

IUPAC Chemistry and the Environment Division meets Cambodia

by Roberto Terzano, Fani Sakellariadou, Doo Soo Chung, and Annemieke Farenhorst

The week of 5-10 November 2022 turned out to be a very intense and exciting time for Division VI – Chemistry and the Environment. For six days, Division Members, Young Observers and Guests were involved in many scientific and social events in Siem Reap, Cambodia. This series of events arrived after a long break of in-person activities due to the COVID-19 pandemic and therefore was of particular significance for the IUPAC Division VI community.

The occasion was provided by the Joint Conference organized in Siem Reap with the endorsement of four scientific societies APCE, CECE, ITP and of course, IUPAC. Division VI Member Doo Soo Chung, as Co-Chair of the Conference, offered Division VI the opportunity to organize Division activities within the Conference venue and scientific program.

Division VI participation in the Conference was partially supported by IUPAC (#2020-003-1-FSC for Conferences in Scientifically Emerging Region (SER)). The motivation that inspired this project was that very often emerging regions suffer from environmental pollution and related health issues due to improper waste management, including disposal of chemicals. A proper identification, quantification and risk assessment of

such chemicals, especially emerging contaminants, is fundamental to secure a safe and healthy environment. Within this context, Division VI contributed by sharing its knowledge on these topics with the local scientific community and local University. In addition, Cambodia is not yet part of the National Adhering Organizations of IUPAC and, in fact, its Chemical Society is only newly founded (2010). Hence, the visit of IUPAC Division VI was an important opportunity to promote IUPAC in the Region.

On Saturday 5 November, we had our first Division meeting in-person at the Sokha Siem Resort, long after the last one that took place in August 2019 in Paris during the General Assembly of the IUPAC Centenary. We had the opportunity to discuss face-to-face one whole day about Division agenda items, including brainstorming new project ideas. On this occasion, also the two Subcommittees on Crop Protection Chemistry and Biophysical and Chemical Processes in the Environment had the chance to meet as small groups. The working day ended with the Division dinner in a local restaurant, which allowed the Group to reconsolidate old relationships and establish new ones.

IUPAC Overview Session

On Sunday 6 November, Division VI organized a preconference Symposium about IUPAC and Division VI activities entitled “*IUPAC Overview Session*.” In this Session, Division VI President Roberto Terzano introduced to the audience IUPAC and IUPAC activities with

IUPAC Division VI meeting at the Sokha Siem Reap Resort and Conference Center in Siem Reap, Cambodia





Group picture after the "IUPAC Overview Session" at the Sokha Siem Reap Resort and Conference Center in Siem Reap, Cambodia

a special focus on Division VI organization and projects. Then, Bipul Behari Saha gave a presentation on "A brief history of IUPAC," followed by Hemda Garelick's presentation on "The Global Women's Breakfast." After this general introduction, three recently started projects were introduced through a number of presentations: "The global scenario and challenges of radioactive waste in the marine environment" (project #2021-027-2-600), "Carbon sequestration: Harmonizing carbon sequestration measurement – what does it mean and how we do it" (project #2022-010-2-600) and "Minimizing Environmental Impacts of Tyre and Road Wear Particles" (project #2021-028-3-600). Presentations were held by Nicholas Priest, Diane Purchase, Michelle Bailey, Divina Navarro and Lokesh Padye.

On Monday 7 November, two Special Symposia were organized within the Conference program, one about "The Environment, Health and Food Safety Impact of Microplastics" (project #2019-026-2-600) and one on "Per and polyfluoroalkyl substances (PFASs) in the environment: Information for emerging economies on PFASs analyses in environmental media and their impacts on human health" (project #2019-029-1-600). (see separate next reports p. 40 and 42) During the week, Division Members had also the opportunity to meet in project task groups and discuss about ongoing projects and planning next projects activities.

On Thursday 10 November, Angkor University hosted the event titled "Chemistry and the Environment: IUPAC Contribution to Emerging Environmental Issues," organized by Division VI and the Angkor University. Roberto Terzano presented on the vision,

mission and values as well as the history of IUPAC, and its responsibility and activities. Dr. Terzano highlighted that IUPAC is the authority on chemical nomenclature and terminology and recommends on standardized methods that are of essence to the global Chemistry community. IUPAC has eight Divisions and much of the scientific work within and between Divisions is done through collaborative projects that result in databases, technical reports, journal articles, and books. Hemda Garelick expanded on the importance of IUPAC in connecting chemists and their affiliates across the world by hosting the IUPAC Global Women's Breakfast (iupac.org/gwb). Ankor University has large strengths in Health Sciences education and hence Garelick also provided an opportunity for the audience to learn about the history of antibiotics and their mechanisms, and also about how bacteria can acquire antimicrobial resistance.

Speakers Rai Kookana and Fani Sakellariadou provided for examples of topics covered by IUPAC Division VI projects. Kookana presented on per and polyfluoroalkyl substances (PFAS) in the environment, particularly this being an emerging issue for developing economies. The audience learned about the sources of PFAS and why they are so problematic in the environment (e.g., persistent, mobile). Kookana also provided a wide range of examples of studies reporting PFAS detections in Asian waters. Sakellariadou presented on microplastics, focusing on the marine environment. The audience learned about a variety of in-depth studies on the size and weight of plastics in surface waters such as the Atlantic Ocean, Pacific Ocean, and Mediterranean



Group picture at the Angkor University (Siem Reap, Cambodia) after the event “Chemistry and the Environment: IUPAC Contribution to Emerging Environmental Issues.”

Sea. Sakellariadou warned the audience that by 2050, the weight of plastics might exceed the weight of fish in the oceans. The audience also learned that microplastics can be found along all coast lines in the world and are particularly abundant on the shores of Asian waters. Given that Angkor University has a strong focus on agriculture, Diane Purchase and Annemieke Farenhorst focused their presentations on this area. Purchase provided for an overview of the valorization of agricultural wastes. Purchase talked about the different types of natural and synthetic agricultural wastes and their impact. In addition, a case study was presented showing that some agricultural wastes can be used such as xylitol, a substitute for sugar. Farenhorst presented on agricultural pesticides, going all the way back to about 4,700 years ago when sulfur was first reported as a tool to prevent rodent outbreaks in spaces inhabited by humans. Farenhorst discussed current-pesticides use and their fate processes, and highlighted some examples by which we can protect the environment from pesticide contamination. As such, the audience also learned about communities organizing the recycling of empty pesticide containers, and individual farmers using biobeds to capture their sprayer rinsate.

At the end of the day, the Rector of the Angkor University awarded all the speakers from Division VI

with a certificate of appreciation and expressed his interest in further collaboration with IUPAC in the interest of the local scientific community.

by Roberto Terzano (University of Bari, Italy), Fani Sakellariadou (University of Piraeus, Greece), Doo Soo Chung (Seoul National University, South Korea), Annemieke Farenhorst (University of Manitoba, Canada)

Tackling the global microplastic challenge

by Hemda Garelick and Weiping Wu

On 7 November 2022, as part of the APCE-CECE-ITP-IUPAC 2022 Conference in the Sokha Siem Resort and Conference Center of Siem Reap, Cambodia, the IUPAC Division VI held a symposium entitled “*The Environment, Health and Food Safety Impact of Microplastics*.” The aim of this meeting was to bring scientists together to discuss this emerging pollutant and consider new solutions on how to tackle this challenge.

In recent years, microplastics have been recognized as a global problem. Microplastics have been detected in environmental compartments such as soil, freshwater, and oceans. They were also found in food, drinking water, and human bodies. However, their impacts on the environment,