DKU. The undergraduate students are taking the bus from the Innovation Building on campus to the Scholar's Hotel off campus. Some of them don't take the bus and choose to walk. We purchased devices that monitor the air pollution and also track their physical functions, so we can see the difference between people who take the bus and people who walk under different

scenarios of air pollution and green space to see if there is enough short term effect that we can capture. The study is a Masters Project that three iMEP Class of '21 students are working on - Susan Ong, Zhang Yang, and Hua Ting.



Professor Ji receives recognition for speaking at the Sun Yat-sen University's Third International Forum on Climate Change and Health Response Conference in 2019

look at green space. My family and my friends all tell me 'Hey, why don't you go run in a park instead of the side of the road with traffic? In a park maybe the trees will take away the air pollution, and the area is cleaner.' So there is

## Patrick S. Ward

Assistant Professor of  
Environmental Economics and Policy



Dr. Ward holds a PhD in Agricultural Economics with a specialization in International Development from Purdue University. Prior to joining the DKU faculty, Dr. Ward was a research fellow in the Environment and Production Technology Division of the International Food Policy Research Institute (IFPRI). Patrick's primary research interests center around sustainable development and conservation agriculture, with a particular emphasis on developing country agriculture.

He has extensive experience conducting research in South Asia, including Bangladesh, India, Nepal, and Pakistan, and in China, Malawi, and Kenya. His current projects focus on agricultural risk management, soil fertility management and soil conservation, inclusive development of rural agricultural machinery markets, and water resource management. He is especially interested in how insights from behavioral economics and cognitive psychology can be used to inform policies and interventions.

### STUDENT PERSPECTIVE

## Songjia Zhang: Connecting Drone Technology to Soil Management Policy

**M**y name is Songjia Zhang, and I am from Kunshan, China. I recently graduated from the iMEP program at Duke Kunshan University. For my undergraduate studies I went to the University of Washington, Seattle, majoring in chemistry with a focus on chemical experiment analysis and experimental design. My interest and love for environmental protection originated from an environmental chemistry course named Green Chemistry during my junior year. In that class, I learned to feel deeply that we cannot assign solving environmental problems to a small group of people. Everyone has a responsibility to protect the environment.

In my senior year, I started to learn about environmental chemistry in everyday life. My research interests changed from lab-based research such as lake water analysis, toxic substance detection, and decomposition to a social science approach to solving problems, such as waste tracking, the impact of water pollution on residents' health, and so on.

**“I found that the solutions to many problems are stalled, often not because of a lag in our scientific research technologies or a shortage of certain hardware, but because policy-makers do not have effective policy guidance in the process of policy implementation.”**

Therefore, I decided to expand my knowledge in environmental policy by pursuing a graduate degree, and iMEP has been an amazing opportunity for me.

At the end of my first year in the iMEP program, it was time to explore and determine my Master's Project topic by joining an advisor's research group. After meeting with several professors, I ended up joining Professor Patrick S. Ward's group to study heavy metal pollution in soil and related health issues. In the beginning, we planned to compare the heavy metal pollution in rice field soil in a province of China with the health of residents in that province to see whether soil containing heavy metals will affect human health. However, after several months of attempting to collect data, I found that most soil data



Songjia rides in the middle with classmates during the Wanglang National Nature Reserve field trip Spring 2019



sources in China are not open to the public. After the authorities rejected our requests for data several times, we gave up the idea of using secondary data and started to think about ways of obtaining soil data by ourselves.

An answer came from an unexpected place. I have a connection with a company in Shanghai that uses the Beidou satellite navigation system and drones with remote sensing technology. I learned about a project they were working on using drone remote sensing to manage river water pollution. After careful inquiry, I learned that they established a numerical relationship between the remote sensing image and common pollutants in the river, and used this model to carry out monitoring of the river and predict the unknown river pollutants in the area.

Learning about this technique inspired me to modify my research direction and raise a new question: can we also use drones with remote sensing to predict heavy metals in soil? If this method is feasible, this new prediction technology will save scientists time and effort compared to the expensive and time-consuming traditional soil testing. After discussing this idea with Professor Ward, we decided to use a method called the back propagation of artificial neural networks to establish a prediction model in conjunction with drone remote sensing. Therefore, my Master's Project is titled "Predicting Heavy Metal Concentrations in Soils Through Remote Sensing and Artificial Neural Networks." We selected paddy fields in Qingpu, Shanghai to analyze the heavy metals of lead and arsenic in the paddy soil. The company in Shanghai agreed to provide drones and remote sensing equipment for our research. Fortunately, we were able to collect all

the data before the COVID-19 pandemic.

At present, China's soil pollution problem is becoming more and more serious. The overarching question I asked in my Master's Project is how can Chinese scientists and regulators introduce new technologies to quickly and efficiently manage the soil pollution and improve soil quality? The traditional soil monitoring method is to establish a monitoring system covering the entire area, obtain various statistical indicators through manual ground observation and measurement, and then use laboratory analysis to determine soil quality. The conclusions I drew from my Master's Project suggest that remote sensing technology combined with an artificial neural network model could provide vital soil quality data on a large scale. To connect the data to policy-making, I suggest each local government establish a database, which would include the heavy metal concentrations and crop yields, plus other economic and social factors such as local GDP, population density and average education level. In this way, environmental scientists could create a comprehensive Chinese soil database to provide policy makers with the data they need to better implement relevant regulations and enforce the protection rules.

During my Master's Project, Professor Patrick Ward has been a source of inspiration and encouragement to me. Although this is my first time learning and applying artificial neural networks to my research, he has always believed in my research skills. Professor Ward has been very patient with all my questions and has given me many helpful tips for the revision of my paper. He challenged me to be my best and instilled in me a passion for learning.

# WATER TOWNS

## Environmental Film & Art Festival



See more information on the Water Towns official website: <https://sites.duke.edu/watertowns>

Professor Rojas-Sotelo with visiting artist Nong King

**W**ater Towns: Environmental Film & Art Festival (EFAF) is an international event that features recent and historical pieces of documentary film and artistic production under a selected environmental theme. Water Towns EFAF create a bridge between from the arts and sciences bringing together worlds that cannot be reached otherwise. It also offers the opportunity of connecting the academic and local communities in Kunshan, Shanghai and beyond, by facilitating the integrative and immersive experiences that cinema and the arts provide.

The first ever EFAF took place at DKU and the nearby Jinxi Water Town in April, 2019. The topic of this year highlighted the plastic issue, including plastics in the environment, ocean pollution, and plastics in the food chain (environmental and health related problems). This year's film exhibition consisted of 61 feature length films and short films from 16 countries. Parallel events included art exhibitions and TED style talks given by filmmakers, special guests, faculty and students. The first Water Towns EFAF brought an extraordinary visual and mental experience to its audience.

The founder and chief producer of the first annual Water Towns EFAF, Professor Miguel Rojas-Sotelo from Duke University said, "Through exhibiting cutting edge films, and inviting excellent filmmakers, scholars and artists who focus on environmental issues, we hope that we could deliver a positive message that DKU is committed to the 'greenest' campus in China and the leading interdisciplinary institute. We want people to know how this young university will contribute to China and the world."



# A Timeline of Life as an IMEP Student

Orientation and Convocation at Duke Kunshan University, China - Fall 2018



Orientation

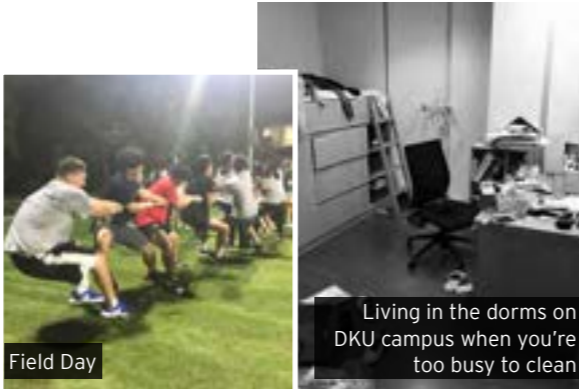
College life at DKU - Fall 2018



Going to class at DKU



Commencement



Field Day

Living in the dorms on DKU campus when you're too busy to clean

IMEP Field Trips across China - Spring 2019



Wanglang Nature Reserve



Jiangsu Dafeng Elk National Nature Reserve

Choosing a client-based or research-based Masters Project topic and Giving Final Presentations - Spring 2019



Graduation - Spring 2020



The Class of 2020 celebrated their graduation virtually due to the COVID-19 pandemic



Studying in the Duke library

Social events and life at Duke - Fall 2019

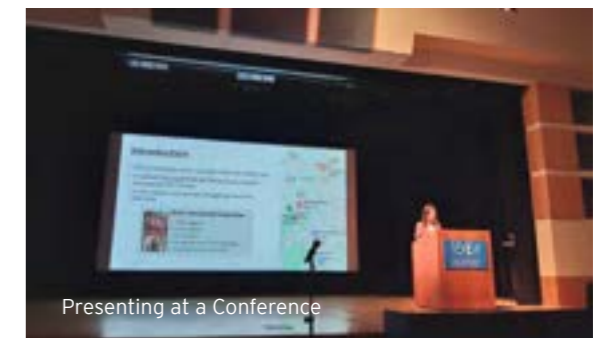


Mid-autumn Festival Celebration at the Nicholas School



Graduation at Duke Spring 2019

Studying at Duke; Attending conferences - Fall 2019



Presenting at a Conference



Playing at the Duke Rec Center on campus

Orientation at Duke University, Durham - Fall 2019



Arriving at Duke



Nicholas School Orientation



Sanford School Orientation



STUDENTPERSPECTIVE

## iMEP Takes to the Field

Student Perspectives: iMEP students not only immerse themselves in classroom learning and research, but also take advantage of many opportunities to pack their bags and dive into field education and research throughout the year. Some of these opportunities are part of iMEP coursework, and others present themselves through internships, research assistantships, and the final year Master's Project. Through fieldwork, iMEP students gain new understandings of environmental protection that only firsthand experiences can provide.

### The Historical Legacy of Xiujuan Xu Yancheng National Rare Birds Nature Reserve, Jiangsu, China

By Tianqi Wu

There are eight migratory routes for birds in the world at present. The East Asian-Australasian Flyway through China is the route with the largest bird populations and the most threatened route for birds. There are 25 endangered species on this route in total, 23 of which live in Yancheng. According to the International Union for Conservation of Nature (IUCN) Red List of Threatened Species, three of these 23 threatened species are at the critical endangered (CR) level, such as the Siberian white crane. Eight are at the endangered (EN) level, such as red-crowned cranes and oriental white cranes. And 12 are at the vulnerable (VU) level 1, such as black-billed gulls and swan geese. During an iMEP field trip to Yancheng National Rare Birds Nature Reserve, we were very lucky to see some of these rare birds.

In China, the red-crowned crane is endowed with the cultural connotations of loyalty, integrity, and noble character. They also symbolize health and longevity. Only first-class civil officers in ancient China could wear clothes that had red-crowned crane patterns. The red-crowned crane is named for the bright red skin on its head. The feathers on its neck are black, and the feathers behind its head are white, forming a clear black and white boundary that makes this bird very distinctive. There are currently

about 2,000 red-crowned cranes in the world, distributed throughout China, Japan, Russia, North Korea, and South Korea. The red-crowned crane in China has the largest group population with more than 1,000. However, only forty years ago, there were only a few hundred red-crowned cranes in China due to poaching, poisoning, and habitat destruction. At Yancheng we learned about the work of Xiujuan Xu in protecting these endangered birds.

There are two lines of a poem written on the wall in Xiujuan Xu's former residence in Yancheng National Rare Birds Nature Reserve: "I would like to turn into a flower, I could become more beautiful when the wind blows and the sun shines." Xiujuan worked tirelessly to rescue and rehabilitate birds in the Nature Reserve, and in 1987, Xiujuan accidentally drowned in search of a lost swan. She was declared a martyr, known as "China's first crane girl." Her deeds as an early conservationist have been widely circulated, and the need to protect the red-crowned crane has entered the public eye, infecting generation after generation since then. For more than 40 years, the increase of the red-crowned crane population should be credited to the dedicated work of animal protection workers, beginning with Xiujuan Xu.



### Technology in the Swamp: The Story of the Milu Dafeng Milu Nature Reserve, Jiangsu, China

By Siqi Liang

Dafeng Milu Nature Reserve is located on the shore of the Yellow Sea in the eastern part of Jiangsu Province. The 40,000 acre area was created to protect rare animals such as the Milu and red-crowned cranes. Like the Yancheng National Rare Birds Nature Reserve, Dafeng Milu Nature Reserve also takes on the heavy responsibility of protecting the coastal wetland ecosystem.

Compared with other protected areas in China and other coastal wetland reserves, Dafeng Milu Nature Reserve is unique because of the Milu it protects. Milu is also known as Père David's deer or elaphure, a species of deer that is currently extinct in the wild, but has been reintroduced in the Nature Reserve and has been able to multiply autonomously. Because I only knew of the sika deer and Santa's reindeer before this field trip, I thought that deer only lived in the forest. I was quite surprised when I found that Milu used to inhabit the river valleys of China and like to live in swampy areas and wetland habitats. It grazes mainly on grass and aquatic plants. The success of the Milu reintroduction is legendary in the conservation biology world.

One factor in Dafeng's success in Milu protection may be their use of technology to monitor all areas of the Reserve. I was surprised to learn that there are currently a total of 83 groups of high-definition cameras spread throughout the Reserve. Relevant staff can monitor the real-time dynamics of each area 24 hours a day without leaving their offices. Camera technology is not particularly high-tech, but it is the first time I have seen camera technology used in the management of a protected area. Nature Reserve staff also told us that drones are sometimes used in this reserve to monitor bird breeding. The story of the Dafeng Milu Nature Reserve showed us how technology can be used in new ways to manage wildlife areas and protect endangered species.



### Walking iMEP Class Wanglang National Nature Reserve, Sichuan, China

At the end of April, iMEP students, led by Professor Binbin Li, came to the first county of the world's giant pandas—Pingwu County, Sichuan. They continued deeper into Wanglang National Nature Reserve, looking for wild birds and panda traces in the forest, and experiencing the Baima Tibetan culture of the local inhabitants.

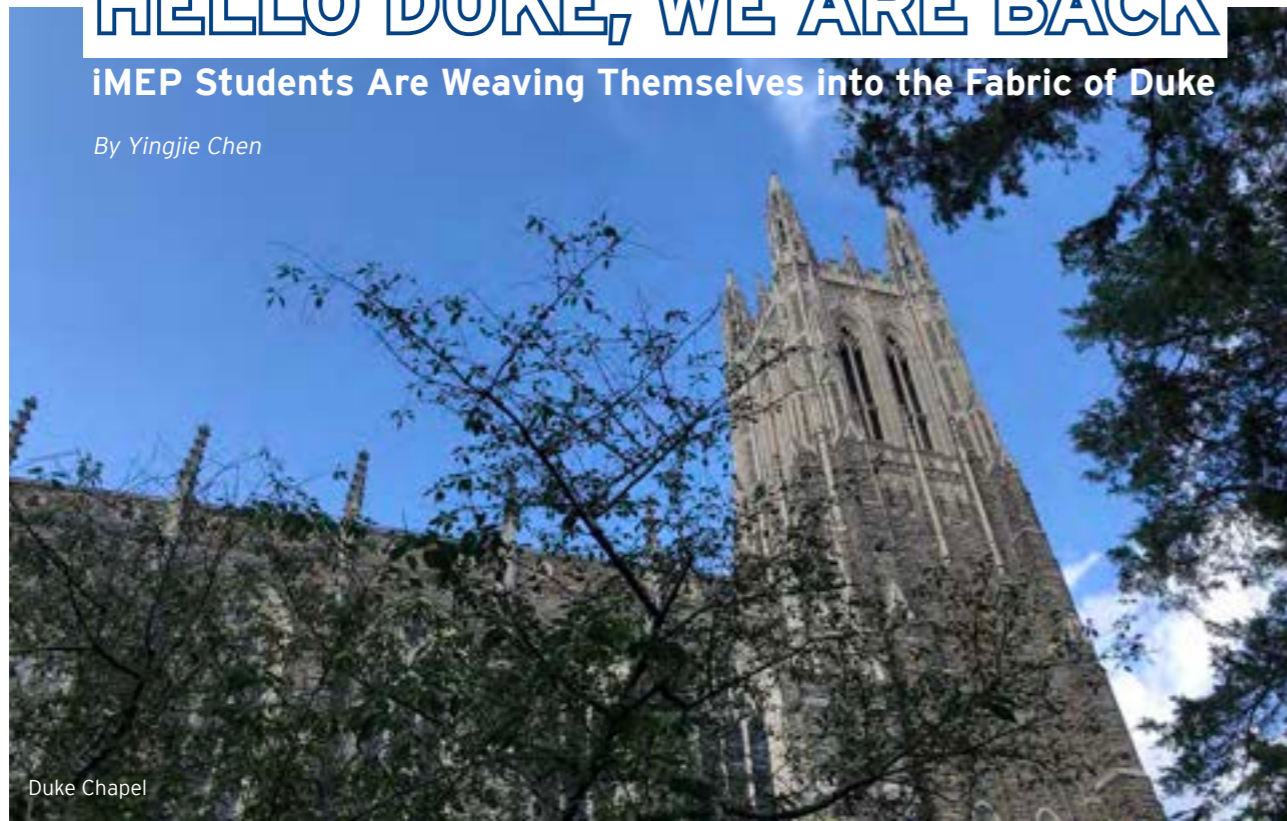
Wanglang National Nature Reserve, located in Pingwu County, Mianyang, Sichuan, is one of the first four nature reserves established in China to protect rare wild animals and their habitats. As of 2008, Wanglang National Nature Reserve contained 200 species of vertebrates of 22 orders and 64 families, including birds, reptiles, and amphibians. Among them, there are multiple species under national-level priority protection, including giant pandas, golden snub-nosed monkeys, wildebeests, leopards, and cloud leopards, as well as many rare plants. Wanglang also comprises the core area of the largest wild panda population in China, making it a vital area in panda protection efforts.

During the field trip, iMEP students were divided into two groups. The first group explored the impact of different livestock grazing intensities on birds living in the giant panda habitat. The other studied the impact of incentive mechanisms on community residents' attitudes towards the establishment of local national parks and environmental policies. According to many iMEP students, the Wanglang Field Trip is one of the highlights of the iMEP program. Every year a small group of students continues working with Professor Li on their Master's Projects, covering a range of conservation and land management topics, while continuing field research in Wanglang. Professor Li's experience and connections in the field provide iMEP students with an unparalleled opportunity to work directly on conservation issues that help protect the world's most famous endangered species, the panda.

# HELLO DUKE, WE ARE BACK

## IMEP Students Are Weaving Themselves into the Fabric of Duke

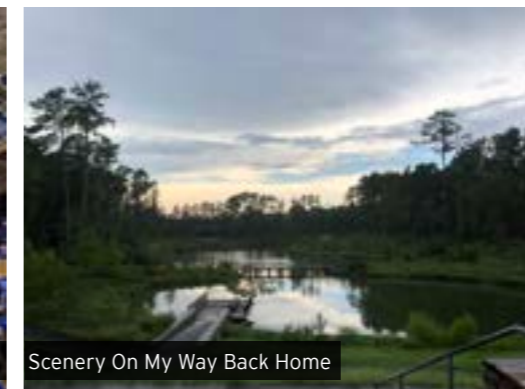
By Yingjie Chen



Duke Chapel



Duke Basketball



Scenery On My Way Back Home



Dinner at Erika Weinthal's House

### STUDENTPERSPECTIVE

## Yingjie Chen's Experience at Duke

If I had the opportunity to talk to myself in early August 2019, I would comfort the girl who was too anxious to welcome the coming excitement of traveling to Durham in the US. I worried, what if I forget to take some important stuff with me? What if I encounter danger in an unfamiliar country, and what if I cannot mingle very well with my new classmates? I felt like I was standing on the edge of my comfort zone, counting the last "safe and sound" days in China.

I got on the flight from Shanghai to JFK airport as planned, spent five days in New York, which is the most famous metropolitan city in the world, and finally arrived in Durham on August 10th. Soon I realized living in North Carolina, or more specifically by the Duke campus, was not a "to be or not to be" question, and it is more likely that my time at Duke will be an exploration of both the outside world and my inner self.

Orientation activities were really helpful for learning about Duke and feeling more ready for the semester.



IMEP 20 at Sanford Orientation

First, we joined orientation activities designed for international students by International House (iHouse). An orientation fair that showcased student groups and other organizations from across Duke provided students with important information about campus life and living necessities. We were introduced to the Duke transit system and the school buildings through a campus tour. I received the GoPass, which allows Duke students to take all the buses in NC for free. A dinner reception followed these activities, and I made an acquaintance with a PhD student, who just couldn't wait to impart his hands-on experience to new comers.

The Nicholas and Sanford School orientations welcomed iMEP students in a more academic way. As a second year graduate student, this manner actually gave me a warm and homey feeling. We listened to the speeches of deans from both schools. We had a library workshop guided by the librarians from both the Sanford and Nicholas schools. We enjoyed free lunches and chatted with other students from various backgrounds. The characteristics of my peers from the Nicholas School and Sanford School are quite different. This fact reminds me that iMEP is an interdisciplinary program, and we should be equipped with diverse skills, including how to communicate with many kinds of people.

If you are a future iMEP student, I suggest living right next to campus, because you don't really want to get up early. There are some good options along Erwin Road: Trinity Commons, The Lofts, and The Flats. It will take you less than 10 minutes to walk to the Nicholas classrooms, and about 15 minutes to Sanford. The Duke van service is also available after 5pm if you live in these communities. During the first several days of your arrival, the restaurants and cafés in the neighborhood can save your life. But after a while, cooking might be a better choice. Personally speaking, when I was in China, my elementary cooking skills prevented me from cooking anything complex. However, now I believe cooking is merely another "start or not" problem, and your attitude determines what you will encounter. I have even learned to think of cooking as a recreational activity. It helps release the stress of studying and appease any bad moods. Strangely, I might never have had the opportunity to rethink the little things in life if I did not go abroad and study at Duke.

Supermarkets and malls are tolerable distances from Duke. Having your own car can certainly bring convenience, but public transportation can get you where you want to go. For example, I go to the downtown area in Durham on a Duke bus. Walmart is a little bit further but the No. 400 bus can reach there within half an hour. The mall is in Southpoint. Take the No. 6 bus, and you will arrive at Macy's an hour later. The public transportation is free for students with the GoPass, so I cleverly take

advantage as a Duke graduate student and enjoy a lot of activities every weekend.

Apart from figuring out everyday routines, life here is full of surprises. The range of recreational activities is beyond my imagination. As part of the Nicholas School orientation week, we went to the notable Duke Forest, a vast university-owned secondary forest for research, civil science, and sightseeing. We were also invited to attend a dinner party with Professor Stuart Pimm, where we chatted with other prestigious Duke faculty members such as Billy Pizer, Elizabeth Losos, Erika Weinthal and Dalia Patino-Echeverri. My email inbox is usually filled with advertisements about diverse workshops, conferences, seminars and field activities, including hiking, surfing, and camping. I wish I could have Hermione's time-turner because I do not want to miss any of them.

I hope as a future iMEP student you can come here in person and experience what I have depicted and beyond. I will end here with the lyrics of *Duke's Alma Mater, which we sang together* under the dome of Duke Chapel during commencement, one of the most touching moments I have had so far: "Dear old Duke thy name we'll sing. To thee our voices raise. To thee our anthems ring, in everlasting praise. And though on life's broad sea, our fates may far us bear. We'll ever turn to thee, our Alma Mater dear."



CAREEREXPLORATION

## Environment Career Guide

As concerns about climate change, environmental degradation, and sustainability grow across the globe, the demand for professionals trained in environmental economics, data analysis, and policy-making skills also increases. According to a recent report from the PRC, the environmental industry in China has grown by 15 -20% per year since 2011. The U.S. Bureau of Labor Statistics predicts that job opportunities in the environmental industry in the U.S. will increase by 11% from 2016 to 2026. In China, the U.S., and worldwide, all sectors of society - private, public, and non-profit - increasingly need environmental professionals to support the research, education, and policy-making that will help solve society's greatest challenges.

Here is iMEP's quick start guide to possible career paths in the environmental policy field after graduation.

### Environmental Policy Analyst

Environmental Policy Analyst positions exist in all sectors of society, including government, research institutions, NGO's, non-profits, IGO's and private companies. Working as an Environmental Policy Analyst requires one to research current policies and analyze data trends in order to propose environmental policy solutions. The policy content will depend on the work of the organization, so be sure to look for organizations doing work you really care about.



### Sustainability Consultant

Sustainability Consultants work at the intersection of efficient business operations and environmental sustainability, supporting a company's transition to a lower carbon footprint. You will be responsible for researching the environmental effects of the company's operations, including but not limited to noise pollution, air pollution, water pollution, energy and material consumption and the carbon emission footprint. Based on your research, you will provide a cost-effective plan for the company's future sustainable development.



### Environmental Scientist

There are many different kinds of environmental scientists, working to collect and analyze data in many different ways - by hand in the field, using satellites and GIS, and using sociological research methods. Scientists often work on teams, conduct fieldwork to collect data, and spend hours analyzing samples or data in the lab. The ability to communicate complicated scientific findings is a valuable skill in this field. Many environmental scientists continue their studies to earn a PhD. Environmental scientists are on the front lines exploring the relationships between humans and nature, and provide policy-makers with the data they need to make sound policy decisions.



### Environmental Engineer

Are you a problem-solver with a creative mind? Are you interested in the intersections between technology and environmental conservation and sustainability? Working as an environmental engineer requires you to search for creative solutions to environmental problems using technology and infrastructure. Engineers do the on-the-ground work of putting new environmental policies into action and prioritize the sustainability of any organization they work for.



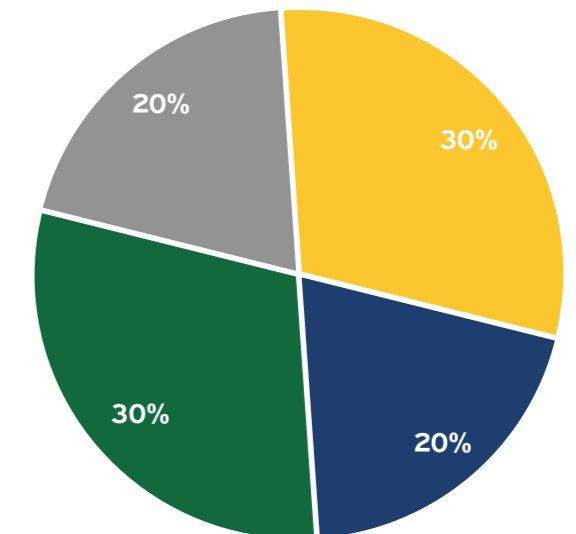
### Environmental Economist

Environmental economists bring knowledge of finance, investment and business to the task of developing environmentally-friendly economic models and policies. They must balance the economic needs of the organization or government with environmental conservation efforts. You must have strong quantitative and data analysis skills, and the ability to communicate complicated economic models to a wide audience. There are multiple positions available to environmental economists in a variety of sectors, including non-profit foundations, consulting companies, government departments, and private corporations.

## Career Paths of iMEP Graduates

The 2019 and 2020 iMEP graduates entered a variety of industries after graduation. Their employers include U.S. Department of Energy (DOE), ScottMadden, PwC Shanghai Branch, Shanghai SGS, SEMC, Sichuan National Nature Reserves, Paradise International, WWF, SynTao, Energy Observer, P&G, and China Dialogue. iMEP graduates have successfully received Ph.D offers from the National University of Singapore, San Diego State University, UC - Santa Barbara, and Duke University.

### Class of 2019, 100% Job Placement



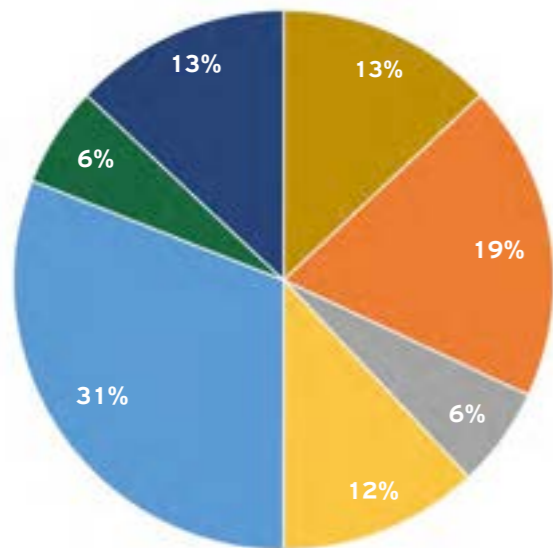
- Consulting
- Academia/Research
- Private/Corporate
- NGO/Non-profit



## Internships are the First Step

The summer after their first year in the iMEP program, students complete an internship in the environmental policy field. Completing an internship allows iMEP students to apply their new skills gained in iMEP core courses to real world applications, learn more about what kind of job they

may want post-graduation, and build their resume for the job search process in their second year. For many iMEP students, their internship employer may also become their client for their second year Master's Project, in which they will research a policy problem and propose a policy solution for the client.



**Class of 2020  
Internship Placements**

- NGO/Non-profit
- Consulting
- Media and Communications
- Academia/Research
- Law Firm
- Private/Corporate
- Other



### Admission Requirements

Applicants must hold the equivalent of a US bachelor's degree from an accredited institution and submit the following materials:

- Online application form ([dukekunshan.edu.cn/environment](http://dukekunshan.edu.cn/environment))
- Resume
- Statement of purpose
- 2 Letters of recommendation (3 optional)
- Transcript(s) in English
- Official TOEFL or IELTS score
- GRE Optional

### Application Deadlines:

- Early Bird Deadlines:** August 31, October 31
- Priority Deadline:** January 15
- Final Deadline:** May 31

Applications submitted after the priority deadline will be considered on a rolling basis.

### Scholarships and Financial Aid

All applicants are automatically considered for merit-based scholarships based on the quality of their application. Chinese citizens may apply at DKU for need-based financial aid after admission, and U.S. citizens may apply for federal student loans through the FAFSA application. For citizens from other countries, we will work with you to find other sources of financial aid if possible.

The international Master of Environmental Policy (IMEP) program faculty members are internationally recognized for rigorous research and active engagement in current environmental policy debates, with expertise that includes air and water pollution, climate change, energy, environmental health, environmental management, ecology and conservation. A rotating roster of preeminent professors from Duke University will come to Duke Kunshan each semester to teach, conduct research and advise students.



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## Upcoming Events

Please see the iMEP website for more information about how to attend these upcoming events:

**JULY 27** Program Info Session

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**SEPTEMBER 3** Program Info Session

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**OCTOBER 13** CareerEco Virtual Fair

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**NOVEMBER 17** Program Info Session

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**DECEMBER 15** Program Info Session



## Social Media Channels

-  dukekunshan\_iMEP
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