

Edward Byers

Nationalities: Irish, British & Brazilian
Languages: English (native), Portuguese
(advanced), Spanish, French, German (basic)

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I'm a research scientist with interests in infrastructure systems, climate change risks and development economics with a range of multi-disciplinary experience working in academic, inter-governmental, non-profit and private sector projects. I love working in teams and my strengths are in finding ways to synthesize bulky and complex (climate) data into impactful insights that help us mitigate and adapt to climate change. I'm most proud of the work that I've done relating to the Global Hotspots Assessment, ongoing collaboration within the IPCC and working with organizations such as Global Environment Facility, UNIDO and Green Climate Fund.

EDUCATION

- 2015 Ph.D. in Civil Engineering. Newcastle University, UK. *Water use of the UK electricity sector and its vulnerability to drought.*
- 2009 M.Eng in Civil & Environmental Engineering, 1st Class Hons, 2009. Newcastle University, UK. + 1 year Erasmus exchange at Chalmers University of Technology, Sweden.

SELECTED PROFESSIONAL APPOINTMENTS

2018 - RESEARCH SCHOLAR, IIASA, AUSTRIA.

- Various multi-indicator climate impacts and "hotspots" analyses at country and river basin levels, e.g. with national governments and Green Climate Fund via a technical assistance programme; Global Environment Facility & UNIDO. Data preparation & analysis; report writing and presentations
- Led development of <http://www.hotspots-explorer.org> interactive climate impacts website as part of Integrated Solutions for Water, Energy & Land project. Also assistant project manager.
- Chapter Scientist and Contributing Author in IPCC 6th Assessment Report (and SR1.5 & SRCCL). Managing collection and assessment of the "Scenarios Database" to support analysis of mitigation pathways.
- Supervision of ~8 visiting PhD students and 4 junior staff. IIASA Scientific Leadership Committee. Contributor to various research proposals. Staff Association vice-president. Founder & Chair of Sustainability Champions group. Department coordinator for visiting summer students.

2016 - 2018 IIASA POSTDOCTORAL RESEARCH FELLOWSHIP, IIASA, AUSTRIA.

- Led "Global Hotspots Assessment", combining data from various integrated assessment, climate and impacts models (IAMs, ISIMIP CMIP5). Work featured in Nature, New York Times, IPCC 1.5 Report, Carbon Brief, Global Commission for Adaptation.
- Developed skills and routines for gridded (hydro-climate) data processing as input to variety of assessments on climate impacts and vulnerability, thermal power plant cooling and pumped storage potential, space cooling and air conditioning demands; water stress.

2015 POSTDOC RESEARCHER, ENVIRONMENTAL CHANGE INST., UNIVERSITY OF OXFORD, UK.

- Led analysis on impacts of drought on electricity prices for UK (Nature Comms. 2020). Used hi-res hydro-climate data (RCM perturbed physics ensemble), and developed a weather-driven machine-learning model of daily power plant availability to calculate price impacts.

2012-2014 SCIENTIFIC OFFICER (PART-TIME DURING PH.D), PLANET EARTH INSTITUTE, UK.

- Responsible for scientific communication and policy, and coordinating scientific programmes.

- Policy work on Post-2015 and SDG development agendas and facilitating South-South collaboration. During extended assignments in Angola I worked on developing African Centres of Research Excellence with public and private sectors.
- Also helped organise high-level events and roundtables, in the area of higher education, STEM and SDGs with partners such as AfDB, WB, UNEP, UNECA, AU.

2010-2015 RESEARCH ASSISTANT (PART-TIME DURING PH.D), NEWCASTLE UNIVERSITY, UK.

- Analysis and consultancy on water operations and climate risks working with the major Turkish electricity producer. Site visits, risk assessment and workshops at coal plants in Turkey.
- Lead author reviewing Climate Risks to (UK) Infrastructure report card (coal, oil, gas, nuclear).

PUBLICATIONS, PEER-REVIEW AND EDITORIAL

- Co-author on ~30 peer-reviewed journal articles in leading journals including Nature Sustainability, Nature Energy, Nature Communications, Environmental Research Letters, Global Environmental Change, Energy & Environmental Science
- Associate Deputy Editor of Climatic Change journal (2020-); Deputy Editor of two Special Issues in *Water* and *Environmental Research Letters* (ongoing); Energy Topic Editor at Global Water Forum (2014-2016)
- Manuscript reviewer (40+) for: Nature, Nature Energy, Nature Climate Change, Nature Communications, Climatic Change, Earth System Dynamics, Water Resources Research, +10 others.

[Google Scholar](#)

[ORCID](#)

[ResearchGate](#)

[PubLons](#)

COMPUTER SKILLS

Nine years programming, initially in Matlab and subsequently Python (4+ years: xarray, pandas, sklearn, cartopy, seaborn, matplotlib, jupyter...);

- Comfortable with: lazy handling of many, large out-of-memory datasets in xarray (netCDF, tiff); split-apply-combine; masking and weighted spatial aggregation (e.g. to country); multi-model ensemble and uncertainty statistics; plotting (incl. maps); Github; jupyter notebooks
- Occasional experience with: shapefile-to-raster burning; ArcGIS/QGIS; extreme value statistics (e.g. GEV for peak flows; drought event statistics); basic machine-learning (sk-learn); html; wget; Geoserver; contributor to *pyam* python package

PUBLIC SPEAKING, CONFERENCES AND ENGAGEMENT

- Comfortable public speaker, having delivered invited lectures, presentations and as panellist to large technical and non-technical audiences
- Trained in presentation skills (including online) and in workshop facilitation.
- Highlights include:

Stockholm World Water Week 2014
 2nd U.S DOE & EC expert workshop on water-energy interdependencies
 IAEA workshop on Climate, Land, Energy & Water systems modelling
 IRENA-JRC Expert Workshop on mitigation scenario comparison
 UNFCCC COP26 GEF-GCF Pavilion side-event

Co-convenor and presenter EGU 2016-2020, including the first *xarray* short-course;
 2x invited talks at AGU 2018
 Impacts World 2017
 International Energy Workshop 2018
 Asian Energy Modelling Workshop (invited)

PERSONAL INTERESTS

- Snowboarding, cycling & MTB, hiking, photography, travelling,

SELECTED PUBLICATIONS (SELECTED 1ST AUTHOR, MOST RELEVANT, HIGH-IMPACT)

JOURNAL ARTICLES

- Byers, E., Gidden, M., ... Riahi, K. (2018). Global exposure and vulnerability to multi-sector development and climate change hotspots. *Environmental Research Letters*, 13(5). <https://doi.org/10.1088/1748-9326/aabf45>
- Byers, E. A., Coxon, G., Freer, J., & Hall, J. W. (2020). Drought and climate change impacts on cooling water shortages and electricity prices in Great Britain. *Nature Communications*, 11(1), 1-12. <https://doi.org/10.1038/s41467-020-16012-2>
- Byers, E. A., Hall, J. W., Amezaga, J. M., O'Donnell, G. M., & Leathard, A. (2016). Water and climate risks to power generation with carbon capture and storage. *Environmental Research Letters*, 11(2). <https://doi.org/10.1088/1748-9326/11/2/024011>
- Byers, E., Gidden, M., & Maussion, F. (2017). *Working with big, multi-dimensional geoscientific datasets in Python: a tutorial introduction to xarray*. EGU General Assembly 2017, Short Course.
- Byers, E. A., Hall, J. W., & Amezaga, J. M. (2014). Electricity generation and cooling water use: UK pathways to 2050. *Global Environmental Change*, 25(1), 16-30. <https://doi.org/10.1016/j.gloenvcha.2014.01.005>
- Hunt, J. D., Byers, E., Wada, Y., et al. (2020). Global resource potential of seasonal pumped hydropower storage for energy and water storage. *Nature Communications*, 11(1), 1-8. <https://doi.org/10.1038/s41467-020-14555-y>
- Mastrucci, A., Byers, E., Pachauri, S., & Rao, N. D. (2019). Improving the SDG energy poverty targets: Residential cooling needs in the Global South. *Energy and Buildings*, 186, 405-415. <https://doi.org/10.1016/j.enbuild.2019.01.015>
- Qin, Y., Höglund-Isaksson, L., Byers, E., Feng, K., Wagner, F., Peng, W., & Mauzerall, D. L. (2018). Air quality-carbon-water synergies and trade-offs in China's natural gas industry. *Nature Sustainability*, 1(9), 505-511. <https://doi.org/10.1038/s41893-018-0136-7>
- Vinca, A., Parkinson, S., Riahi, K., Byers, ... et al.. (2020). Transboundary cooperation a potential route to sustainable development in the Indus basin. *Nature Sustainability*, 1-9. <https://doi.org/10.1038/s41893-020-00654-7>
- Wang, Y., Byers, E., Parkinson, S., Wanders, N., Wada, Y., Mao, J., & Bielicki, J. M. (2019). Vulnerability of existing and planned coal-fired power plants in Developing Asia to changes in climate and water resources. *Energy and Environmental Science*, 12(10), 3164-3181. <https://doi.org/10.1039/c9ee02058f>
- Byers, E. A., & Amezaga, J. M. (2015). UK nuclear and fossil fuel energy infrastructure climate risks. *Infrastructure Asset Management*, 2(3), 120-130. <https://doi.org/10.1680/iasma.14.00031>
- Yalew, S. G., van Vliet, M. T. H., Gernaat, D. E. H. J., Ludwig, F., Miara, A., Park, C., Byers, E., ... van Vuuren, D. P. (2020). Impacts of climate change on energy systems in global and regional scenarios. *Nature Energy*, 5(10), 794-802. <https://doi.org/10.1038/s41560-020-0664-z>
- Satoh, Y., Kahil, T., Byers, E., et al. (2017). Multi-model and multi-scenario assessments of Asian water futures: The Water Futures and Solutions (WFaS) initiative. *Earth's Future*, 5(7), 823-852. <https://doi.org/10.1002/2016EF000503>

REPORTS & BOOK CHAPTERS

- IPCC 6th Assessment Report Working Group 3 (in review) - Chapter 3, 6, Technical Annex
- [IPCC Special Report on Climate Change on Land](#) (2019) - Chapter 7
- [IPCC Special Report on Global Warming of 1.5°C](#) (2018) - Chapter 3, Chapter 5
- Willaarts, B., Byers, E. et al (2020). *Integrated Solutions for Water, Energy and Land project - 4th Progress Report and Final Report*.
- Wiberg, D., Satoh, Y., et al.. (2017). *Water Futures and Solutions: Asia 2050 (Final Report)*. Knowledge and Innovation Support for the Water Financing Program of the Asian Development Bank (RETA 6498). <http://pure.iiasa.ac.at/14476/>
- Tran, M., Byers, E. A., et al.. (2016). Quantifying interdependencies: the energy--transport and water--energy nexus. In *The Future of National Infrastructure* (pp. 227-240). Cambridge University Press.
- Byers, E. A., & Amezaga, J. M. (2015). Working Technical Paper: Energy: Nuclear, coal, oil and gas. In [A Climate Change Report Card for Infrastructure](#). Living With Environmental Change programme.
- Tran, M., Hall, J., et al.. (2014). *National infrastructure assessment: Analysis of options for infrastructure provision in Great Britain*. University of Oxford. <http://www.itrc.org.uk/>