Zarrar Khan

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EDUCATION

- **PhD in Sustainable Energy Technologies and Strategies (SETS)** – Joint Doctorate: ***2018***
  KTH Royal Institute of Technology, Sweden; Comillas University, Spain; Delft University of Technology, Netherlands.
  Dissertation: "Integrating Water and Energy Systems for Long-Term Resource Management"
- **Master of Engineering** – Cornell University, Ithaca, USA. Civil Engineering, Geotechnical ***2010***
- **Master of Project Management** – COMSATS University**,** Pakistan. ***2009***
- **Bachelor of Arts** – Dartmouth College, NH, USA. Engineering & Environmental Studies ***2007***

WORK EXPERIENCE

Senior Associate - Energy & Climate, Abt Global Inc. ***Jan'24 to present***
(https://www.abtassociates.com//) Rockville, MD, USA

- **Technical Leadership:** Provided strategic guidance on adaptation, resilience, and mitigation strategies, applying innovative solutions in energy security, water scarcity, economic growth, and forestry. Authored thought leadership pieces to advance global discourse on climate resilience and sustainability.
- **Business Development:** Led efforts to expand Abt Global's climate & energy portfolio with donors such as USAID, FCDO, GCF, & DFAT. Contributed to large-scale proposals ($10M–$100M) as Capture Director, Solutioning Lead, and Lead Writer across sectors including water, energy, forestry, and resilience. Developed strategic partnerships and aligned initiatives with global climate and energy priorities in Jamaica, Morocco, Pakistan, Mexico, Papua New Guinea, and Republic of Congo.
- **Stakeholder Engagement & Representation:** Cultivated high-level relationships with global stakeholders to align project goals with international climate & clean energy priorities. Represented Abt Global at prominent global conferences (AGU24, SIDUS24), sharing implementation insights and positioning the organization as an industry leader.
- **Selected Projects:** As Climate Modeling Lead for the Regenerative Agroecological Landscape Acceleration Facility (RALAF), funded by the Green Climate Fund (GCF) and Pollination, I am responsible for developing the climate rationale for regenerative agriculture across six African countries. For USAID's Resilient Economies and Sectors Activity (RESET) ($20M, 5 years), I serve as a Grants Evaluation Committee Member, assessing funding proposals for feasibility and impact in 11 Eastern and Southern Caribbean countries. Provided technical assistance for the GCF-funded Mexico City Water Resilience Project, analyzing climate and water feasibility studies to inform adaptation strategies for vulnerable communities.

Computational Scientist, JGCRI, Pacific Northwest National Lab (PNNL) ***Feb'18 to Dec'23***
(https://www.pnnl.gov/projects/jgcri) College Park, MD, USA

- **Global Change Intersectoral Modeling System (GCIMS) (U.S. DOE)** https://gcims.pnnl.gov/
  Integration Lead. As the integration lead I was responsible for ensuring integrated development of the GCIMS eco-system of modeling tools including data and software standardization, interoperability, feedback loops between models, scalability, large ensemble runs, database management and visual analytics. I also led direct development of several additional models focused on temporal and spatial disaggregation, visualization, mapping, GIS, and data management. Additionally, I also led the development of several training tools and capacity building efforts for other scientists, stakeholders, and policy makers.
- **Integrated Multisector Multiscale Modeling (IM3) (U.S. DOE)** https://im3.pnnl.gov/
  Integrated Modeling Lead. In this project I lead the development of domestic U.S. integrated modeling analysis for a suite of socioeconomic, climate, and policy scenarios in collaboration with multiple labs and research teams across the IM3 project. The IM3 project couples open-source, process-based, human, and natural system models at multiple scales to project vulnerability and resilience in the United States to both short- and long-term influences. My team runs multiple models to explore hydrology (Xanthos), human-Earth system dynamics (GCAM-USA), water demands (Tethys), Landuse (Demeter), as well as develops new scripts to process data for new insights, scales, and formats.
- **Net-zero pathways in Southeast Asia (U.S. State Department)** https://jgcri.github.io/seasia/index.html
  Principal Investigator. Project involving digitalization, smart cities, cyber security and decarbonization pathway analysis for Thailand and Malaysia. As principal investigator I led our team in coordinating with the U.S. State Department as well as local ministries, universities, city mayors, and other stakeholders across the two countries and chosen cities (Bangkok and Kuala Lumpur). I also led model development of city-scale analysis in a global context; design and implementation of local and net-zero pathway scenarios, as well as capacity building events including workshops and training sessions for local decision makers and modelers.

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- **Integrated Human Earth Systems Dynamics (IHESD) (DOE)**
  Experiment 1.2 Lead. As part of the IHESD project I lead analysis on Experiment 1.2, "How will variability in future temperature and precipitation affect investment, generation, and demand in the U.S. electricity system?". Work involved enhancing the capabilities of our global human-Earth system model, GCAM-USA, by separating electricity investments and dispatch, including sub-annual dynamics and endogenizing the demand response in the buildings sector. These capabilities open the doors to key future opportunities such as investigation of EV penetration and the impacts of compounding environmental stressors such as droughts and heat waves. Author and co-author on two publications resulting from the project.
- **Integrated Climate Policy Analysis in Latin America (Inter-American Development Bank (IDB))**
  Stakeholder Engagement and Capacity Building Lead. Led several stakeholder training workshops as part of this multi-sector, multi-institution project in collaboration with IDB and the governments of Argentina, Colombia, and Uruguay. Led development of a new version of our global human-Earth system model GCAM with local details for Latin American Countries (LAC). Developed the new software Metis, to facilitate data analysis in a single platform across models, sectors and spatial scales. Author and co-author on multiple reports, publications, and presentations from the project.
- **Just Transitions in Integrated Modeling (Bloomberg, UMD)**
  Modeling lead. As the modeling lead in this Joint Appointment with the University of Maryland's Center for Global Sustainability (CGS), I am responsible for training and leading efforts to integrate justice, equity, gender, and co-benefits into all stream of our integrated modeling. I am organizing collaboration with the leading researchers in the discipline and chairing a session at the European Geosciences Union (EGU24) conference 2024 titled: "Incorporating equity, gender, health and other co-benefits into NEXUS and IAM research" together with colleagues from IIASA, BC3, and Imperial College.
- **Net-Zero World (U.S. Government Multiple)** https://www.nrel.gov/international/net-zero-world.html
  Country Coordinator. Launched at COP26, NZW is a collaborative effort between the U.S. government, partner countries, and philanthropies aimed at accelerating global energy decarbonization by providing technical and investment support. As one of the six global country coordinators representing the US government, I worked closely with the Chilean government to identify key areas for a just transition in their net-zero pathways and led interactions between local experts across various sectors and US laboratory experts. Additionally, I served as the lead modeler for net-zero pathway analysis in Chile, guiding the development of innovative and effective decarbonization strategies.
- **Subnational Climate Action Leaders Exchange (SCALE) (U.S. State Department, WRI, C40, Under 2)**
  Principal Investigator (PNNL). As principal investigator from PNNL I was responsible for the technical scope, staffing, budget, and delivery of the project objectives to support cities, states, and regions in the development and implementation of net-zero, climate-resilient targets, and roadmaps. SCALE envisioned to empower subnational champions to drive ambition at the national and international level and to leverage action and advocacy organized around a set of high-level thematic and sectoral goals needed to keep a 1.5-aligned, climate-resilient future within reach. As part of the SCALE project, I was one of four scientists to represent PNNL at COP28 in Dubai.
- **South Asia Group for Energy (SAGE) (USAID)** https://sarepenergy.net/sage/
  Integrated Modeling Lead. As the integrated modeling lead, I am responsible for managing the technical scope, staff, budget, and delivery of project objectives for the USAID South Asia Group for Energy (SAGE) project, investigating power resilience in Bhutan, Nepal, and India. The consortium represents excellence in research and international development in the energy sector to advance the Clean Enhancing Development and Growth through Energy (EDGE) Asia priorities in the South Asia region.
- **India Water Scarcity – (CEEW, USAID)**
  Capacity Building Lead. In this project in collaboration with the Indian Council on Energy, Environment and Water (CEEW), USAID and the government of India, used Metis to analyze sub-regional water analysis at state and reviver basin spatial scales in response to the varying needs of the stakeholder. Also conducted a detailed webinar to train local users to use GCAM and the associated downscaling tools to replicate the analysis.
- **Pakistan Energy Task Force – (USAID)**
  Capacity Building Lead. In this project in collaboration with USAID and the Government of Pakistan, led two online webinars and participated in one in-country workshop to train local stakeholders in using GCAM to help guide long-term integrated energy planning. The project involved assessing the current situation in the country and evaluating various projections and policies involving technology transformations, electric vehicle penetration and fuel switching.

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Research Assistant, International Institute for Applied Systems Analysis (IIASA) ***Feb'17 to Feb'18***
(http://www.iiasa.ac.at/) Vienna, Austria

- **Integrated Solutions for Water, Energy and Land** (*IS-WEL*)
  Worked on the development of the global IIASA MESSAGEix modeling framework to include water, energy and land inter-linkages. Work included data preparation, integrated modeling development and applications of the model to a case study in the Indus River Basin.

Young Scientist, International Institute for Applied Systems Analysis (IIASA) ***Jun'15 to Aug'15***
(http://www.iiasa.ac.at/) Vienna, Austria

- **Young Scientists Summer Program** (*YSSP*)
  Member of the energy and water groups to develop an integrated water-energy nexus model capable of optimizing both the water and energy systems simultaneously. Collaboration with other IIASA groups (population, ecosystems) and policy makers helped frame the overall complexity and interconnected nature of the problem being addressed.

Research Fellow, Instituto de Investigación Tecnológica (IIT), Comillas Pontifical University ***Sep'13 to Sep´14***
(www.iit.upcomillas.es) Madrid, Spain

- **Implications of future water scenarios on power systems in Spain**
  Funded by the Fundación Canal (Canal Isabel III) the project involved assessing the impacts of climate-induced changes in water availability on the Spanish power system. A spatially disaggregated bottom-up energy model with water constraints was developed to analyze optimal investment and operation decisions.

Lead Research Fellow, Lahore University of Management Sciences (www.lums.edu.pk) ***Sep'12 to Jan'13***

- **Hydrodynamic Contamination Spread Monitoring Via Model Driven Data Assimilation**
  The project was funded by the EPA Punjab, Pakistan and implemented by LUMS University Pakistan in collaboration with TU Delft and KAUST University, Saudi Arabia. Research activities included analyzing historical and contemporary contamination in the Punjab region. Tasks included geostatistical and spatial analysis in ArcGIS to identify trends and correlations of contamination and environmental impacts.

Senior Dam Engineer, National Engineering Services Pakistan (www.nespak.com.pk) ***Feb'12 to Sep'12***

- **Attabad Landslide Dam, Hunza, Pakistan**
  Led rehabilitation design of the Karakoram Highway which was inundated after the massive landslide (1.80 billion cubic feet (50 million m^3)) that occurred at Attabad in 2010.
- **16 MW Naltar-III Hydropower Project, Naltar valley, Pakistan**
  Engineer on design team of 16 MW hydropower project in the Naltar Valley in Gilgit. Carried out feasibility studies, site investigations, hydraulic studies, environmental assessment and cost estimation.
- **Al-Lith Dam, Saudi Arabia**
  Member of team to design the Al-Lith Dam in Saudi Arabia. Conducted seepage and slope stability analysis.
- **Jandola Landslide, Jandola, Pakistan**
  Led slope stability analysis and analyzed the design of a road to be constructed on a rehabilitated slope failure.

Geotechnical Engineer, Arup, New York, USA (www.arup.com) ***June '10 to Feb '12***

- **Delta Airlines, JFK Airport Terminal 4 Redevelopment, Queens, New York, USA**
  Planning, design and implementation of all stages of the project involving a 1000 taper tube pile foundation design; seismic and liquefaction analysis; site investigation with boreholes; and in-situ SPT, CPT, suspension logging, vane shears and dissipation testing. Field engineer for lateral, uplift and compression load tests.
- **Tappan Zee Bridge, New York, USA**
  Foundation design for replacement bridge options. Work involved analyzing past site investigation and laboratory data to evaluate soil and rock properties. Calculated settlement and bearing capacity of various pile cap and pile options for different load cases and took group effects into consideration.
- **Queens Basement (23rd St -41st Ave), Queens, New York, USA**
  Performed a Plaxis analysis for a secant pile retaining wall design for a basement in Queens. During the construction phase, setup and took inclinometer readings across the site to validate the Plaxis analysis and compare actual movements to predicted movements.

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- **King Abdullah International Airport, Jeddah, Saudi Arabia**
  Calculated lateral soil springs and analyzed the response of a circular mat foundation with 104 piles for various loading. Used the program GROUP and considered group effects as well as seismic loads.
- **Haeundae Resort, Busan, South Korea**
  Calculated soil and rock properties based on site investigation results. Used the results to do a seepage analysis for the tower loads using SEEP/W based on derived permeability of the various rock and soil layers. Used this to analyze different options for grouting.
- **Hyundai Amco, Seoul, South Korea**
  Analyzed the site investigation data to evaluate and present the soil profile for the 110 floor 7 basement tower.
- **BMW Guggenheim Laboratory, New York, USA**
  Led the site investigation for the Guggenheim Laboratory art exhibit structure, to uncover underground masonry walls as well as create geology profile. Also calculated the foundation bearing capacity and settlements for given structural loads.
- **Battery Park Pier A, Battery Park, New York, USA**
  Forensic study to understand causes of settlement at the Battery Park headhouse structure. Led the site investigation consisting of 2 boreholes and 5 test pits to uncover historical foundations resting partially on a seawall. Also researched historical construction documents and analyzed options for future design.
- **East River Waterfront Esplanade, New York, USA**
  Calculated design parameters for soil and rock and used these to design rock sockets for compressive, tensile, lateral and seismic loading.
- **Pier 25, New York, USA**
  Conducted site investigation to investigate causes of pavement cracking at Pier 25 in New York City. Also prepared the geotechnical report.

PUBLICATIONS

Peer-Reviewed

- Burleyson, C.D., **Khan, Z.,** Kulshresta, M., Voisin, N., Zhao, M., & Rice, J.S., 2025. When do different scenarios of projected electricity demand start to meaningfully diverge? *Applied Energy*, 380, p.124948. https://doi.org/10.1016/j.apenergy.2024.124948
- Weber, M., Pressburger, L., Chau, L.W., **Khan, Z.,** Waite, T., Westphal, M.I., Ling, G.H.T., Ho, C.S. and Evans, M., 2024. Carbon neutrality in Malaysia and Kuala Lumpur: insights from stakeholder-driven integrated assessment modeling. Frontiers in Energy Research, 12, p.1336045. https://doi.org/10.3389/fenrg.2024.1336045
- Thompson, I., Vernon, C.R. and **Khan, Z.,** 2024. Tethys: A Spatiotemporal Downscaling Model for Global Water Demand. Journal of Open Source Software, 9(97), p.5855. https://doi.org/10.21105/joss.05855
- Rodés-Bachs, C., Sampedro, J., Horowitz, R., Van de Ven, D.J., Cui, R.Y., Zhao, A., Zwerling, M. and **Khan, Z**., 2024. gcamreport: An R tool to process and standardize GCAM outputs. Journal of Open Source Software, 9(96), p.5975. https://doi.org/10.21105/joss.05975
- Zhao, M., **Khan, Z.,** Dorheim, K. and Vernon, C., 2024. helios: An R package to process heating and cooling degrees for GCAM. Journal of Open Source Software, 9. https://doi.org/10.21105/joss.06033
- Waite, T., Pradhan, B.B., Winyuchakrit, P., **Khan, Z.,** Weber, M., Pressburger, L., Chaichaloempreecha, A., Rajbhandari, S., Pita, P., Westphal, M.I. and Jonvisait, A., 2024. Stakeholder-driven carbon neutral pathways for Thailand and Bangkok: integrated assessment modeling to inform multilevel climate governance. Frontiers in Energy Research, 12 https://doi.org/10.3389/fenrg.2024.1335290
- McManamay, R.A., Vernon, C.R., Chen, M., Thompson, I., **Khan, Z.,** and Narayan, K.B., 2024. Dynamic urban land extensification is projected to lead to imbalances in the global land-carbon equilibrium. Communications Earth & Environment, 5(1), p.70 https://doi.org/10.1038/s43247-024-01231-y
- Ahsan, H., **Khan, Z.,** Snyder, A., Kyle, P. and Vernon, C., 2023. osiris: An R package to process climate impacts on agricultural yields for the Global Change Analysis Model. Journal of Open Source Software, 8(85), p.5226. https://doi.org/10.21105/joss.05226
- Yarlagadda, B., Wild, T., Zhao, X., Clarke, L., Cui, R., **Khan, Z.,** Birnbaum, A. and Lamontagne, J., 2023. Trade and Climate Mitigation Interactions Create Agro-Economic Opportunities With Social and Environmental Trade-Offs in Latin America and the Caribbean. Earth's Future, 11(4), p.e2022EF003063. https://doi.org/10.1029/2022EF003063

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- Matamala, Y., Flores, F., Arriet, A., **Khan, Z.** and Feijoo, F., 2023. Probabilistic feasibility assessment of sequestration reliance for climate targets. Energy, p.127160. https://doi.org/10.1016/j.energy.2023.127160
- McGrath, C., Burleyson, C., **Khan, Z.,** Rahman, A., Rice, J., Vernon, C. and Voisin, N., 2022. Tell: a Python package to model future total electricity loads. Journal of Open Source Software, 7(79), 4472, https://doi.org/10.21105/joss.04472
- **Khan, Z.,** Zhao, M., Wild, T., Vernon, C., 2022. rmap - An R package to plot and compare tabular data on customizable maps across scenarios and time. Journal of Open Source Software, 7(77), p.4015. https://doi.org/10.21105/joss.04015
- **Khan, Z.** et al. 2022. Emerging themes and future directions of multi-sector nexus research and implementation. Frontiers in Environmental Science-Environmental Systems Engineering, SI: Food-Energy-Water Systems: Achieving Climate Resilience and Sustainable Development in the 21st Century, https://www.frontiersin.org/articles/10.3389/fenvs.2022.918085/full
- Martinez de Estivariz J., Sampedro, **Khan, Z.**, Vernon, C.R., Smith, S.J., Waldhoff, S.T., and Dingenen, R. Van, 2022. rfasst: An R tool to estimate air pollution impacts on health and agriculture. Journal of Open Source Software (JOSS). https://joss.theoj.org/papers/10.21105/joss.03820
- Kholod, N., Evans, M., **Khan, Z.,** Hejazi, M., Chaturvedi, V., 2021, Water-Energy-Food Nexus in India: A Crit*ical Review. Energy and Climate Change 2, 100060*. https://doi.org/10.1016/j.egycc.2021.100060
- Zhao, M., Binsted, M., Wild, T.B., **Khan, Z.,** Iyer, G., Yarlagadda, B., Vernon, C., Patel, P., 2021. Plutus - An R package to calculate electricity investments and stranded assets from the Global Change Analysis Model. Journal of Open Source Software, https://joss.theoj.org/papers/10.21105/joss.03212
- Wild, T.B., **Khan, Z.,** Zhao, M., Suriano, M., Bereslawski, J.L., Roberts, P., Casado, J., Gavino-Novillo, M., Clarke, L., Hejazi, M. and Miralles-Wilhelm, F., 2021. The Implications of Global Change for the Co-Evolution of Argentina's Integrated Energy-Water-Land Systems. Earth's Future, p.e2020EF001970. https://doi.org/10.1029/2020EF001970
- Binsted M.T., G.C. Iyer, P.L. Patel, N.T. Graham, Y. Ou, **Z. Khan**, and N. Kholod, et al. 2021. "GCAM-USA: Integrated modeling of state and subnational U.S. energy, water, and land systems within a global framework." Geoscientific Model Development (GMD). https://doi.org/10.5194/gmd-2021-197
- **Khan, Z.,** Wild, T.B., Iyer, G.C., Hejazi, M. and Vernon, C.R., 2021. The future evolution of energy-water-agriculture interconnectivity across the US. Environmental Research Letters. https://doi.org/10.1088/1748-9326/ac046c
- Wild, T.B., **Khan, Z.,** Clarke, L., Hejazi, M., Bereslawski, J., Suriano, M., Roberts, P., Casado, J., Miralles-Wilhelm, F., Gavino Novillo, M., Munoz-Castillo, R., Moreda, F., Yarlagadda, B., Lamontagne, J., Birnbaum, A., 2021. Integrated Energy-Water-Land Nexus Planning in the Colorado River Basin (Argentina). *Regional Environmental Change*, 21 (62). https://doi.org/10.1007/s10113-021-01775-1
- **Khan, Z.,** Wise, M., Patel, P., Kim, S.H., Hejazi, M., Burleyson, C., and Iyer, G., 2021. Impacts of long-term temperature change and variability on electricity investments. *Nature Communications*, 12(1), pp.1-12. https://doi.org/10.1038/s41467-021-21785-1
- Binsted, M., Iyer, G., Cui, R., **Khan, Z.,** Dorheim, K. and Clarke, L., 2020. Evaluating long-term model-based scenarios of the energy system. Energy Strategy Reviews, 32, p.100551. https://doi.org/10.1016/j.esr.2020.100551
- **Khan, Z.,** Wild, T., Carrazzone, M.E.S., Gaudioso, R., Mascari, M.P., Bianchi, F., Weinstein, F., Pérez, F., Pérez, W., Miralles-Wilhelm, F. and Clarke, L., 2020. Integrated energy-water-land nexus planning to guide national policy: an example from Uruguay. *Environmental Research Letters*. https://doi.org/10.1088/1748-9326/ab9389
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- Wise, M., Patel, P., **Khan, Z.,** Kim, S.H., Hejazi, M. and Iyer, G., 2019. Representing power sector detail and flexibility in a multi-sector model. *Energy Strategy Reviews*, *26*, p.100411. https://doi.org/10.1016/j.esr.2019.100411
- Vinca, A., Parkinson, S., Byers, E., Burek, P., **Khan, Z.,** Krey, V., Diuana, F., Wang, Y., Ilyas, A., Köberle, A.C. and Staffel, I., 2019. The Nexus Solutions Tool (NEST): An open platform for optimizing multi-scale energy-water-land system transformations. *Geoscientific Model Development Discussions*, pp.1-33. https://doi.org/10.5194/gmd-13-1095-2020
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- **Khan, Z.,** Linares, P. and García-González, J., 2016. Adaptation to climate-induced regional water constraints in the Spanish energy sector: An integrated assessment. *Energy Policy*, *97*, pp.123-135. https://doi.org/10.1016/j.enpol.2016.06.046
- Parkinson, S.C., Djilali, N., Krey, V., Fricko, O., Johnson, N., **Khan, Z.,** Sedraoui, K. and Almasoud, A.H., 2016. Impacts of groundwater constraints on Saudi Arabia's low-carbon electricity supply strategy. *Environmental science & technology*, *50*(4), pp.1653-1662. https://doi.org/10.1021/acs.est.5b05852

Technical Reports

- (Technical Contributor) USGCRP, 2017: Fifth National Climate Assessment (NCA5), Chapter 5: Energy Supply, Delivery, and Demand, U.S. Global Change Research Program, Washington, DC, USA, doi: XXX. (In-Progress) https://www.globalchange.gov/our-work/fifth-national-climate-assessment
- Kintner-Meyer, M.C., Conzelmann, G., Kim, H., Zhou, N., DeStephano, P., Durga, S., Elgowainy, A., Hamilton, B., Kanudia, A., Khanna, N. and **Khan, Z.,** 2022. The Net Zero World Initiative's Preliminary Analysis of Decarbonization Pathways for Five Countries. Lawrence Berkeley National Lab.(LBNL), Berkeley, CA (United States). https://doi.org/10.2172/1897738
- Charles, M.M., **Khan, Z.,** Yu, S., Smith, S.J., Douville, T.C., Homer, J.S., Hardy, T.D., Masud, J., Yusuf, A. and Siddiqui, B., 2021. Electrification of Pakistan's Transport System: Modeling Electric Vehicle Penetration and Energy Supply Chain Impacts (No. PNNL-31757). Pacific Northwest National Lab.(PNNL), Richland, WA (United States). https://doi.org/10.2172/1820372
- Vogt-Schilb, A., Breton, H., Edwards, G., Jaramillo, M., Amin, A., Waisman, H., Bataille, C., Briand, Y., Aubert, P., Svensson, J., Baron, R., Burkholder, B., Navizet, D., Dali, S., Lecuyer, O., Meisel, N., Lallana, F., Bravo, G., Le Treut, G., Lefevre, J., Cadena, A., Delgado, R., Arguello, R., Romero, G., Wild, T.B., **Khan, Z.,** Clarke, L., Edmonds, J., Godinez, G., Victor-Gallardo, L., Quiros-Tortos, J., Ramos, E., Howells, M., Usher, W., De León, F., Soria, R., Villamar, D., Carvajal, P., Schaeffer, R., Szklo, A., Rochedo, P., Imperio, M., Tovilla, J., Buira, D., Gastelum, D., Farbes, J., Haley, B., Jones, R., Williams, J., Gomez, X., Mak, W., Requejo, F., Collado, M., Ugarte, D. Getting to Net-Zero Emissions: Lessons from Latin America and the Caribbean (2019). Inter-American Development Bank, Washington, DC, 56 pp. http://dx.doi.org/10.18235/0002024
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- Linares, P., **Khan, Z.**2015. Agua, energía y cambio climático. Tecnologías de generación eléctrica a partir de la disponibilidad recursos hídricos en escenarios de cambio climático, (Technical Report), Fundación Canal, Canal de Isabel II, Madrid, Spain. http://www.madrid.org/bvirtual/BVCM019289.pdf

Editor

- Abraham, E., Byers, E., Parkinson, S., and **Khan, Z.** (Eds), Focus on Multi-Scale Water-Energy-Land Nexus Planning to Manage Socio-Economic, Climatic, and Technological Change, 2021, Environmental Research Letters, https://iopscience.iop.org/journal/1748-9326/page/Multi-Scale-Water-Energy

Invited Reviewer

- Boehm, S., L. Jeffery, K. Levin, J. Hecke, C. Schumer, C. Fyson, A. Majid, J. Jaeger, A. Nilsson, S. Naimoli, J. Thwaites, E. Cassidy, K. Lebling, M. Sims, R. Waite, R. Wilson, S. Castellanos, N. Singh, A. Lee, and A. Geiges. 2023. State of Climate Action 2023. Berlin and Cologne, Germany, San Francisco, CA, and Washington, DC: Bezos Earth Fund, Climate Action Tracker, Climate Analytics, ClimateWorks Foundation, NewClimate Institute, the United Nations Climate Change High-Level Champions, and World Resources Institute. (In-prep)
- Boehm, S., L. Jeffery, K. Levin, J. Hecke, C. Schumer, C. Fyson, A. Majid, J. Jaeger, A. Nilsson, S. Naimoli, J. Thwaites, E. Cassidy, K. Lebling, M. Sims, R. Waite, R. Wilson, S. Castellanos, N. Singh, A. Lee, and A. Geiges. 2022. State of Climate Action 2022. Berlin and Cologne, Germany, San Francisco, CA, and Washington, DC: Bezos Earth Fund, Climate Action Tracker, Climate Analytics, ClimateWorks Foundation, NewClimate Institute, the United Nations Climate Change High-Level Champions, and World Resources Institute. https://doi.org/10.46830/wrirpt.22.00028

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RESEARCH GRANTS

- Shiklomanov, A., Zhang, T., **Khan, Z.,** 2021 "Assessing the Impact of Urban Land Conversion on Local and Regional Surface Climate and Its Socioeconomic Consequences in Western North Africa", NASA, NNH21ZDA001N – LCLUC, https://gsweb4.umd.edu/projects/assessing-impact-urban-land-conversion-and-regional-surface-climate-and-its-socio-economic

PRESENTATIONS

Conference Sessions Chaired

- Wild, T.B., **Khan, Z.,** Awais, M., Andrijevic, M., Niazi, H., and Taniguchi, M. "Multisector Dynamics: Energy-Water-Land Interactions and Adaptations at Multiple Scales II," American Geophysical Union (AGU) Fall Meeting, December 2024. https://agu.confex.com/agu/agu24/meetingapp.cgi/Session/233882
- **Khan, Z.,** Burgis, C., Vadnais, S., Lau, A., and Rainard, M. "Advancing Equity and Health in Climate Transitions: Multisectoral Strategies for Inclusive Adaptation II," American Geophysical Union (AGU) Fall Meeting, December 2024. https://agu.confex.com/agu/agu24/meetingapp.cgi/Session/240522
- Qin, Y., Abraham, E., **Khan, Z.**, Krueger, E., and Byers, E.A. "From research to practice in managing the water-energy-food-environment nexus in a changing world", European Geosciences Union (EGU) General Assembly, Apr 2024 https://meetingorganizer.copernicus.org/EGU24/session/49008
- Sampedro, J., **Khan, Z.**, Mittal, S., and Kikstra, J. "Incorporating equity, gender, health and other co-benefits into NEXUS and IAM research", European Geosciences Union (EGU) General Assembly, Apr 2024 https://meetingorganizer.copernicus.org/EGU24/session/50310
- **Khan, Z.,** Wild, T.B., Taniguchi, M., Vinca, A. " Multisector Dynamics: Energy-Water-Land Interactions at Multiple Scales." In AGU Fall Meeting 2023. GC31B https://agu.confex.com/agu/fm23/meetingapp.cgi/Session/202527
- Abraham, E., Matta, E., **Khan, Z.**, Laspidou, C., Qin, Y., Rodriguez, A. C., Byers, E.A. "Multi-scale water-energy-food-environment (WEFE) nexus planning: from research to practice in managing socio-economic, climatic, and technological change (Session HS5.7)", European Geosciences Union (EGU) General Assembly, Apr 2023 https://meetingorganizer.copernicus.org/EGU23/session/45338
- **Khan, Z.,** Wild, T.B., Taniguchi, M., Byers, E. "Multisector Dynamics: Energy–Water–Land Interactions at Multiple Scales." In AGU Fall Meeting 2022. GC058 https://agu.confex.com/agu/fm22/prelim.cgi/Session/157386
- Abraham, A., **Khan, Z.**, Byers, E., Yue Qin. "Multi-scale water-energy-land nexus planning to manage socio-economic, climatic, and technological change (Session HS5.5)". European Geosciences Union (EGU) General Assembly, Online, May 2022, https://meetingorganizer.copernicus.org/EGU22/session/43303
- Wild, T.B., **Khan, Z.,** Vinca, A., Taniguchi, M. "Multisector Dynamics: Energy–Water–Land Interactions at Multiple Scales." In AGU Fall Meeting 2021. GC059 https://agu.confex.com/agu/fm21/webprogrampreliminary/Session123182.html
- Abraham, A., Nouri, H., Byers, E., **Khan, Z.**, Parkinson, S., Borujeni, S. C., Galindo, A., Berger, M. "Multi-scale water-energy-land nexus planning to manage socio-economic, climatic, and technological change (Session ITS1.1/ERE7.1)". European Geosciences Union (EGU) General Assembly, Online, April 2021, https://meetingorganizer.copernicus.org/EGU21/session/39969
- Wild, T.B., **Khan, Z.,** Vinca, A., Taniguchi, M. "Multisector Dynamics: Energy–Water–Land Interactions at Multiple Scales." In AGU Fall Meeting 2020. https://agu.confex.com/agu/fm20/webprogram/Session107219.html
- **Khan, Z.**, Abraham, A., Byers, E., "Multi-scale water-energy-land nexus planning to manage socio-economic, climatic, and technological change (Session ITS1.1/ERE7.1)". European Geosciences Union (EGU) General Assembly, Online, April 2020, https://meetingorganizer.copernicus.org/EGU2020/session/35928
- **Khan, Z.,** Parkinson, S., Trierweiler, A., and Qin, Y. "Multiscale Modeling of Human-Natural Earth System Interactions for Sustainable and Resilient Planning at the Nexus of Water-Energy-Food Security, Health, and Conflict I." In AGU Fall Meeting 2019. AGU, 2019.
- Abraham, A., Pande, S., **Khan, Z.** Integrated Assessment of Water-Food-Energy Nexuses (Session H25.4.3). European Geosciences Union (EGU) General Assembly, Vienna, Austria, April 2019

Conference Presentations and Proceedings

- **(Invited) Khan, Z.,** Cissé, J.D., Hellmuth, M., and Staub, C. "Enhancing Community Resilience: Towards a Comprehensive Risk Lens for International Development." 10 Dec 2024. AGU 2024, Washington D.C., USA. GC23L-07 https://agu.confex.com/agu/agu24/meetingapp.cgi/Paper/1521414

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- Ahsan, H., Zhao, M., **Khan, Z.,** Wild, T.B., Patel, P.L., Snyder, A., and Rice, J.S. "Exploring Energy-Water-Land System Dynamics Under Climate and Socioeconomic Uncertainties with GCAM-USA." 11 Dec 2024. AGU 2024, Washington D.C., USA. GC31U-0087 https://agu.confex.com/agu/agu24/meetingapp.cgi/Paper/1710959
- Knight, B., Zhao, M., Waite, T., Niazi, H., Vernon, C.R., and **Khan, Z.** "Foresight – Global Change Analytics: Communicating Complex Science Through Interactive Dashboards." 10 Dec 2024. AGU 2024, Washington D.C., USA. IN24B-05 https://agu.confex.com/agu/agu24/meetingapp.cgi/Paper/1591028
- Weber, M., Pressburger, L., Chau, L.W., **Khan, Z.,** Waite, T., Westphal, M., Ling, G.H.T., Ho, C.S., and Evans, M. "Carbon neutrality in Malaysia and Kuala Lumpur: Insights on the role of city-level action to meet national climate mitigation targets." 11 Dec 2024. AGU 2024, Washington D.C., USA. GC31M-0006 https://agu.confex.com/agu/agu24/meetingapp.cgi/Paper/1696756
- **Khan Z.,** Zhao, M., Ahsan, H., Wolfram, P., Vernon, C.R., Iyer, G., Rice, J.S., Binsted, M.T., Snyder, A., and Kyle, P. "Coevolution of future water, energy and land systems across the United States in response to national and global socioeconomic, climate, and energy policy drivers." 13 Dec 2023. AGU 2023, San Francisco, USA. GC33L-1288 https://agu.confex.com/agu/fm23/meetingapp.cgi/Paper/1263025
- **Khan, Z.,** Vernon, C., Zhao, M., Waite, T., Niazi, H., and Knight, B. "Foresight – Global Change Analytics: Communicating Complex Science Through Interactive Dashboards." 14 Dec 2023. AGU 2023, San Francisco, USA. IN43B-0619 https://agu.confex.com/agu/fm23/meetingapp.cgi/Paper/1248922
- Zhao, M., **Khan, Z.,** Ahsan, H., Mongird, K., and Rice, J. " Future Pathways of U.S. Nuclear Power Buildout Under Socioeconomic and Climate Scenarios." 13 Dec 2023. AGU 2023, San Francisco, USA. GC33E-1196 https://agu.confex.com/agu/fm23/meetingapp.cgi/Paper/1361529
- McManamay, R., Chris Vernon, C., Chen, M., Thompson, I., Khan, Z., Narayan, K. "Dynamic urban land extensification and imbalances to the global land-carbon equilibrium." 13 Dec 2023. AGU 2023, San Francisco, USA. GC31C-03 https://agu.confex.com/agu/fm23/meetingapp.cgi/Paper/1296995
- Santos da Silva, S.R., Miralles-Wilhelm, F., and **Khan, Z.** "Exploring Food-Water Nexus Challenges in Azerbaijan Under Alternative Water Futures". 13 Dec 2023. AGU 2023, San Francisco, USA. GC33L-1294 https://agu.confex.com/agu/fm23/meetingapp.cgi/Paper/1394584
- Evans, M., Hoesly, R., and **Khan, Z.** "Power Systems in South Asia: Implications of Simultaneous Change from Climate Impacts, Growing Demand, and Decarbonization". 13 Dec 2023. AGU 2023, San Francisco, USA. GC33H-1244 https://agu.confex.com/agu/fm23/meetingapp.cgi/Paper/1259397
- **Khan, Z.,** Vernon, C., Zhao, M., Waite, T., Niazi, H., and Knight, B. "Foresight – Global change analytics for communicating complex science through interactive dashboards", Integrated Assessment Modeling Consortium (IAMC) 2023, Venice, Italy, 14–16 Nov 2023. https://www.iamconsortium.org/event/sixteenth-iamc-annual-meeting-2023/
- **Khan, Z.,** Vernon, C., Patel, P., Thompson, I., and Knight, B. "GCIMS – Integration: Reproducible, robust, and scalable workflows for interoperable human-Earth system modeling", Integrated Assessment Modeling Consortium (IAMC) 2023, Venice, Italy, 14–16 Nov 2023. https://www.iamconsortium.org/event/sixteenth-iamc-annual-meeting-2023/
- **Khan, Z.,** Vernon, C., Thompson, I., and Patel, P. "GCIMS – Integration: Reproducible, robust, and scalable workflows for interoperable human-Earth system modeling", EGU General Assembly 2023, Vienna, Austria, 24–28 Apr 2023, EGU23-4525, https://doi.org/10.5194/egusphere-egu23-4525, 2023.
- **Khan, Z.,** Vernon, C., Zhao, M., Waite, T., and Niazi, H.: Foresight – Global Change Analytics: Communicating complex science through interactive dashboards, EGU General Assembly 2023, Vienna, Austria, 24–28 Apr 2023, EGU23-4534, https://doi.org/10.5194/egusphere-egu23-4534, 2023.
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- Ahsan, H., Snyder, A., **Khan Z.,** Kyle, P., and Vernon, C.R. 12/13/2022. "Osiris: An R package to process climate impacts on agricultural yields for the Global Change Analysis Model." AGU 2022, Chicago, IL. https://agu.confex.com/agu/fm22/prelim.cgi/Paper/1072384
- Zhao, M., **Khan Z.,** Vernon, C.R., and Rice, J. 12/13/2022. "Helios: An R Package to Process Heating and Cooling Degrees for an Integrated Model of Global Energy-Water-Land Dynamics." AGU 2022, Chicago, IL. https://agu.confex.com/agu/fm22/prelim.cgi/Paper/1067410
- Mongrid, K., Vernon, C.R., Rice, J., **Khan Z.,** and Oikonomou, K. 12/13/2022. "Exploring how MultiSector Dynamics Influence the Evolution of the U.S. Electricity System Power Plant Landscape Under a Range of Future Global Climate and Socioeconomic Scenarios." AGU 2022, Chicago, IL. https://agu.confex.com/agu/fm22/prelim.cgi/Paper/1072800

- Thompson, I., Margiotta, E., **Khan, Z.,** Vernon, C.R. and Graham, N.T., 2022, December. "Tethys 2.0: A Tool to Explore Global Monthly Sectoral Water Withdrawals and Consumption at 1/8th Degree Resolution in Response to Human and Earth System Dynamics Across Alternative Futures". In Fall Meeting 2022. AGU. https://agu.confex.com/agu/fm22/meetingapp.cgi/Paper/1075049
- **Khan, Z.,** Thompson, I., Vernon, C., Graham, N., Wild, T., and Chen, M.: A global gridded monthly water withdrawal dataset for multiple sectors from 2015 to 2100 at 0.5° resolution under a range of socioeconomic and climate scenarios, EGU General Assembly 2022, Vienna, Austria, 23–27 May 2022, EGU22-6476, https://doi.org/10.5194/egusphere-egu22-6476, 2022.
- **Khan Z.,** C.R. Vernon, G.C. Iyer, J.S. Rice, P. Wolfram, M.T. Binsted, and N.T. Graham. 12/13/2021. "Coevolution of future water, energy and land systems across the United States in response to national and global socioeconomic, climate, and energy policy drivers." Abstract submitted to AGU 2021, New Orleans, Louisiana.
- **Khan Z.,** C.R. Vernon, T.B. Wild, M. Zhao, S.X. Tang, and A.M. Warmka. 12/13/2021. "Argus - An interactive application to enable scientific discovery through multi-sector and multi-scale visual analytics." Abstract submitted to AGU 2021, New Orleans, Louisiana.
- McGrath C.R., C.D. Burleyson, C.R. Vernon, J.S. Rice, N. Voisin, **Z. Khan**, and A. Rahman. 12/13/2021. "TELL: A Python Package for Predicting the Short- and Long-Term Evolution of Total Electricity Loads in the United States." Abstract submitted to AGU Fall Meeting 2021, New Orleans, Louisiana.
- Sampedro Martinez de Estivariz J., **Z. Khan,** C.R. Vernon, S.J. Smith, S.T. Waldhoff, and R. Van Dingenen:. 12/01/2021. "rfasst: An R tool to estimate air pollution impacts on health and agriculture." Abstract submitted to Fourteenth IAMC Annual Meeting -- The Integrated Assessment Modeling Consortium (IAMC), Virtual, Maryland.
- Zhao M., T.B. Wild, **Z. Khan,** B.N. Yarlagadda, L.E. Clarke, M. Hejazi, and F.R. Miralles-Wilhelm, et al. 12/15/2021. "The Implications of Global Change for the Co-Evolution of Argentina's Integrated Energy-Water-Land Systems." Abstract submitted to Integrated Assessment Modeling Consortium (IAMC), Online Conference, District Of Columbia. PNNL-SA-164195
- **Khan Z.,** Vernon, C.R., Warmka A., 13 July 2021, GCAM Community Modeling Meeting, Breakout Session 3: GCAM visual analytics apps. https://gcims.pnnl.gov/community
- **Khan, Z.,** Graham, N., Vernon, C., Wild, T., Chen, M., and Calvin, K.: A global gridded monthly water withdrawal dataset for multiple sectors from 2015 to 2100 at 0.5° resolution under a range of socioeconomic and climate scenarios, EGU General Assembly 2021, online, 19–30 Apr 2021, EGU21-903, https://doi.org/10.5194/egusphere-egu21-903 , 2021
- Suriano, M., Casado, J., Novillo, M.G., Bereslawski, J.L., Roberts, P., **Khan, Z.,** Wild, T.B. (2021). Gestión de los recursos hídricos bajo un enfoque nexo: agua-energía-alimentos. Estudio de caso en Argentina. (English: Management of water resources with a Nexus Approach: Water-Energy-Food Case Study in Argentina. Congreso Latinoamericano de Hidraulica, Acapulco, Mexico, April 2021.
- **Khan, Z.,** Wild, T.B., Iyer, G., Vernon, C.R. and Hejazi, M.I., (2020), December. The evolution of energy-water-agriculture inter-connectivity across scales in the US. In AGU Fall Meeting 2020. AGU. December 2020.
- **Khan, Z.,** Wild, T.B., Vernon, C., Hejazi, M., Iyer, G., Graham, N. (2020). Dynamic Energy-Water-Land Hotspots at Variable Spatial Scales Across the United States. Oral Presentation at the European Geophysical Union (EGU), virtual conference, April 2020.
- **(Invited)** Wild, T.B., **Khan, Z.,** Clarke, L., Hejazi, M., Miralles-Wilhelm, F., Munoz-Castillo, R., Bereslawski, J., Casado, J., Gavino Novillo, M., Miller, A., Moreda, F., Roberts, P., Suriano, M., Vernon, C. (2019). From Sub-Regional to Global: Fusing Together Data Sets Across Scales and Sectors to Inform Integrated Regional Food-Energy-Water Planning. Oral presentation at the American Geophysical Union, San Francisco, CA, December 2019.
- Wild, T.B., **Khan, Z.,** Clarke, L., Hejazi, M., Miralles-Wilhelm, F., Munoz-Castillo, R., Bereslawski, J., Casado, J., Gavino Novillo, M., Miller, A., Moreda, F., Roberts, P., Suriano, M., Vernon, C., Melo, S., Romero, G., Delgado, R., Arguello, R., Gaudioso, R., Mascari, P., Carrazzone, M.E., Weinstein, F., Bianchi, F., Perez, F. (2019). Integrated, Stakeholder-Driven, Regional Energy-Water-Land Planning in Latin America. Oral presentation at the American Geophysical Union, San Francisco, CA, December 2019.
- **(Invited) Khan, Z.,** Wild, T.B., Clarke, L., Hejazi, M., Vernon, C., Miralles-Wilhelm, F., (2019). Bridging the gap between coarse and fine resolution models to inform integrated water-energy-land planning at decision-relevant scales. Oral Presentation at the European Geosciences Union (EGU) General Assembly, Vienna, Austria, April 2019
- **Khan, Z.,** Hejazi, M., Wise, M., Iyer, G., Patel, P., Kim, S. (2019). Impacts of climate variability and extremes on US power system capacity and operations. Oral Presentation at the European Geosciences Union (EGU) General Assembly, Vienna, Austria, April 2019
- **Khan, Z.,** Hejazi, M., Wise, M., Iyer, G., Patel, P., Kim, S. (2018). Improved Energy Systems Planning and Decision-making Using Integrated Assessment Research. Oral Presentation at the INFORMS Annual Meeting, Phoenix, AZ, USA, November 2018
- **Khan, Z.,** Hejazi, M., Wise, M., Iyer, G., Turner, S., Clarke, L. (2018). An integrated approach to Climate Impacts on the Power Sector Using GCAM. Oral Presentation at the INFORMS Annual Meeting, Phoenix, AZ, USA, November 2018

- Wild, T.B., **Khan, Z.,** Clarke, L., Hejazi, M., Miralles-Wilhelm, F., and Munoz-Castillo, R. (2018). Applying a water-energy-food dynamics framework at sub-national scale in Latin America to facilitate integrated infrastructure investment planning. Oral presentation at the Integrated Assessment Modeling Consortium's 11th Annual Meeting, Seville, Spain, November 2018.
- **(Invited)** Wild, T.B., **Khan, Z.,** Clarke, L., Hejazi, M., Miralles-Wilhelm, F., and Munoz-Castillo, R. (2018). A Framework to Facilitate Integrated Sub-Regional Multi-Sector Infrastructure Investment Planning. Oral presentation at the American Geophysical Union, Washington, DC, December 2018.
- Wild, T.B., **Khan, Z.,** Clarke, L., Hejazi, M.I., Miralles-Wilhelm, F., Castillo-Munoz, R. (2018). Applying a water-energy-food nexus framework at sub-national scale in Latin America to facilitate integrated infrastructure investment planning. Snowmass 2018, Workshop on Analyses of Multi-Sector Energy and Environmental Dynamics, Snowmass, Colorado, USA, July 2018.
- Wild, T.B., **Khan, Z.,** Clarke, L., Hejazi, M., Miralles-Wilhelm, F., and Munoz-Castillo, R. (2018). Invited. A Framework to Facilitate Integrated Sub-Regional Multi-Sector Infrastructure Investment Planning. Oral presentation at the American Geophysical Union, Washington, DC, December 2018.
- Wild, T.B., **Khan, Z.,** Clarke, L., Hejazi, M., Miralles-Wilhelm, F., and Munoz-Castillo, R. (2018). Applying a water-energy-food dynamics framework at sub-national scale in Latin America to facilitate integrated infrastructure investment planning. Oral presentation at the Integrated Assessment Modeling Consortium's 11th Annual Meeting, Seville, Spain, November 2018.
- **Khan, Z.,** Linares, P. The Economic impact of climate-induced regional water constraints in the Spanish energy sector. Oral Presentation at the 10th Congress, Energía y Agua, Spanish Association for Energy Economics (AEEE), Tenerife, Spain, February 2015.
- **Khan, Z.,** Linares, P. Nuevas tecnologías de generación eléctrica a partir de la disponibilidad de recursos hídricos en escenarios de cambio climático, Oral Presentation at the 9 Foro, Agua Para el Desarrollo, Agua y Energía, Fundación Canal, Madrid, Spain June 2014.

Workshops, Seminars and Webinars

- (Invited) **Khan. Z.,** (2023), Iowa State University – Spring 23 – Class – CE 574X Integrated assessment modeling and science-policy integration for global environmental change, Guest Lecture – 12 April 2023 - 230 Town Engineering Building, Iowa State University, Ames, IA 50011.
- (Invited) **Khan. Z.,** (2023), University of Maryland – Spring 23 – Class - PLCY-798K Integrated Human-Earth System Modeling and Policy Assessment, Lecture 7 - Food-Energy-Water Nexus - 1 March 2023. Tydings Hall 2106, University of Maryland, College Park, MD 20742.
- (Invited) **Khan. Z.,** (2023), Training Workshop, Global Change Analysis Model (GCAM), Country Climate and Development Reports (CCDR), World Bank Group - 24 February 2023. Merten Hall, George Mason University, Fairfax, VA, USA.
- (Invited) **Khan. Z.,** (2022), Emerging themes and future directions of multi-sector nexus research and implementation, October 6, 2022, EO4WEF (Earth observations for the Water-Energy-Food Nexus) Community of Practice (CoP), Stockholm, Sweden/Virtual
- (Invited) **Khan. Z.,** (2022) Workshop on Integrated Assessment Modelling for Multi-Sectoral Policy Insights, September 22 -23, 2022, Centre for Water Informatics & Technology, LUMS, Lahore, Pakistan/Virtual
- Wild, T.B., **Khan, Z.,** Clarke, L., Hejazi, M.I., Miralles-Wilhelm, F., Castillo-Munoz, R. (2019). Informing Integrated National and Regional Energy-Water-Land Planning in Uruguay. Public Workshop on Analyses of Multi-Sector Dynamics in Uruguay conducted in collaboration with IDB and the National Secretary of the Environment, Water and Climate Change, Presidencia República Oriental del Uruguay. Montevideo, Uruguay, November 2019.
- **Khan, Z.,** Homer, J., Smith, S., Yarlagadda, B., Yu, S., Charles, M. Oral webinar - Pakistan Integrated Energy Planning (IEP) GCAM Training Webinar #2 – Using GCAM. Organized jointly by the Government of Pakistan, United States Agency for International Development (USAID), US Department of Energy (DOE). Webinar, August 2019
- **Khan, Z.,** Foster, N., Homer, J., Smith, S., Yarlagadda, B., Yu, S. Oral webinar - Pakistan Integrated Energy Planning (IEP) GCAM Training Webinar #1 – Introduction to GCAM. Organized jointly by the Government of Pakistan, United States Agency for International Development (USAID), US Department of Energy (DOE). Webinar, June 2019
- **Khan, Z.,** Foster, N., Homer, J., Smith, S., Yarlagadda, B., Yu, S. Oral Presentation at the Pakistan Energy Task Force Modeling Consortium. Organized jointly by the Government of Pakistan, United States Agency for International Development (USAID), US Department of Energy (DOE). Islamabad, Pakistan, February 2019
- **Khan, Z.,** Hejazi, M., Kholod, N., Evans, M. Webinar on the Nexus Analysis of Water Scarcity. Attended by the Shri R. P. Gupta - Additional Secretary of Energy (NITI Aayog), Julia Kennedy - Deputy Director, Clean Energy and Environment Office (USAID), TERI/CEEW. Webinar, December, 2018

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- Wild, T.B., Clarke, L., Hejazi, M.I., **Khan, Z.,** Miralles-Wilhelm, F., Castillo-Munoz, R. (2018). Applying a water-energy-food nexus framework at sub-national scale in Latin America to facilitate integrated infrastructure investment planning. Snowmass 2018, Workshop on Analyses of Multi-Sector Energy and Environmental Dynamics, Snowmass, Colorado, USA, July 2018.

SOFTWARE DEVELOPED

- **Foresight:** https://release-test.d20keptxywps69.amplifyapp.com/ (In-dev) - Global Change Analytics. (AWS, Java Script, React)
- **Argus:** https://github.com/JGCRI/argus - An interactive platform to effectively communicate and share spatio-temporal scientific data. (R, R Shiny)
- **rfaast:** https://github.com/JGCRI/rfasst **-** Estimation of a consistent range of adverse health and agricultural effects attributable to air pollution for a GCAM scenario (R)
- **osiris:** https://github.com/JGCRI/osiris - An R package to process climate impacts on agricultural yields for the Global Change Analysis Model (GCAM). (R)
- **helios:** https://github.com/JGCRI/helios - An R package to process heating and cooling degrees for GCAM. (R)
- **rmap:** https://github.com/JGCRI/rmap - An R package to plot and compare tabular data on customizable maps across scenarios and time. (R)
- **jgcricolors:** https://github.com/JGCRI/jgcricolors - Package to manage JGCRI color themes. (R)
- **gcambreakout:** https://github.com/JGCRI/gcambreakout - R package to breakout new regions in the GCAM. (R)
- **gcamextractor:** https://github.com/JGCRI/gcamextractor - R package to extract and process GCAM data and manipulate into standardized tables. (R)
- **Plutus:** https://github.com/JGCRI/plutus - An R package to calculate electricity investments and stranded assets in GCAM (R)
- **Metis:** (https://github.com/JGCRI/metis) - Metis offers powerful charting, mapping and data manipulation capabilities to facilitate multi-sector analysis at variable spatiotemporal scales. (R)
- **Tethys:** https://github.com/JGCRI/tethys - Open-source spatiotemporal downscaling model for global water demand (Python)
- **Xanthos:** https://github.com/JGCRI/xanthos - Open-source hydrologic model to quantify/analyze global water availability (Python)
- **GCAM LAC:** Version of GCAM with subregional details in LAC. Used to carry out various case-studies as part of a project with the Inter-American Development Bank (IDB) and the governments of Argentina, Uruguay, and Colombia. (R, Python, C++)
- **NEST (Nexus Solution Tool)**: (https://github.com/iiasa/NEST) Programmed in R and Python, NEST is designed to provide insights into the vulnerability of water, energy and land resources to future socioeconomic and climatic change at different spatio-temporal resolutions. (Python)
- **SPATNEX-WE (Spatial and Temporal Nexus -Water Energy):** Proprietary software developed at Universidad Pontificia de Comillas, Madrid, Spain. Programmed in GAMS the model was one of the first of its kind to include endogenous hard-linked water and energy systems in a linear optimization framework. The model was used for several case-studies in Spain. (GAMS)

PROGRAMMING SKILLS

Python, R, GitHub, Docker, JavaScript, HTML, CSS, ArcGIS, GRASS, QGIS, Cloud-native development, AWS, IBM Cloud, Google Cloud

LANGUAGES

- **English** – Fluent
- **Urdu/Hindi** – Fluent
- **Spanish** - Professional Proficiency

SCHOLARSHIPS & AWARDS

- **Adult and Pediatric First Aid/CPR/AED,** Red Cross **2024**
- **Mental Health First Aid,** National Council for Mental Wellbeing **2024**
- **Erasmus Mundus Joint Doctorate Fellowship (SETS, Category A),** European Union **2013-2017**
- **Young Scientists Summer Program (YSSP) Fellowship,** IIASA **2015**
- **AEEE Young Researcher Award,** Spanish Association for Energy Economics **2015**
- **Richard D. Lombard Public Service Fellowship,** John Sloan Dickey Center for International Understanding **2007**
- **STARR Scholarship,** Dartmouth College **2003-2006**