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Collaborative Environmental Chemistry Projects: Universiti Kebangsaan Malaysia and the Claremont Colleges

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Collaborative Environmental Chemistry Projects: Universiti Kebangsaan Malaysia and the Claremont Colleges

Katie Purvis-Roberts[1]

For the Spring 2018 semester, I received a course redevelopment grant from the Claremont Colleges EnviroLab Asia initiative for my Environmental Chemistry (CHEM139) course. This allowed me to add a focus on environmental issues in Asia to the course and, more important, co-teach the class with a colleague at the Universiti Kebangsaan Malaysia (UKM). Our students worked on collaborative renewable energy research projects together throughout the semester, communicating mostly through Google docs and e-mail. Eventually I would like to build a network of Asia Pacific Economic Cooperation (APEC) university faculty who will teach these collaborative courses where students can use real-world data collection and analysis to help inform APEC Energy Working Group (EWG) policies.

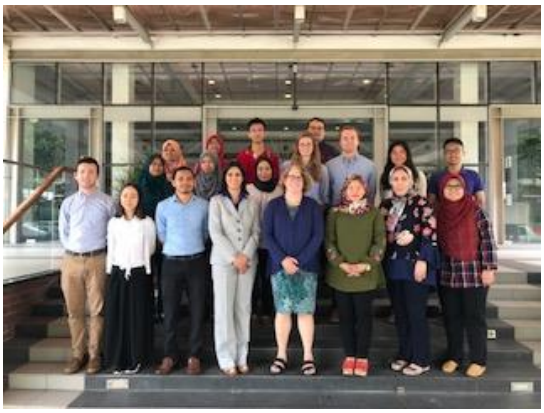
The origins of this project derive from my work as a Jefferson Science Fellow at the U.S. Department of State during the 2016-2017 academic year. I was a Foreign Affairs Officer focused on Energy, Science & Technology for the APEC region. My work concentrated on energy issues within APEC and included participation in Energy Working Group (EWG) meetings, particularly on renewable and energy efficiency installation. I also organized a workshop in Kuala Lumpur, Malaysia for APEC and Association of South East Asian Nations (ASEAN) countries on life-cycle costs of clean energy, which includes thinking about the health and environmental benefits of renewable energy. After working with APEC EWG delegates and colleagues from the U.S. Department of State and U.S. Department of Energy on a range of science policy issues, I realized that there was a key challenge facing EWG delegates. They work on many initiatives, but lack time for the data gathering and analysis necessary to make data-driven policy decisions. As an academic with experience working in APEC, I know that these countries have excellent research universities that could fill this need. I have been working to develop a network of universities in APEC countries that can support and inform regional energy/environmental policy development and support EWG delegates. A key objective of this network is to develop problems-based science/environmental policy classes that connect students, researchers, and policymakers, for regional environmental challenges.

During this pilot course, Malaysian and U.S. students worked on five different projects, ranging from the integration of Green Buildings in Kuala Lumpur versus Los Angeles to the Environmental Benefits of Blending Ethanol into Gasoline in Malaysia and the United States. My colleague and I realized partway through the course that the analysis that the students were doing was sophisticated and potential of interest to the wider academic community, so we started brainstorming ways that the students could work together to turn their project papers into peer-reviewed work. During the semester, the students communicated through Google docs, texts, and

[1] Katie Purvis-Roberts is a professor of Chemistry and Environmental Science in the W.M. Keck Science Department. An award-winning teacher, she was a Jefferson Science Fellow at the U.S. State Department, where she worked in the Bureau of East Asian and Pacific Affairs. During her sabbatical year in 2019-20, she is continuing her previous efforts, captured in part in this essay, to organize cross-cultural exchanges between academics and the communities they serve within the East Asian and Pacific spheres. In addition, she is working to connect energy policy makers with the academic communities within the Asia-Pacific Economic Cooperation (APEC).

e-mails, and they could get so much more done if they actually met together face-to-face and worked together on their papers. In addition, we thought it would be good if the students could present their research findings to each other and to the broader UKM community.

On May 15-16, 2018 in Selangor, Malaysia at the Solar Energy Research Institute (SERI), part of the Universiti Kebangsaan Malaysia, hosted a symposium for me and my students. Faculty from SERI talked about the research they are doing and the educational program for the students. I introduced the UKM community to the Claremont Colleges and talked about the benefit of a liberal arts education. A Foreign Service Officer from the U.S. Embassy in Kuala Lumpur joined us as well. She talked about U.S. energy policy and how it relates to Malaysia and shared different opportunities for U.S. students to come back to Malaysia and for Malaysian students and faculty to travel to the U.S. to continue collaborations.



Students from both schools gave talks about their research, including the following talks from the Claremont Colleges students:

- Will Cullen (CMC) & Lude Rong (CMC) *Energy, Economics, & Environment for Industry 4.0*
- Ryan Drover (Pitzer) *Environmental benefits for blending ethanol into gasoline for Kuala Lumpur, Malaysia and Los Angeles, United States*
- Emma Stacy (Scripps) & Emma Su (Scripps) *Environmental Impact from Renewable Energy Technologies System*

The students then spent two days working with their group to turn their research papers into peer-reviewed papers. The students worked with Dr. Norasikin and myself to come up with a target journal and outline for the paper. After communicating electronically all semester, it was fun to see the groups meet together for the first time. They had great discussions, not only about their projects, but about life in the U.S. and Malaysia, their interests outside of school, etc. One

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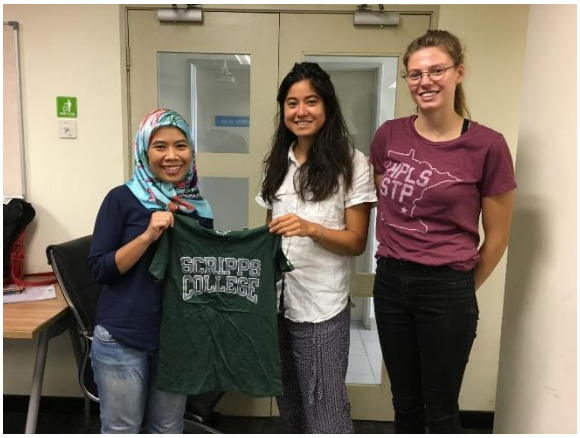
of the papers, "Environmental benefits for blending ethanol into gasoline for Kuala Lumpur, Malaysia and Los Angeles, United States" was submitted to Journal of Cleaner Production in August 2019.



During the symposium, we visited the Solar Park, the Advanced Silicon Laboratory and the Advanced Organic Solar Cell Laboratory on campus.

The Claremont students had learned quite a bit about renewable energy in Malaysia and the U.S. during the semester in class and by working on their projects. We did not learn much about Malaysian culture though. Dr. Norasikin and her students took us somewhere new each day to teach us about Malaysian history, culture, and the environment. We visited the federal government center in Putrajaya and toured the National Mosque, and hiked in a rainforest outside of Kuala Lumpur. Dr. Norasikin invited us to her house to break the fast on the first night of Ramadan, and took us to a Ramadan Night Market ahead of time so that we could sample traditional treats during dinner. We also toured around Kuala Lumpur one day to see the KL Towers, the Malaysian Cultural History Museum, and see the Batu Caves a Hindu shrine. The students learned so much more from a week on the ground in Malaysia than they could have all semester in my class.

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The impact of this work can be seen in the number of students who are thinking about applying for Fulbright fellowships to either do a research project or teach in Malaysia after they graduate.[2] Three of the students traveling with me had traveled outside the U.S., but to Europe and South America. They learned so much from being in Asia for the first time. Overall, this was an extremely impactful trip for the students and myself. Our interactions with our Malaysian collaborators and learning more about the history and culture of Malaysia were invaluable for the future work we all plan to do.

For Emma Su (Scripps'18), the experience made her "really interested in learning about renewable energies and attitudes towards them in different countries. The feasibility of different energy technologies is so dependent on natural resources, policy and public opinion. This trip has made me think more about the possibility of doing work abroad in the future." And one of the keys to that realization was that she, like her peers, was excited for the direct, person-to-person collaboration with students in Malaysia, which "offered clarity and ideas that would not have

[2] William Cullen has done work related renewable energy in India, and he was awarded a U.S. Department of State Critical Language Scholarship to study Hindi in Jaipur, India. After the language training, he is going to work with two different organizations to study local models of renewable energy entrepreneurship and their benefits for rural electrification, community empowerment, job creation and gender equality in Rajasthan and Uttar Pradesh.

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been possible via email. We completely reorganized our paper based off of in-person collaboration." There was also the chance to re-think assumptions:

> "Working on this project at home we only thought about the science aspect of renewable energies in Malaysia and didn't really consider social or political factors that will impact implementation feasibility. I found it extremely interesting when the US economic advisor, told us that one of their top recommendations for renewable energies was increased education in a schools. Even if these technologies are feasible, the opinion of the people and the policies are an important factor in their implementation. It was extremely valuable to learn a little more about the culture and the place we are studying."

Being open to the new ideas, as they were experienced on the ground, also caught the attention of Ryan Drover (Pitzer'19):

> I found that this collaborative work and travel to Malaysia was an incredible cultural and academic experience. This experience throughout the semester, as well as this opportunity at the beginning of the summer, gave me a much greater understanding of some of the advantages and challenges of working with collaborators on a project, especially those from a different culture with a vastly different understanding and viewpoint on the topic.

Those differences in opinion and perspective, for Will Cullen (Claremont McKenna'19), made him "much more aware of environmental issues in Malaysia and how the US can collaborate with other countries to promote sustainable development," an awareness that led Emma Stacy (Scripps'19) to reflect critically on the impact that renewable energy development might have in Southeast Asia: having visited Malaysia, and seen "how much dense forest there was" there, she wondered about "the viability of solar energy because vast solar fields would require cutting down jungle."

What these intellectual insights and personal realizations suggest is that this particular EnviroLab clinic trip, as with so many of the others, are transformative experiences, maybe even life-changing.