# Supplementary File

Consists of a Data collection Methods section, <u>3 Figures</u> and <u>11 Tables</u> referenced in the main article text.


## Evaluating features of scientific conferences: A call for improvements

Sarvenaz Sarabipour[1]*, Benjamin Schwessinger[2], Fiona N. Mumoki[3], Aneth D. Mwakilili[4,5], Aziz Khan[6,7], Humberto J. Debat[8], Pablo J. Sáez[9,10], Samantha Seah[11], Tomislav Mestrovic[12,13]

[1]Institute for Computational Medicine & Department of Biomedical Engineering, Johns Hopkins University, Baltimore, Maryland, United States
[2]Research School of Biology, The Australian National University, Acton 2601, ACT, Australia
[3]Department of Zoology and Entomology, University of Pretoria, South Africa
[4]Swedish University of Agricultural Sciences, Plant Protection Department, Alnarp, Sweden
[5]University of Dar es Salaam, Department of Molecular Biology and Biotechnology, Dar es Salaam, Tanzania
[6]Centre for Molecular Medicine Norway (NCMM), Nordic EMBL Partnership, University of Oslo, 0318, Oslo, Norway
[7]Stanford Cancer Institute, Stanford University School of Medicine, Stanford University, Stanford, California, United States
[8]Center of Agronomic Research, National Institute of Agricultural Technology (IPAVE-CIAP-INTA), Córdoba, Argentina
[9]Institut Curie, Paris Sciences & Lettres Research University, CNRS, UMR 144, F-75005, France
[10]Department of Biochemistry and Molecular Cell Biology, University Medical Center Hamburg-Eppendorf, 20246 Hamburg, Germany.
[11]European Molecular Biology Laboratory, Genome Biology Unit, Heidelberg, Germany
[12]Clinical Microbiology and Parasitology Unit, Poliklinika Dr. Zora Profozic, Zagreb, Croatia
[13]University Centre Varazdin, University North, Varazdin, Croatia

*ssarabi2@jhu.edu

# Supplementary File

Consists of a Data collection Methods section, <u>3 Figures</u> and <u>11 Tables</u> referenced in the main article text.

| Table S1. American Chemical Society Fall & Spring Annual Meeting Attendee Statistics | | | | | | |
|---|---|---|---|---|---|---|
| Year | Location | Attendees | Students | Expo-Only | Exhibitors | Total |
| Spring 2019 | Orlando, FL | 7,974 | 6,043 | 444 | 858 | 15,754 |
| Fall 2018 | Boston, MA | 8,380 | 3,691 | 682 | 1,172 | 14,463 |
| Spring 2018 | New Orleans, LA | 9,067 | 6,472 | 334 | 879 | 16,752 |
| Fall 2017 | Washington, DC | 8,400 | 2,999 | 477 | 1,068 | 12,944 |
| Spring 2017 | San Francisco, CA | 9,830 | 6,920 | 967 | 1,200 | 18,917 |
| Fall 2016 | Philadelphia, PA | 7,860 | 3,257 | 697 | 1,175 | 12,989 |
| Spring 2016 | San Diego, CA | 8,776 | 5,989 | 477 | 1,068 | 16,310 |
| Fall 2015 | Boston, MA | 8,599 | 3,468 | 595 | 1,266 | 13,928 |
| Spring 2015 | Denver, CO | 7,612 | 5,142 | 357 | 847 | 13,958 |
| Fall 2014 | San Francisco, CA | 10,372 | 3,724 | 550 | 1,128 | 15,774 |
| Spring 2014 | Dallas, TX | 7,083 | 5,172 | 433 | 810 | 13,498 |
| Fall 2013 | Indianapolis, IN | 6,849 | 2,664 | 418 | 872 | 10,803 |
| Spring 2013 | New Orleans, LA | 8,329 | 5,848 | 383 | 913 | 15,473 |
| Fall 2012 | Philadelphia, PA | 8,130 | 3,184 | 690 | 1,224 | 13,228 |
| Spring 2012 | San Diego, CA | 9,266 | 5,749 | 716 | 1027 | 16,758 |
| Fall 2011 | Denver, CO | 6,712 | 2,387 | 356 | 998 | 10,453 |
| Spring 2011 | Anaheim, CA | 7,641 | 4,688 | 596 | 1,097 | 14,022 |
| Fall 2010 | Boston, MA | 8,554 | 3,240 | 770 | 1,508 | 14,072 |
| Spring 2010 | San Francisco, CA | 10,200 | 5,717 | 927 | 1,223 | 18,067 |
| Fall 2009 | Washington, DC | 8,914 | 3,159 | 671 | 1,449 | 14,193 |
| Spring 2009 | Salt Lake City, UT | 5,963 | 3,443 | 420 | 780 | 10,606 |
| Fall 2008 | Philadelphia, PA | 8,699 | 2,972 | 838 | 1,488 | 13,997 |
| Spring 2008 | New Orleans, LA | 7,581 | 4,671 | 385 | 1,158 | 13,795 |
| All years Combined | Total Attendees | 190,791 | 100,599 | 13,183 | 25,208 | 330,754 |
| Total Carbon Footprint | Average $CO_2$ produced: | ~190,791 metric tons | ~100,599 metric tons | ~13,183 metric tons | ~25,208 metric tons | ~300,754 metric tons |
| | Average Arctic ice | 572,373 $m^2$ | | 39,414 $m^2$ | 75,624 $m^2$ | 902,262 $m^2$ ~ |

| | | | | | |
|---|---|---|---|---|---|
| | <span style="color:red">melted:</span> | | <span style="color:red">301,797 m$^2$</span> | | | <span style="color:red">Over 4 times the area of NY Grand Central Station</span> |

**Table S1.** Over a decade of American Chemical Society (ACS) annual meeting attendance has left a large carbon footprint. These are statistics for fall and spring annual meetings only and do not include the many regional meetings of this society at various states across the United States (Data source (146)). A round-trip flight from New York to San Francisco emits about 1 metric tons of carbon dioxide per person. Every metric ton of $CO_2$ emitted leads to 3 square meters of Arctic sea ice loss. If every attendee trip,food and accomodation produced about 1 metric tons of $CO_2$ on average, total ACS annual meeting attendance resulted in loss of over 900,000 m$^2$ of arctic ice. The Grand Central Station in New York, NY, the largest train station in the world by platform count, measures 200,000 square meters (m$^2$) in total area.


## An Online Database of key conferences in various scientific disciplines

**Methods of Data collection: Generating the conference list.** The majority of academic conferences do not report complete meeting statistics before or after the event. We chose a wide selection of fields and looked for conferences that scientists would be attending by performing online searches for academic conferences on Google and lists available online (Table S2). We used a number of conference lists compiled by journals and learned societies available online. All the academic meetings in our database were held between 2018 and 2020 and spanned a wide range of engineering, natural sciences, life sciences and a number of humanities disciplines (Table S3). We looked for conferences organized by over 200 scientific societies. We also selected conferences organized by funding agencies such as the US National Institutes of Health (NIH), UK Wellcome Trust and US National Science Foundation (NSF), conferences organized by publishing industry journals such as Nature and Elsevier as well as conferences organized by diagnostic and therapeutic biological companies such as pharmaceutical corporations. We recorded the name and geographic location of the conferences in our database (8). We further searched for conferences organized nationally and internationally by scientific societies around the world. We manually collated the data available online on each of 270 conference websites in a database between August 2019 and February 2020 (8). A Google search was performed for each conference to identify the learned society/organization/entity/university/corporation in charge of organizing the meeting and the number of years the meeting has been held and the frequency of the meeting (i.e. held annually, biennially more or less frequent). Further searches were performed to find the exact or estimated number of members each scientific society (if applicable to a specific conference) had registered. A separate search was performed for each conference, on the meeting website to identify the number of meeting attendees (exhibitors included). If the number of attendees was not provided on the meeting website, full program or program report (in the cases where the conference was already held), a Google search was performed instead. If after all search avenues were exhausted, the exact attendee number was not available online, an estimated number of attendees or society members was used instead (by comparison to members and attendees counts of societies in related fields). The number of attendees was collected to calculate/estimate the total meeting air travel and other (ground transportation, food and accommodation) attendee footprint. We quantified various features of the conferences from the information we had collected manually using the corresponding conference website. When quantifying the number of men and women speakers, chairs, organizing and scientific committee members, in cases where a name appeared ambiguous, we searched for the first

and last name of the researcher with their university affiliation and field of expertise/research/conference topics to locate a photo. Aggregate summaries of the database is presented as Figures 1-2 and supplementary tables S2-S11. On each conference website, the name of the conference, geographic location of the meeting, hosts/funders/sponsors, the year that the meeting was held, number of attendees, registration costs for different types of attendees, digital or virtual conferences with live streaming of talks and digital poster options (meaning online posters, excluding digital or ePosters on physical stands on site), availability of recorded talks and ePosters/iPosters (digital libraries), digital libraries/archives of talks, posters and slides after the meeting was held, total conference cost for each attendee (converted to US dollars), minimum and maximum meeting registration cost for each attendee availability of full (both oral and poster sessions detailed) conference program as electronic/virtual meeting scientific program, (keywords "program", "agenda", "schedule" book, "meeting planner", "meeting App" for the scientific program book file or App (talks and abstracts), estimate air travel and other carbon footprint for total attendees of each meeting, on-site or off-site, free or at a cost childcare facilities, lactation or nursing rooms or personal consideration rooms, caregiver grants, types of career development workshops offered, types of Early career Researcher (ECR) promotion events (poster or oral/platform presentation awards, ECR symposia), networking events (Mixers, meet and greet, ice-breaker or meet the experts events for trainees), availability of code of conduct, code of ethics (or research integrity), local safety instructions or Apps or facilities (e.g. a body system for watching out for fellow attendees, free bus/train), gender equity statement, diversity statement, keynote speaker/opening/closing speakers names, plenary speaker names, conference chair names, organizing or steering committee names, session chair/organizer/moderator/convenor/discussion leader names and invited or featured speaker names, environmental sustainability events, public outreach events (such as free public lectures or engagement with local schools and libraries) and green policies were indicated and recorded in our database for this study (8). To explore early career promotion and appreciation events on conference websites, we looked with terms such as "award", "scholarship", "fellowship", "funding" and "prize". To search for session heads, we searched with keywords such as "session chair", "session moderator", "session organizer" and "session convenor". To find the conference organizing committee, searches were performed with words such as "program committee" or "scientific committee". Searches were also performed to count men and women members of the "organizing committee" or "planning committee" or "steering committee". A separate Google search provided the corresponding academic discipline, the scientific organization associated or supporting the meeting and the most recent number of society members. To find information about sponsoring organizations, institutions or corporations which provided financial, intellectual or media support/partners, searches were performed using keywords "sponsors", "supporters" and "partners" on each meeting website. To source information on code of ethics, we searched the conference and associated learned society webpage with the keywords "code of ethics", "statement of ethics", "professional code of conduct" and "statement/code of research integrity". To explore the available information on the statement of gender equity, we searched the conference and corresponding society website with the keywords, "gender balance statement", "gender equity statement", "diversity statement", "inclusion statement". We also examined the conference websites for their "sustainability initiatives" or "green policies strategies or considerations" incorporated into the organization of these conferences. We also included the meeting URL address and other important announcements, features or notices available for attendees (such as epidemics or phishing scams for flights and accommodations that could impact attendees).

| Table S2. Online sources with compiled lists of conferences | | |
|---|---|---|
| Type | Name | Website |
| Conference List | Nature Ecology and Evolution | www.nature.com/natecolevol/about/conferences |
| Conference List | the National Invasive Species Information Center | www.invasivespeciesinfo.gov/conferences-and-events |
| Journal List | List of ecology, evolution, and conservation journals | https://docs.google.com/spreadsheets/u/1/d/1uG2Dg0LogysCSAsK51Rh9lD_dxRRFOeo2jq92_TwqF0/htmlview |
| Broad Search platform | Google | www.Google.com |

**Table S2.** Lists and resources used to compile our conference database (8).

| Table S3. Conference Disciplines | |
|---|---|
| Physics, Astronomy, Space Research, Astronautics, Condensed Matter Physics | (3/270) |
| Chemistry, Chemical Engineering, Mass Spectrometry, Glycobiology | (7/270) |
| Molecular Biology, Molecular Life Sciences, Biochemistry | (4/270) |
| Microbiology, Microbial Communication, Microbial Population Biology, Veterinary Microbiology | (12/270) |
| Cell Biology, Single Cell Biology, Developmental Cell Biology, Mechanobiology | (10/270) |
| Developmental Biology, Zebrafish Biology, Evolutionary Developmental Biology | (3/270) |
| Behavioral Biology, Behavioral Ecology | (2/270) |
| Fish & Wildlife science, Forest insect science, Forest conservation | (3/270) |
| Coral Reef Biology, Island Biology | (2/270) |
| Land Ecology, Ecosystem Restoration, Lake Ecology, Soil & Water Conservation | (6/270) |
| Agriculture, Agricultural Engineering, Enology | (2/270) |
| Integrative & Comparative Biology | (1/270) |
| Veterinary Microbiology, Veterinary parasitology | (2/270) |
| Evolution, Human Evolution, Ecology, Archaea Ecology, Molecular Ecology, | (44/270) |

| | |
|---|---|
| Microbial Ecology, Mathematics of Ecology, Ecology & Cancer | |
| Zoology, Ornithology, Primatology, Mammalogy, Herpetology | (8/270) |
| Insectology, Entomology, Myrmecology, Pesticide Resistance, Beekeeping | (7/270) |
| Paleontology, Paleoanthropology, Vertebrate Paleontology | (4/270) |
| Oceanography, Marine Biology, Ocean Science, Marine Mammalogy | (4/270) |
| Climate Science | (2/270) |
| Human Genetics, Fungal Genetics | (7/270) |
| Vertebrate Pest Science | (1/270) |
| Invertebrate Pathology | (1/270) |
| Epigenetics | (2/270) |
| Pathology, Molecular Pathology | (2/270) |
| Pharmacology & Drug Development, Neuropsychopharmacology, Pharmaceutical Sciences, Peptide Science, Redox Chemistry & Medicine | (5/270) |
| Mathematics, Mathematical & Theoretical Biology | (2/270) |
| Immunology, Virology, Infectious Disease, Clinical Microbiology, HIV, Vaccines, Allergy, Leukocyte Biology, Lymphology | (19/270) |
| Biophysics, X-ray Diffraction & Scattering, Chromatin Biophysics | (5/270) |
| Neuroscience, Neurological Disorders | (3/270) |
| Cognitive Sciences | (3/270) |
| Plant Science (Plant-microbe interactions, bacterial wilt, aquatic plant science)/Synthetic Biology, Phytobiome research | (14/270) |
| Biomedical Engineering, Medical Physics, Biomedical Electronic Devices | (3/270) |
| Imaging, Microscopy | (5/270) |
| Biomolecular Research Facilities | (1/270) |
| Materials Science & Engineering, Computational Modeling of Materials, Mining Engineering | (5/270) |
| Mechanotronic & Robotics | (1/270) |
| Environmental & Energy Engineering | (1/270) |
| Systems Biology, Computational Biology, Molecular Dynamics | (11/270) |
| Bioinformatics, Data science, Machine Learning | (2/270) |
| Computer Science (Software & Hardware Applications) | (3/270) |
| Conservation Biology | (5/270) |

| | |
|---|---|
| Cancer Research | (1/270) |
| Epidemiology, Molecular Epidemiology | (2/270) |
| Bone & Skeletal Disorders, Autism, Osteoporosis, Osteoarthritis, Musculoskeletal Disease | (4/270) |
| Psychology, Psychonomics | (2/270) |
| Clinical Laboratory Science, Clinical Research | (2/270) |
| Nutrition | (1/270) |
| Toxicology | (1/270) |
| Ophthalmology | (1/270) |
| Geology & Earth Science, Biogeography (invasive species), Geography | (6/270) |
| Health care/Human health, Medicine, Anaesthesiology | (3/270) |
| Cardiovascular Disease, Diabetes, Vascular Biology | (3/270) |
| Alzheimer's disease | (1/270) |
| Endocrinology | (1/270) |
| Maternal Medicine, Infant studies (Development of infants), Reproductive Biology, Study of birth defects, Pediatric Research | (5/270) |
| Rare Disease | (1/270) |
| Gerontology, Biology of Aging | (1/270) |
| Sports Medicine | (1/270) |
| Behavioral Medicine | (1/270) |
| Linguistics | (1/270) |
| History, Philosophy & Social Sciences of Biology, Ethnobiology, History of Medicine | (4/270) |
| Biosafety & Biosecurity | (1/270) |
| Education, Gender, Diversity (Research Culture) | (2/270) |

**Table S3.** The research disciplines for the 270 conferences analyzed. Conference names and year the meeting was held are available in the database (8).

| Table S4. Frequency of in-person National & International Conferences Worldwide | |
|---|---|
| Annual | 73.7% (199/270) |
| Biennial | 20% (54/270) |
| Triennial | 1.5% (4/270) |
| Quadrennial | 3.7% (10/270) |
| Other: meetings held multiple times a year | 1.1% (3/270) |

**Table S4.** The frequency of occurrence of the 270 conferences examined in this study (8).

| Table S5.Years Conferences held | |
|---|---|
| Minimum | 1 Year |
| Average | 29 Years |
| Maximum | 187 Years |

**Table S5.** The number of years the 270 academic conferences examined were held (8).

| Table S6. Number of All Conference Attendees (Researchers & Exhibitors) | |
|---|---|
| Minimum | 70 researchers |
| Average | 2,500 researchers |
| Maximum | 31,000 researchers |
| Estimate total Attendees | ~859,114 researchers |
| Estimate total Learned Society Members, representing over 150 learned societies | ~1,658,602 researchers |

**Table S6.** The number of attendees varied widely for the 270 conferences in our database (8).

| Table S7. Cost of Conference Registration for Attendees | |
| --- | --- |
| Minimum | Free ($0) |
| Average | Over US$200 |
| Maximum | US$2,296 |
| Average Total Funds spent for all attendees (~859,114 researchers, each on average spent US$1500) | US$1.288 billion |

**Table S7.** The registration cost for the 270 conferences we examined. Minimum and maximum registration costs were recorded for each conference, available online (8).

| Table S8. Travel Carbon Footprint of Conference Attendees | |
| --- | --- |
| Minimum per attendee | Traveling 1 mile by train to the convention center produces 0.5 kg $CO_2$ |
| Maximum per attendee | Flying from Perth, Australia to London, United Kingdom and back for Virology & Infectious Diseases (ICVID) 2019 generated about 3,153 kg (3.47 tons) of $CO_2$ |
| Total **Air Travel** carbon footprint generated from 270 conferences (~859,114 attendees combined, average air travel $CO_2$ of 2 tons per attendee) | 1,718,228 tons of $CO_2$ |
| Total **Other** carbon footprint generated from 270 conferences(~859,114 attendees combined, average all other $CO_2$ production of 0.5 tons per attendee) | 429,557 tons of $CO_2$ |

**Table S8.** Examples of individual $CO_2$ production and aggregate amount for 270 conferences held between 2018 and 2020. Details of $CO_2$ production for each meeting is detailed in the online database (8).

| Table S9. Summary key considerations of the 270 Scientific Conferences Analyzed | | | |
| --- | --- | --- | --- |
| **Key Considerations** | | **Yes** | **No** |
| Equity, Intersectionality & Inclusivity | Live streaming or Recordings of **some or all** talks is available at the time of in-person meeting | 3.7% (10/270) | 96.3% (260/270) |

| Considerations | Live streaming or Recordings of **ALL** talks is available at the time of in-person meeting | 3.3% (9/270) | 96.7% (261/270) |
|---|---|---|---|
| | Virtual Reality or Digital Posters (ePosters/iPosters/Twitter Posters) | 1.4% (4/270) | 98.6% (266/270) |
| | Archives of all or most recorded talks or eposters available from conference or scientific society website from previous meeting years | 11% (30/270) | 89% (240/270) |
| | Code of Conduct (COC) | 41% (111/270) | 59% (159/270) |
| | Code of Research Ethics & Integrity | 22% (59/270) | 78% (211/270) |
| | On-site Facilities for Mothers such as Lactation/Nursing Room also called a Personal Considerations Room | 15% (41/270) | 85% (229/270) |
| | Caregiver Grants | 12.2% (34/270) | 87.8% (236/270) |
| | Some form of Childcare (free or at cost) available on-site | 19% (51/270) | 81% (219/270) |
| | Free on-site Childcare | 11% (30/270) | 89% (240/270) |
| | On-site Childcare at a cost ($$) | 8% (21/270) | 92% (249/270) |
| | ECR Training Workshops for Career Development | 35% (94/270) | 65% (176/270) |
| | ECR promotion Events (special symposia, talks, poster sessions for postdoctoral researchers on the job market, ECR awards) | 38.5% (104/270) | 61.5% (166/270) |
| | ECR Networking Events (such as mixer/ice-breaker events with fellow ECRs and senior researchers) | 20% (54/270) | 80% (216/270) |
| | ECR travel Award (Limited in number: 5-20 awarded during each conference) | 55% (149/270) | 45% (121/270) |
| | Local Safety Apps or Instructions for attendee physical safety in town/city | 4% (12/270) | 96% (258/270) |
| | Diversity statement Reported on the conference website online | 22% (59/270) | 78% (211/270) |
| | Gender equity/balance statement Reported on the conference website online | 8% (22/270) | 92% (248/270) |
| | Conferences chair gender balance 39.3% (106/270) of conferences reported this information on the meeting website | 46.2% (49/106) | 53.8% (57/106) |

| | | | |
|---|---|---|---|
| | Keynote speaker gender balance<br>41% (111/270) reported this information on the meeting website | 40.5%<br>(45/111) | 59.5% (66/111) |
| | Plenary speaker gender balance<br>47.4% (128/270) of conferences reported this information on the meeting website | 38.3%<br>(49/128) | 61.7% (79/128) |
| | Invited/Featured speaker gender balance<br>52.2% (141/270) of conferences reported this information on the meeting website | 19.1%<br>(27/141) | 80.9%<br>(114/141) |
| | Session Chair gender balance<br>52.6% (142/270) rof conferences reported this information on the meeting website | 36%<br>(51/142) | 64% (91/142) |
| | Organizing/Steering Committee gender balance<br>46.3% (125/270) of conferences reported this information on the reported website | 36.8%<br>(46/125) | 63.2% (79/125) |
| | Program/Scientific Committee gender balance<br>30% (81/270) of conferences reported this information on the reported website | 27.2%<br>(22/81) | 72.8% (59/81) |
| | Local public outreach events (e.g. public talks) | 6%<br>(15/270) | 94%<br>(255/270) |
| Environmental Sustainability Considerations | Sustainability Policy or Green Strategy<br>(e.g. buying carbon off-sets, going paperless, reducing plastic bottles, sourcing local vegetarian food options for catering) | 5.6%<br>(15/270) | 94.4%<br>(255/270) |
| | Electronic Apps or online program books<br>(complete schedule of talks and posters/abstract book)<br>(in the form of interactive schedule or .pdf file or mobile phone App) | 91%<br>(247/270) | 9% (23/270) |
| | Nature (e.g. Forest, Beach) clean-up walks/ events | 0% (0/270) | 100%<br>(270/270) |

**Table S9.** Summary of aggregate data from 270 conferences. Not every conference reported or designated scientists in certain roles. For instance a number of conferences did not assign session chairs during their meeting. Plenary, keynote or invited/featured speaker roles were not also all consistently assigned in all meetings. Detailed data available online (8).

| Table S10. Types of Educational/Career Development Workshops/Events Held | | |
|---|---|---|
| **Type of Workshop** | **Number of Conferences which offered the workshop** | **Notes/Details** |
| **Events/Workshops for Undergraduate/Graduate/Postdoctoral Trainees** | | |
| Mentoring & Leadership Training | 23 | Overcoming bias through mentorship, mentoring connections, one-on-one Mentoring, Career Mentoring |
| Improving academic environments & culture | 1 | Research culture |
| Managing Yourself as a researcher | 1 | Leadership |
| Tools for Negotiations | 4 | Advocating for yourself and your brand/goals/ Advocating for your research publications |
| Professionalism: Building Success in Science | 1 | |
| Early career Researcher Networking & Conversations | 14 | Supporting ECRs/ Early career days/ ECR Challenges/ Community & Connections |
| Creating Early Career Researcher (ECR) committees | 1 | Engagement in scientific community |
| Effective Management of shared facilities | 1 | Management skills |
| Effective Teaching in Classrooms | 7 | Through practice/ Inclusive pedagogy/ Creating a comfortable and welcoming learning community: From a strategic syllabus to realized student engagement/ effective use of online resources for your class/ Developing a concept inventory to evaluate Student learning In undergraduate courses |
| Career Advice: Navigating the Job market | 11 | Career Transition/Hiring & Promotion/job skills/career planning for success/Diverse career paths in specific fields/First year on the jobs tips/career planning, getting hired, Searching, Applying, Interviewing, and Negotiating for Your First Job |

| | | |
|---|---|---|
| Career Fair/Career Panel/Career Consultation | 10 | Building a good CV/ Recruitment event |
| Graduate & Postdoctoral researcher career development session | 12 | Networking: How to Create Your Dream Career, Networking, Informational Interviews for ECRs, navigating the path to professional success, preparing trainees for modern careers, IDPs: Individual Career Development plans |
| Developing a value statement | 4 | Elevator pitch, Three-minute thesis competition, Student & Early career pop talks (5 minute TED style talks) |
| Graduate & Postdoctoral Career Development | 8 | Developing graduate skills /The Strategic Postdoc: How to find & leverage your postdoc experience, creating an individual development plan/postdoctoral challenges/non-traditional postdocs, ECR discussions on various PhD projects with senior researchers, tips for successful graduate school applications, Career Speed-Networking Luncheon |
| Networking in research | 2 | |
| Engaging more Graduate & Postdoctoral trainees in scientific societies and their organizing committees | 3 | |
| Academic Career Track | 12 | Preparing your Written Application Materials: CV, Cover Letter, Research Statement, the job talk, Understanding the search process from the perspective of search committees and Decoding Job Announcements |
| Non-Academic Career Tracks | 17 | The industry interview, government & NGO jobs, Resume review session, progressive lunch with Industry |
| Writing Diversity Statements | 1 | |
| Scientific Communication | 23 | Increasing the impact of your research through social media, communicating for Impact: Workshop on engaging meaningfully with your neighbors, your elected officials, funders and the broader public |

| | | about science/<br>turn your science into news/<br>effective communication of your data, How to design and give dynamic powerpoint talks and TED talks, scientific storytelling, Developing Strategies for Effective and Trustworthy Communication |
|---|---|---|
| | 14 | |
| Scientific Writing for Public | 5 | Uncomfortable conversations: Engaging Diverse Communities |
| Scientific writing in Academia | 10 | For trainees & New Principal Investigators, writing your paper, increasing the impact of your research, Writing from Qualitative Data |
| Public Policy for Scientists | 6 | How to transition your research to public policy, Advocating for Biomedical Research: we have done it so can you |
| Public outreach, Advocacy | 4 | Increasing Your Success and Social Capital in Conservation |
| Citizen science workshops | 3 | Working with data collected by citizen scientists – challenges & opportunities, empowering citizen science leaders with tools for robust community engagement |
| Reproducibility in Research | 6 | Experimental or Computational research, Tools for open science: reproducible data analysis and paper writing in R |
| Data/Statistical Analysis Techniques | 2 | |
| Data Management | 8 | Data collection/<br>Database/<br>Repository Building Techniques/<br>Digital Tool development/How to use Github, Integrating Advanced Technologies to Improve Data Quality and Reduce Bias in Population Research and Management, Data Analytics, Data mining, Data Cleaning |
| Teaching computing tools to researchers | 3 | |
| Building Digital Data Collection Apps | 2 | Software Carpentry/<br>building Apps |
| Visualization or illustration Techniques | 6 | Graphic recording/<br>how to make a video of your |

| | | |
|---|---|---|
| | | research/artwork for your research publication, Data visualization |
| Grant proposal Writing | 17 | Optimizing Grant Applications/ Funding Opportunities, Training & Fellowship grants |
| Grant information session with specific funding agencies, Funding & budgeting the research | 9 | e.g. NSF, NIH, FDA, European Council Funding Agency/ Early career grant writing opportunities, Communicating with Program Officers, study section review, progress reports, Science, Dollars, and Outcomes: The Critical Pieces of Budgeting You Can't Work Without, NIH Support for Typical and Non-typical Career Trajectories: getting to where you want to be |
| Forming Successful Collaborations, Networking | 7 | Core competencies for partnering)/ Navigating Teamscience/ strategies to generate data/ joining consortium projects/ Collaborative Science with diverse stakeholders/ Industry collaborations & technology development/new technologies & expanded opportunities for collaboration, promoting yourself by making connections that count, finding your voice |
| Succeeding in Interdisciplinary Research, Effective Team-building and Communication workshop | 3 | |
| Multidisciplinary Research Needs | 1 | |
| International Opportunities in Science | 1 | Working as a scientist outside of the U.S. requires curiosity, adaptability, and open-mindedness, which are valuable qualities important for success in any career |
| Getting your foot at the door for leadership positions | 1 | Getting hired |
| Media Engagement/Communication | 3 | Media training |
| Public Involvement | 4 | Pitch your science to non-scientists/Public Engagement/ Citizen Science Data |
| Tips for STEM Educational Engagement outside Colleges & Universities | 1 | Engaging with schools, youth groups and home educators |

| | | |
|---|---|---|
| Science & Arts | 2 | Researcher Film Festivals/Science & Poetry |
| Promoting Diversity, Equity & Inclusivity | 17 | In classrooms & In research environments/Promoting Women/LQBTQI researchers/cultural diversity, Diversity and Inclusion: Leveraging Actions Through Collaboration |
| Immigration Challenges | 1 | On Obtaining Visas |
| Mental Health & Well-Being | 1 | |
| Work-Life Balance | 4 | Avoiding burn out during your career |
| Responding to Bullying | 2 | |
| Gender inequalities in research environments | 3 | (e.g. in field work), Navigating power dynamics in academia |
| Implicit Bias, Bias Awareness in Academia | 3 | |
| Disability in Academia | 1 | |
| Imposter Syndrome | 1 | |
| Tips for successful publishing in a Journal | 11 | Publishing Q & A: Managing the Expectations of Peer Reviewers |
| Open Access (OA) publishing: Preprints/Peer Community In | 1 | (https://peercommunityin.org/) |
| Peer-reviewing Training | 8 | Reviewing training for reviewing manuscripts & grant applications, best practices, mock review |
| Publication/Research Ethics/Teaching Integrity | 6 | Ethics in research environments, Professional Ethics & Advocacy, Irresponsible & wrong conduct of research |
| Fostering/Unlocking Early Career Potentials | 3 | Youth Capacity Building workshop |
| **Career Development Events/Workshops for Faculty** | | |
| Faculty Career Development Workshops (PUI faculty) | 2 | |
| Early to Mid-Career PI challenges | 4 | New Faculty Forum/Striving for Success/Network, learn and find support, Tips for New and Early Stage Investigators: Planning for Success: Navigating Your First Faculty Position/How to get |

| | | | Tenure |
|---|---|---|---|
| PUI faculty training | | 1 | Strategies for successful faculty/undergraduate student collaborative research at PUIs |
| Enabling Work–Life Balance in Your Research Group | | 1 | |
| Meet the Editors | | 9 | What editors expect in your publication/how to be a good associate editor |
| Lab Management Course for Principal Investigators (PIs) | | 2 | including budget management, hiring staff, mentoring trainees |
| Grant Information Session for faculty and other professionals (Presented by Representatives of the funding agencies) | | 2 | United States National Science Foundation information session |

**Table S10.** Details of the early to mid-career trainee and PI development workshops offered only by 91 of the 270 conferences in our database (8). A number of conferences offered more than one career development workshop, workshops are categorized by topic.

| Table S11. Types of Early Career Researcher (ECR) promotion events | | |
|---|---|---|
| **Type of Event** | **Number of Conferences which offered the event** | **Notes** |
| **Promotion for Undergraduate/Graduate/Postdoctoral Trainees** | | |
| Graduate & Postdoctoral Trainee Reception/Mixer | 4 | Student Networking Events |
| Early Career trainee Research/Young Investigator Career Awards/Distinguished student Award/Merit Awards | 54 | For outstanding science, for ECRs with disabilities, for best talk, best poster, for women, minorities, best in their specific field (Graduate & Postdoctoral researchers), Infancy Early Career Researcher Award, Medical student achievement award |
| Trainee Career Development Award | 2 | |
| Technologists Award | 1 | Lab Technicians/non-doctoral research staff |
| Best talk/presentation/platform award | 22 | |
| Early career trainee symposium | 13 | Typically, mini conference last 1-2 days |

| | | |
|---|---|---|
| Networking (meet & greet/ice-breaker/Mixer) events for ECRs | 12 | Meeting senior researchers at conference breakfast, lunch or dinner events/student-faculty networking lunch, for under-represented minorities, LGBTQI trainees, for women, meet the women leaders, Student-Industry Mixer |
| Social reception following the Early Professionals Mini-Talk Symposium | 1 | Provides a chance to meet with the participants and other early career and mid/senior |
| First time delegate mentoring by other delegates | 1 | |
| Young Investigator Forum | 1 | |
| Outstanding Abstract Award | 1 | |
| Poster competition award | 24 | Meet the Faculty Candidate Poster Session Or (best poster) or special viewing sessions |
| ECR job application networking event | 2 | Recruitment event |
| Fellow in training award | 3 | Basic research fellows, clinical research fellows, trainee award for innovation in medical education |
| Best paper published award | 4 | |
| Outstanding Dissertation/Thesis Award | 3 | |
| Participants favourite talk or poster | 1 | |
| Diversity & Inclusion Awards | 3 | |
| Mobility Awards | 1 | |
| Science Communication Scholar Award | 1 | |
| Outreach initiative awards | 1 | |
| Ethics in research Essay and Video competition | 1 | |
| Best Essay Competition | 1 | |
| Student Engineering Design competition | 1 | |
| Undergraduate trainee platform presentations | 1 | |

| | | |
|---|---|---|
| Undergraduate trainee research awards | 6 | |
| **Promotion efforts for ECR Faculty** | | |
| Early Career Research Awards for Principal Investigators (PIs) | 24 | Prizes for independent investigators/Faculty Development Award/ECR professionals for best research, R1 and PUI (Primarily Undergraduate Institutions) faculty, US-based or International are all eligible, Emerging leader award, Public policy award, Distinguished Early Career Contribution Award, ECR investigator Lectureship, basic researchers, Physician-scientists |
| Early Career Development Awards for Principal Investigators (PIs) | 1 | |
| Excellence in Research, Teaching & Service Award | 1 | |
| Mid-Career Research Awards | 1 | |
| Mid-Career Development Awards | 1 | |
| Emerging Leaders Mentorship Award | 2 | Mentoring Excellence Award |

Table S11. Details of the Early Career Researcher (ECR) promotion events offered by a number of conferences in our database (8).
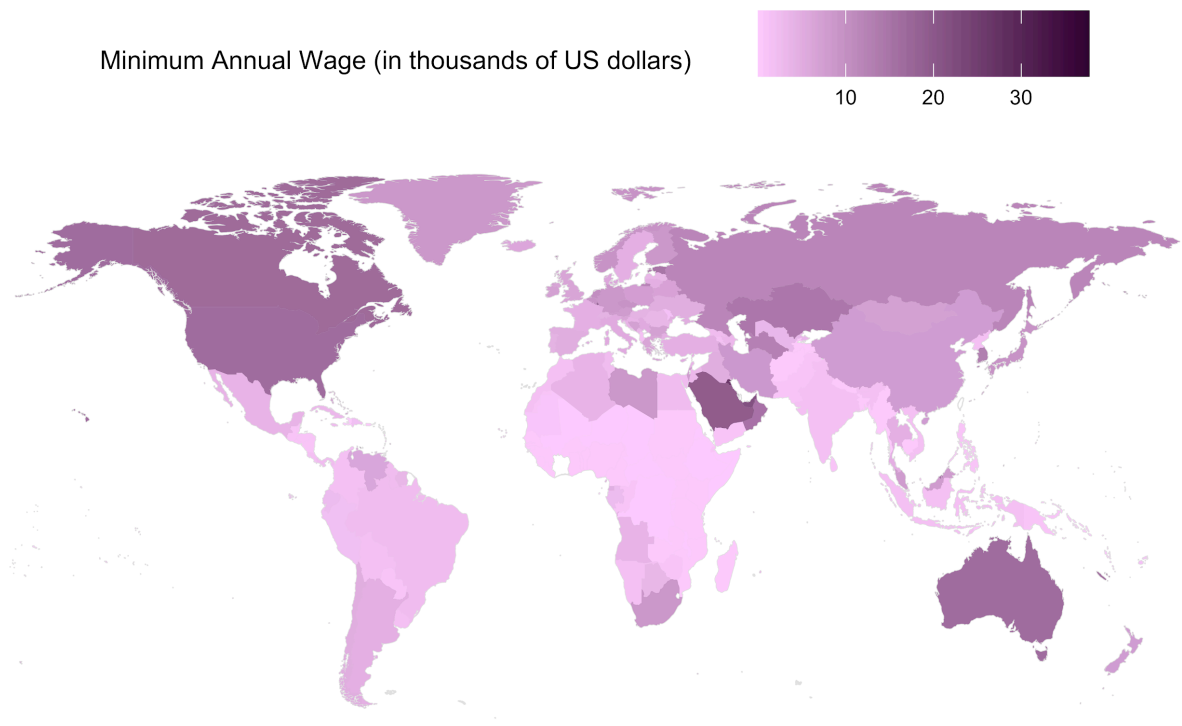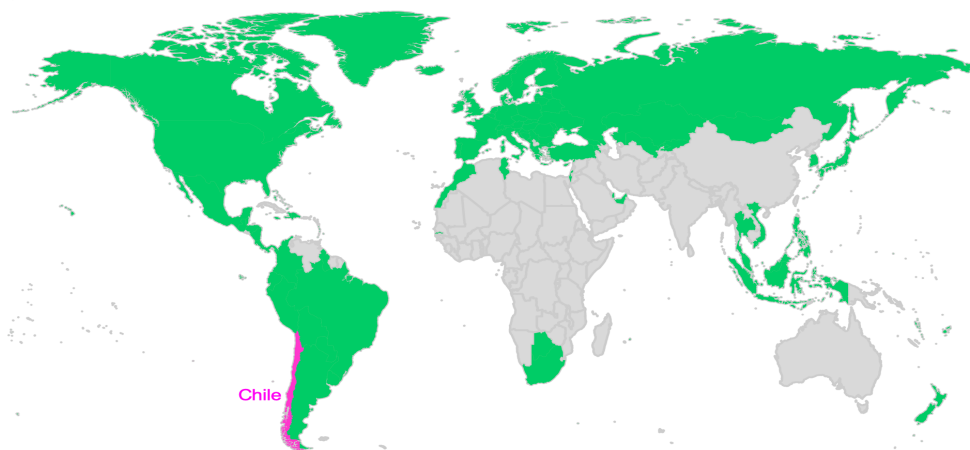
**Figure S1.** The minimum annual (12 months) wages (in thousands of US dollars) Data shown here is for the year 2017 (Data source (89)) Attending a single national or international conference typically costs USD $1,000-4,000.
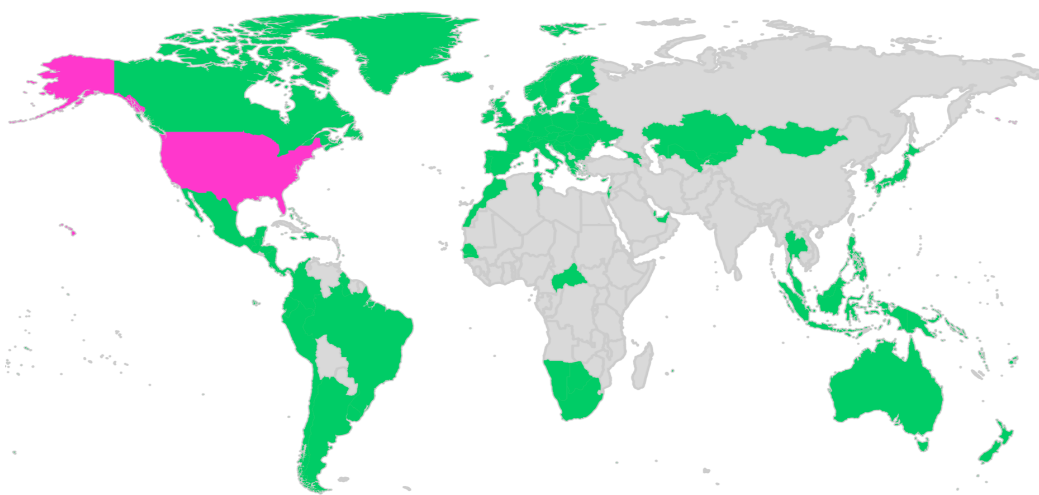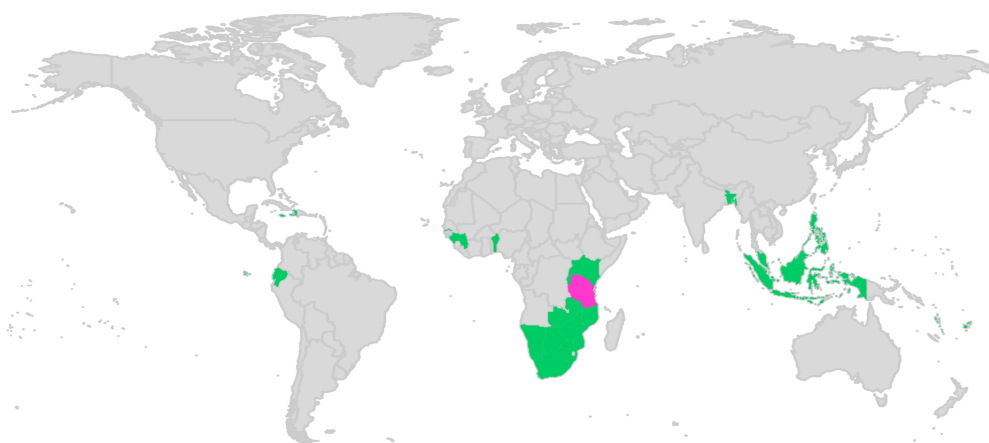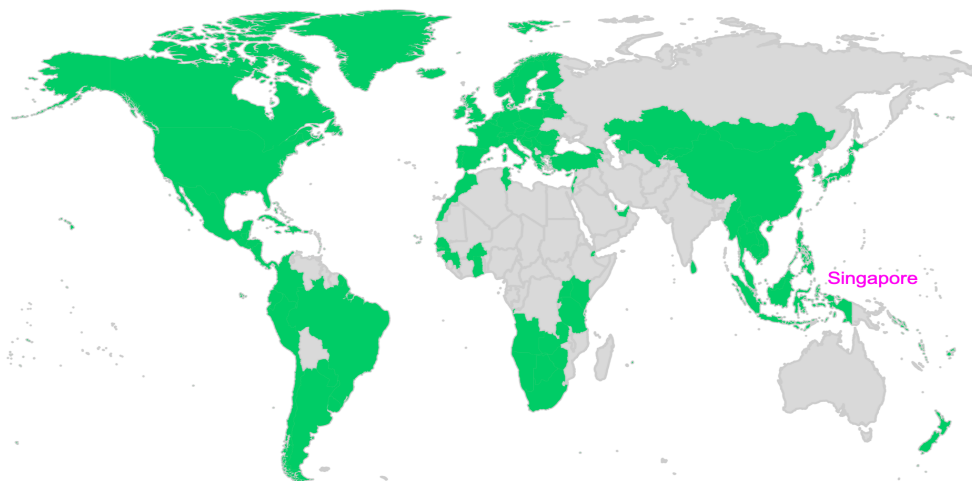
A.

B.

C.

Croatia

Chile

Pakistan

**D.**



**E.**



**F.**



Singapore

**G.**



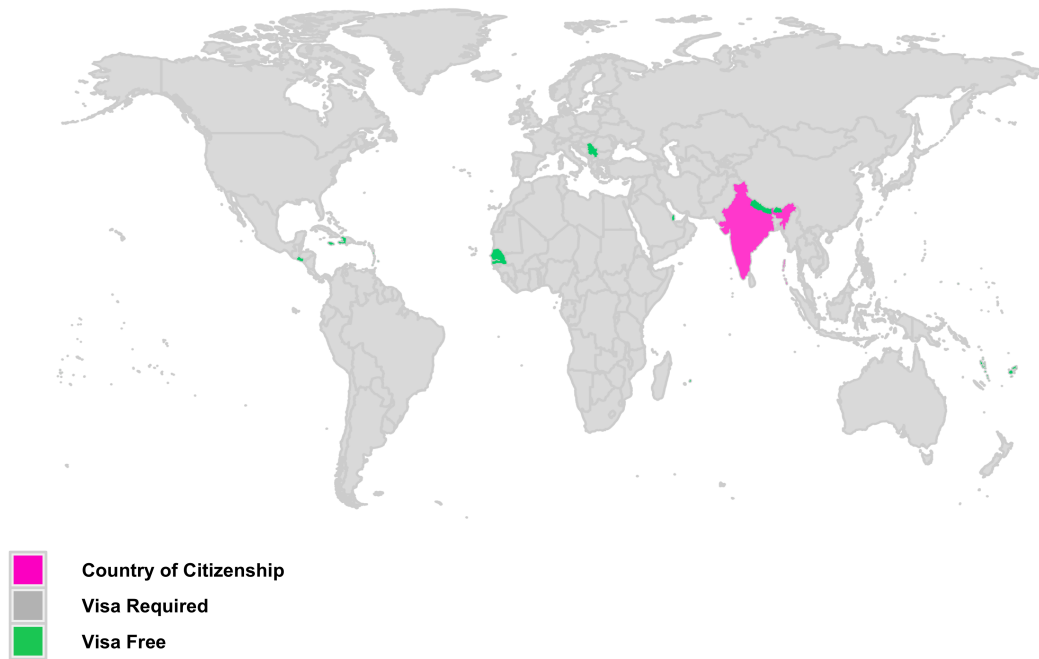- Country of Citizenship
- Visa Required
- Visa Free
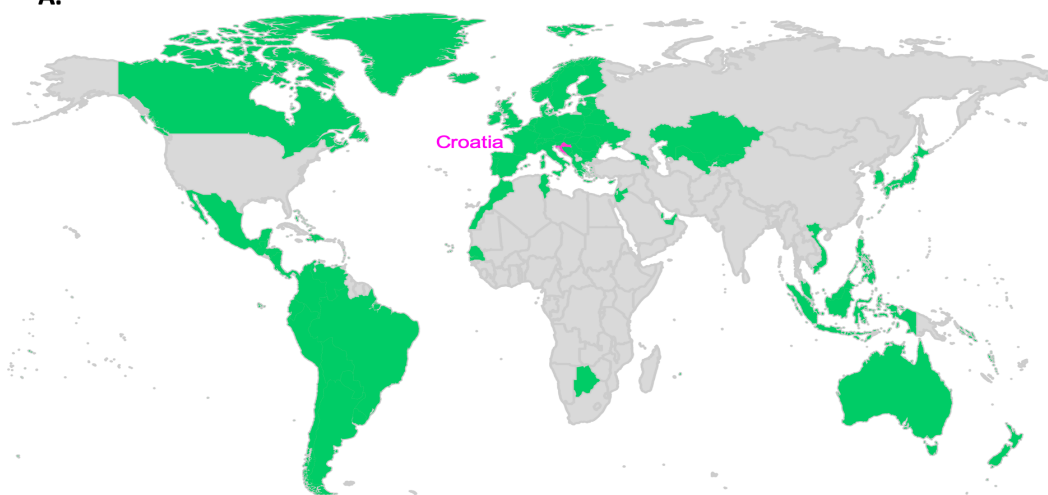
**Figure S2. Visa restrictions and lack of digital conferencing limit scientific career development.** Short-term visitor visa requirements for researchers who are citizens of A) Croatia, B) Chile, C) Pakistan, D) United States E) Tanzania, F) Singapore and G) India. Researchers who are citizens of these countries (in pink) can only travel (short-term for a conference) to select countries (in green) without applying for a visa. Pink color indicates country of citizenship, green color indicates countries researchers can visit without applying for a visa, gray regions indicate that visa required to travel (Data Source (42)).
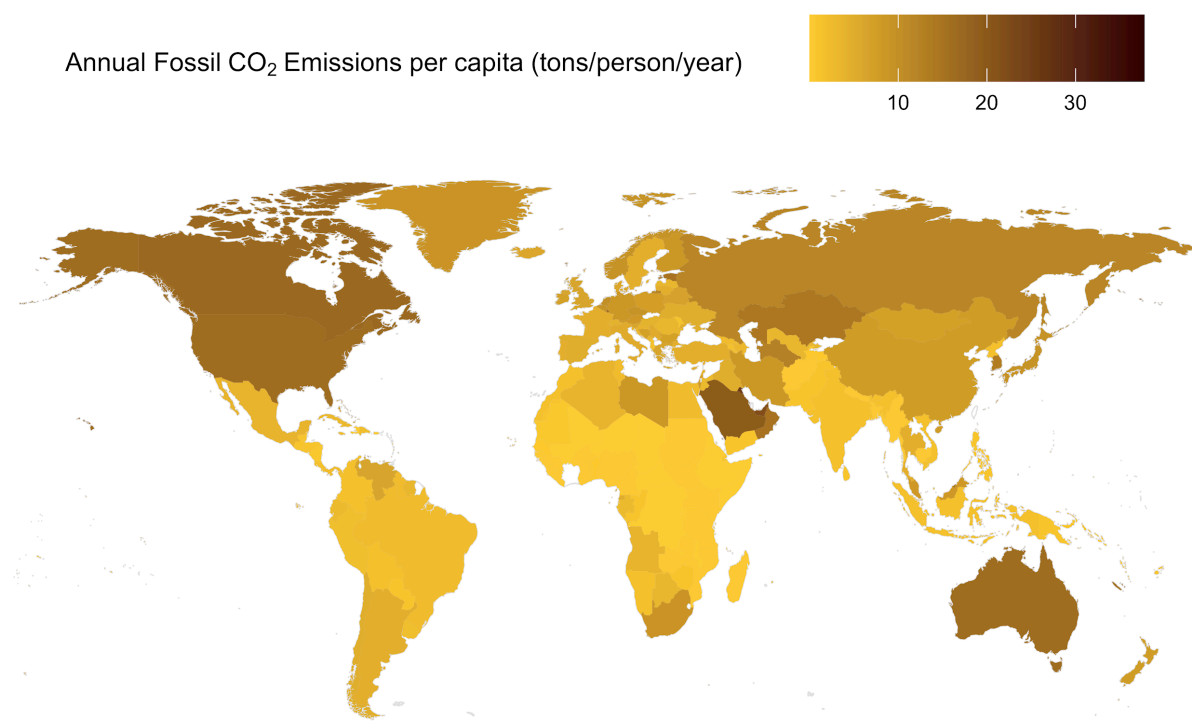
**Figure S3.** The Annual Fossil $CO_2$ Emission per capita: Qatar at 47.8 tons of $CO_2$ per capita, United States at 16.4 tons of $CO_2$ per capita (more than three times the global per capita average), and China at 7.4 tons per capita are amongst the highest emitting countries. Data shown here is for the year 2017 (Data Source (33)).

**References**

8.          Improving Conferences: A database for scientific conferences and their key features [Internet]. [cited 2020 Mar 13]. Available from: https://elifeambassadors.github.io/improving-conferences/

33.          atomsfair-Climate-friendly air travel [Internet]. Available from: https://www.atmosfair.de/en/offset/flight/

42.          The Henley & Partners Passport Index [Internet]. Available from: https://www.henleyglobal.com/henley-passport-index/

65.          Neuromatch: An online conference in Computational Neuroscience [Internet]. 2020 [cited 2020 Mar 31]. Available from: https://neuromatch.io/

89.          The World Bank-All Countries and Economies [Internet]. Available from: https://data.worldbank.org/indicator/PA.NUS.PRVT.P

146.          American Chemical Society National Meeting and Expo-Attendee Demographics [Internet]. 2019. Available from: https://www.acs.org/content/acs/en/meetings/national-meeting/exhibitors/attendee-demographics.html