

Tenth International Conference on Climate Change: Impacts & Responses

Engaging with Policy on Climate Change

20-21 APRIL 2018 | UNIVERSITY OF CALIFORNIA AT BERKELEY | BERKELEY, USA | ON-CLIMATE.COM



Tenth International Conference on **Climate Change: Impacts & Responses**

“Engaging with Policy on Climate Change”

20–21 April 2018 | University of California at Berkeley | Berkeley, USA



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 COMMON GROUND

Tenth International Conference on Climate Change: Impacts & Responses

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Designed by Ebony Jackson
Cover image by Phillip Kalantzis-Cope



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Dear Delegates,

Welcome to Berkeley and the Tenth International Conference on Climate Change: Impacts & Responses. We are so pleased you can join us.

Over more than three decades, Common Ground Research Networks has given voice to many thousands of speakers and authors — people with things to say about the world, and saying them in order to change the world.

We have a strong commitment to providing opportunities for these people to interact, converse, and learn from each other. This conference brings together researchers, practitioners, and scholars from a wide range of disciplines who have a shared interest in the themes and concerns of the Climate Change: Impacts & Responses Research Network. As a result, topics are broached from a variety of perspectives, interdisciplinary methods are applauded, and mutual respect and collaboration are encouraged. We talk, learn, get inspired - but these conversations fade with time.

We are excited to begin a new era. We are introducing CGScholar, a semantically aware environment for knowledge working and learning, to develop a “help economy” where peers are credited for their mutual contributions in the Climate Change Research Network. We encourage all conference participants to explore CGScholar - an online place for intellectual interaction and imagination.

In these and other ways, Common Ground aims to extend the legacy of its first decades well into the twenty-first century—as an organization deeply engaged with the critical questions of our time, and as a media innovator, we are creating the spaces and technical conditions in which, collectively, we can discuss the role of climate change.

Thank you to everyone who has put such a phenomenal amount of work into preparing for this conference. I’d particularly like to thank my Climate Change Research Network colleagues, including Patricija Kirvaitis, Kimberly Kendall, and McCall Macomber, who have put such a significant amount of work into this conference.

We wish you all the best for this conference, and we hope it will provide you every opportunity for dialogue with colleagues from around the corner and around the globe.

Best wishes,

Phillip Kalantzis-Cope, PhD
Chief Social Scientist
Common Ground Research Networks



Our Mission

Common Ground Research Networks aims to enable all people to participate in creating collaborative knowledge and to share that knowledge with the greater world. Through our academic conferences, peer-reviewed journals and books, and innovative software, we build transformative research networks and provide platforms for meaningful interactions across diverse media.

Our Message

Heritage knowledge systems are characterized by vertical separations—of discipline, professional association, institution, and country. Common Ground identifies some of the pivotal ideas and challenges of our time and builds research networks that cut horizontally across legacy knowledge structures. Sustainability, diversity, learning, the future of the humanities, the nature of interdisciplinarity, the place of the arts in society, technology's connections with knowledge, the changing role of the university—these are deeply important questions of our time which require interdisciplinary thinking, global conversations, and cross-institutional intellectual collaborations. Common Ground is a meeting place for these conversations, shared spaces in which differences can meet and safely connect—differences of perspective, experience, knowledge base, methodology, geographical or cultural origins, and institutional affiliation. We strive to create the places of intellectual interaction and imagination that our future deserves.

Our Media

Common Ground creates and supports research networks through a number of mechanisms and media. Annual conferences are held around the world to connect the global (the international delegates) with the local (academics, practitioners, and community leaders from the host research network). Conference sessions include as many ways of speaking as possible to encourage each and every participant to engage, interact, and contribute. The journals and book imprint offer fully-refereed academic outlets for formalized knowledge, developed through innovative approaches to the processes of submission, peer review, and production. The research network also maintains an online presence—through presentations on our YouTube channel, quarterly email newsletters, as well as Facebook and Twitter feeds. And Common Ground's own software, **Scholar**, offers a path-breaking platform for online discussions and networking, as well as for creating, reviewing, and disseminating text and multi-media works.

Climate Change: Impacts & Responses Research Network

Exploring scientific, policy, and strategic perspectives on the impacts of, and responses to, climate change



The Climate Change: Impacts & Responses Research Network is brought together around a common concern for the science of, and social responses to, climate change. The research network interacts through an innovative, annual face-to-face conference, as well as year-round online relationships, a family of peer reviewed journals, and book imprint—exploring the affordances of the new digital media.

Conference

The Climate Change: Impacts & Responses Conference is built upon four key features: Internationalism, Interdisciplinarity, Inclusiveness, and Interaction. Conference delegates include leaders in the field as well as emerging scholars, who travel to the conference from all corners of the globe and represent a broad range of disciplines and perspectives. A variety of presentation options and session types offer delegates multiple opportunities to engage, to discuss key issues in the field, and to build relationships with scholars from other cultures and disciplines.

Publishing

The Climate Change: Impacts & Responses Research Network enables members to publish through two media. First, research network members can enter a world of journal publication unlike the traditional academic publishing forums—a result of the responsive, non-hierarchical, and constructive nature of the peer review process. *The International Journal of Climate Change: Impacts and Responses* provides a framework for double-blind peer review, enabling authors to publish into an academic journal of the highest standard. The second publication medium is through the book imprint, Climate Change: Impacts & Responses, publishing cutting edge books in print and digital formats. Publication proposals and manuscript submissions are welcome.

Research Network

The Climate Change: Impacts & Responses Research Network offers several opportunities for ongoing communication among its members. Any member may upload video presentations based on scholarly work to the research network YouTube channel. Quarterly email newsletters contain updates on conference and publishing activities as well as broader news of interest. Join the conversations on Facebook and Twitter. Or explore our new social media platform, **Scholar**.



What is evidence is there of climate change?

Theme 1: Scientific Evidence

- Paleoclimatology: the earth's climate in a long view
- Climate change today: examining the data
- Ice cap reduction and glacial melt
- Sea level change
- Floods, drought, forest fires, hurricanes, and other sporadic events
- Albedo or measuring the earth's reflectiveness
- Meteorology and climate informatics
- Equilibria and disequilibria: change processes and countervailing tendencies
- Climate measurement processes, methodologies, and technologies
- Reading complex, dynamic, and unstable systems
- Developing local and global climate models
- Change scenarios: slow, rapid, abrupt, or episodic

What are the impacts of climate change on natural environments?

Theme 2: Assessing Impacts in Divergent Ecosystems

- Ocean currents and el Niño
- Riverine ecosystem impacts
- Mountain ecosystem impacts
- Coastal ecosystem impacts
- Marine ecosystem impacts
- Forest and grassland ecosystem impacts
- Impacts on wilderness and protected areas
- Impacts on specific biomes
- Impacts on biodiversity, potential extinctions
- Hardiness zone migration
- Regional variations: temperature and rainfall





What evidence is there that human activity has contributed to climate change, and what are the impacts of climate change on human life?

How do scientists, technologies, policy makers, and community members respond to climate change?

Theme 3: Human Impacts and Impacts on Humans

- Anthropogenic factors in climate change: determining the relative contribution of natural and human causes
- Impacts of carbon dioxide and other greenhouse gases
- Land use patterns, agriculture, and livestock husbandry and deforestation as factors in climate change
- Impacts on humans: agriculture, fish stocks, food supply, health
- Human settlements and sea level rise
- Impacts on humans: water supply, desertification
- Impacts on humans of intense weather events, natural disasters, and ecological surprises
- Impacts of climate change in the developing world

Theme 4: Technical, Political, and Social Responses

- Environmental policies in response to climate change
- Controversy and denial: politics, the media, and scientists with dissenting views
- The international politics of climate change
- The past, present, and future of international agreements
- Education and awareness for management of global climate change
- Protected areas and preservation of biodiversity: “corridorizing” and other strategies
- Strategies for sustainability
- Human adaptive strategies
- Technologies of mitigation: carbon dioxide sequestration, solar shades, and other processes
- Alternative and renewable energy sources: technologies, policies, and strategies
- Carbon taxes, offsets, and trading
- Emission standards
- Climate ethics and the precautionary principle
- Eco-development, eco-efficiency



Climate Change: The Evidence

What is to be done?

Climate is one of the pivotal and dynamic forces in the natural history of the earth. Paleoclimatology provides us a long view of the ebb and flow of climate change, and a framework within which to interpret its ecosystemic consequences. In some times and places climate change explains processes of biodiversification, in other times and places a reduction in biodiversity. In this long view, the history of life on earth is integrally related to climatological history.

For the first time in natural history, the conscious actions of one creature—homo sapiens—have come to influence the course of earth's natural history, not just in local ecosystems, but on a planetary scale. This has been the case since humans began a process of populating the whole earth about one hundred thousand years ago. Ecosystems were revolutionized by the sustained yield harvesting technologies of hunters and gathers, then the farming and animal husbandry technologies of self-sufficient peasantries, and most recently and most intensively by the global division of labor of the industrial revolution, market-directed agriculture, the widespread clearing and harvesting of forests, and the use of fossil fuels.

It is now widely accepted that the most recent phase of human society has had an impact on the earth's climate. Greenhouse gases are heating up the earth. Ice that was permanent until recently is rapidly melting. Sea levels are rising. Extreme weather events are occurring with greater frequency. Different regions are affected by these changes in different ways.

Some of the changes we are experiencing today may be part of the course of natural history. Other changes, many scientists agree, are the byproduct of human activity. Key questions include: How do we measure and explain these changes? What are their immediate and likely future impacts? And what is to be done? These are questions of practical concern and growing urgency.

Ecosystemic Impacts

What are the impacts on ecosystems, communities, species and genetic diversity?

There is today the potential for disastrous impacts on ecosystems, communities, species, and genetic diversity that could well lead to mass extinctions in a relatively brief period. For instance, the special effects of glacial melt on mountain and riverine biodiversity and that of sea level rise on coastal and mangrove systems raise concerns for the future of biodiversity. The effect of climate change on coral reefs is already a major concern. Increased rainfall variability (in especially monsoon regions) could dry up or expand wetlands temporarily which in both scenarios would be disastrous.

The most affected ecosystems will undoubtedly be situated in mountains, forests (especially evergreen types), grasslands, deserts, and wetlands. Glacial, riverine, and coastal ecosystems will also be altered. Knowledge currently available by simulating possible changes in Dynamic Global Vegetation models clearly demonstrates that there will be further species loss. Many species ill-adapted to environmental disturbances may vanish without a trace before scientists can detect decline.

The specific regional impacts on biomes and the vulnerabilities of different ecosystems across the globe need to be assessed. There are parallels between some areas, while there are subtle and complex dissimilarities between the changes that are occurring in different parts of the world. These include floods, drought, forest fires, hurricanes, and other sporadic events that could devastate endemic species and threaten microhabitats.





Some ecosystems could be highly vulnerable and will not be able to respond even to short term impacts such as natural disasters. In the presence of climate change, these short term events could be even more cataclysmic. The possible impacts of invasive alien species that will spread due to climatic change are very little understood and could be devastating.

The possibility of “ecological surprises” in sensitive areas also needs to be addressed. Extreme weather events could be especially damaging. Thus, there is a great need for scientists and practitioners to be brought on a common platform that will at least reduce the ill effects on species ecosystems and protected areas.

Human Impacts

How have we been agents of climate change? How will we be impacted by climate change?

Humans are agents in climate change due to their production of greenhouse gases and their patterns of land use. Humans will also be affected by climate change in many ways: including shifting shorelines, declining agricultural productivity, crisis of food supply, availability of water, the health of populations, and extreme weather events. For instance, environment related diseases could spread rapidly in epidemic proportions with changes in water availability and quality.

These impacts will be felt differentially in developed and developing worlds. Marginalized populations of people may not only have their lives and livelihoods affected, but also be affected by declines in species abundance and diversity of ecosystems upon which they are dependent at a landscape level. In heterogeneous landscapes with a mix of wilderness islands within a changing agricultural environment, urbanization, and industrial spread could well increase pressures on protected area networks as the effects of climatic changes increase. Agricultural communities, especially traditional farmers and pastoralists, may be forced to shift into what is now within the protected area networks in developing countries.

Framing Responses

How do we impact the future course of natural history?

This peculiar creature in natural history, homo sapiens, is increasingly being recognized by scientists to be an agent of climate change, though the precise mix of natural and human causes has yet to be determined. With conscious agency lacking in other species comes a unique species responsibility for the future course of natural history.

On the experience of the past one hundred thousand years, humans are clearly capable of adaptive responses. Our species has the capacity or can develop the capacity to nurture nature through a period of transition, for instance by creating corridors to assist species adaptation and inventing new agricultures which alleviate and mitigate the effects of climate change. Humans are also capable of precautionary action, reducing greenhouse gases for instance as part of a broader strategy of sustainable development. We may even be able to master technologies which balance and stabilize climate change.

The key, however, will be the extent to which our species can take a proactive role, be that technological or social and political acts will that produce changed patterns of land and energy use. Like no other creature in natural history, and like no other time in this creature's history, this is the moment when the future of the planet is in our hands. The consciousness which made us a unique species perhaps a hundred thousand years ago, for the first time today puts us in a position of unprecedented responsibility for the course of natural history. Climate change is a key intellectual and practical challenge for today's science, economics, politics, sociology, and ethics.



About

The Climate Change: Impacts & Responses Research Network is dedicated to the concept of independent, peer-led groups of scholars, researchers, and practitioners working together to build bodies of knowledge related to topics of critical importance to society at large. Focusing on the intersection of academia and social impact, the Climate Change: Impacts & Responses Research Network brings an interdisciplinary, international perspective to discussions of new developments in the field, including research, practice, policy, and teaching.

Membership Benefits

As a Climate Change: Impacts & Responses Research Network member you have access to a broad range of tools and resources to use in your own work:

- Digital subscription to *The International Journal of Climate Change: Impacts and Responses* for one year.
- Digital subscription to the book imprint for one year.
- One article publication per year (pending peer review).
- Participation as a reviewer in the peer review process, with the opportunity to be listed as a Reviewer.
- Subscription to the network e-newsletter, providing access to news and announcements for and from the Research Network.
- Option to add a video presentation to the network YouTube channel.
- Free access to the **Scholar** social knowledge platform, including:
 - ◊ Personal profile and publication portfolio page
 - ◊ Ability to interact and form communities with peers away from the clutter and commercialism of other social media
 - ◊ Optional feeds to Facebook and Twitter
 - ◊ Complimentary use of **Scholar** in your classes—for class interactions in its Community space, multimodal student writing in its Creator space, and managing student peer review, assessment, and sharing of published work





Engage through Social Media



www.facebook.com/OnClimate



[@onclimate](https://twitter.com/onclimate) | [#CCIR18](https://twitter.com/hashtag/CCIR18)

Present and Participate in the Conference

You have already begun your engagement in the research network by attending the conference, presenting your work, and interacting face-to-face with other members. We hope this experience provides a valuable source of feedback for your current work and the possible seeds for future individual and collaborative projects, as well as the start of a conversation with research network colleagues that will continue well into the future.

Publish Journal Articles or Books

We encourage you to submit an article for review and possible publication in the journal. In this way, you may share the finished outcome of your presentation with other participants and members of the research network. As a member of the network, you will also be invited to review others' work and contribute to the development of the research network knowledge base as a Reviewer. As part of your active membership in the research network, you also have online access to the complete works (current and previous volumes) of the journal and to the book imprint. We also invite you to consider submitting a proposal for the book imprint.



The principal role of the Advisory Board is to drive the overall intellectual direction of the Climate Change: Impacts & Responses Research Network and to consult on our foundational themes as they evolve along with the currents of the field. Board members are invited to attend the annual conference and provide important insights on conference development, including suggestions for speakers, venues, and special themes. We also encourage board members to submit articles for publication consideration to *The International Journal of Climate Change: Impacts and Responses* as well as proposals or completed manuscripts to the Climate Change Book Imprint.

We are grateful for the continued service and support of the following world-class scholars and practitioners.

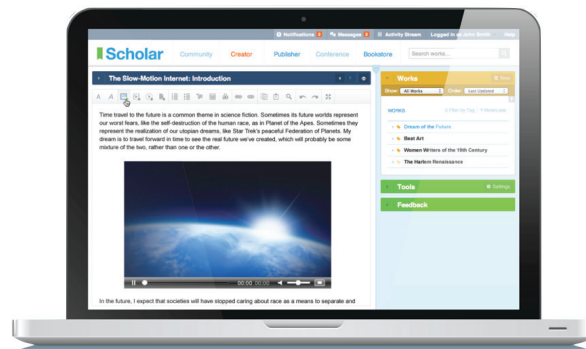
- **Alison Anderson**, University of Plymouth, Plymouth, UK
- **Tapan Chakrabarti**, Chairman, Department of Biotechnology Task Force on Biodiversity Conservation and Environment, National Environmental Engineering Research Institute (NEERI), Nagpur, India
- **Gowtam Raj Chintaram**, Executive Chairman, ANPRAS /Earth-Mauritius, Port Louis, Mauritius
- **Amar Galla**, Executive Director, International Institute for the Inclusive Museum
- **Candice Howarth**, Global Sustainability Institute, Anglia Ruskin University, Cambridge, UK
- **David Humphreys**, The Open University, UK
- **Thomas Krafft**, Geomed Research Corporation, Bad Honnef, Germany
- **Mordechai Shechter**, University of Haifa, Haifa, Israel
- **Gordon Wilson**, The Open University, Milton Keynes, UK
- **Zhijua Zhang**, Deputy Director of Polar Climate and Environment Library, Beijing Normal University, Beijing, China



A Social Knowledge Platform

Create Your Academic Profile and Connect to Peers

Developed by our brilliant Common Ground software team, **Scholar** connects academic peers from around the world in a space that is modulated for serious discourse and the presentation of knowledge works.



Utilize Your Free Scholar Membership Today through

- Building your *academic profile* and list of published works.
- Joining a community with a *thematic or disciplinary focus*.
- Establishing a new Research Network *relevant to your field*.
- Creating *new academic work* in our innovative publishing space.
- Building a *peer review network* around your work or courses.

Scholar Quick Start Guide

1. Navigate to <http://cgscholar.com>. Select [**Sign Up**] below 'Create an Account'.
2. Enter a "**blip**" (a very brief one-sentence description of yourself).
3. Click on the "**Find and join communities**" link located under the YOUR COMMUNITIES heading (On the left hand navigation bar).
4. Search for a community to join or create your own.

Scholar Next Steps – Build Your Academic Profile

- **About:** Include information about yourself, including a linked CV in the top, dark blue bar.
- **Interests:** Create searchable information so others with similar interests can locate you.
- **Peers:** Invite others to connect as a peer and keep up with their work.
- **Shares:** Make your page a comprehensive portfolio of your work by adding publications in the Shares area - be these full text copies of works in cases where you have permission, or a link to a bookstore, library or publisher listing. If you choose Common Ground's hybrid open access option, you may post the final version of your work here, available to anyone on the web if you select the 'make my site public' option.
- **Image:** Add a photograph of yourself to this page; hover over the avatar and click the pencil/edit icon to select.
- **Publisher:** All Common Ground community members have free access to our peer review space for their courses. Here they can arrange for students to write multimodal essays or reports in the Creator space (including image, video, audio, dataset or any other file), manage student peer review, co-ordinate assessments, and share students' works by publishing them to the Community space.

A Digital Learning Platform

Use **Scholar** to Support Your Teaching

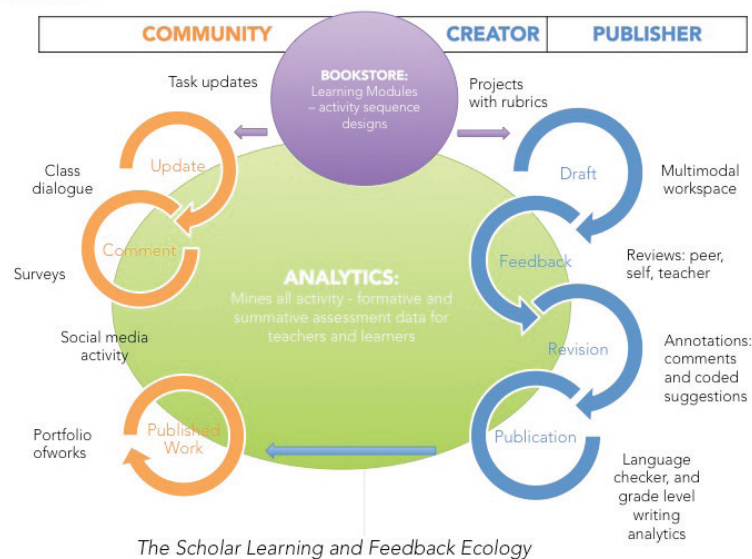
Scholar is a social knowledge platform that *transforms the patterns of interaction in learning by putting students first*, positioning them as knowledge producers instead of passive knowledge consumers. **Scholar** provides scaffolding to encourage making and sharing knowledge drawing from multiple sources rather than memorizing knowledge that has been presented to them.

Scholar also answers one of the most fundamental questions students and instructors have of their performance, “How am I doing?” Typical modes of assessment often answer this question either too late to matter or in a way that is not clear or comprehensive enough to meaningfully contribute to better performance.

A collaborative research and development project between Common Ground and the College of Education at the University of Illinois, **Scholar** contains a Research Network space, a multimedia web writing space, a formative assessment environment that facilitates peer review, and a dashboard with aggregated machine and human formative and summative writing assessment data.

The following **Scholar** features are only available to Common Ground Research Network members as part of their membership. Please email us at support@cgscholar.com if you would like the complimentary educator account that comes with participation in a Common Ground conference.

- Create projects for groups of students, involving draft, peer review, revision, and publication.
- Publish student works to each student’s personal portfolio space, accessible through the web for class discussion.
- Create and distribute surveys.
- Evaluate student work using a variety of measures in the assessment dashboard.



Scholar is a generation beyond learning management systems. It is what we term a *Digital Learning Platform*—it transforms learning by engaging students in powerfully horizontal “social knowledge” relationships. **For more information, visit: <http://knowledge.cgscholar.com>.**

Climate Change: Impacts & Responses Journal

Committed to being a definitive resource for discussions of evidence of climate change: its causes, its eco-systemic and human impacts, and strategic responses



About

The International Journal of Climate Change: Impacts and Responses seeks to create an interdisciplinary forum for discussion of evidence of climate change, its causes, its eco-systemic impacts, and its human impacts. The journal also explores technological, policy, strategic, and social responses to climate change.

The International Journal of Climate Change: Impacts and Responses is peer-reviewed, supported by rigorous processes of criterion-referenced article ranking and qualitative commentary, ensuring that only intellectual work of the greatest substance and highest significance is published.

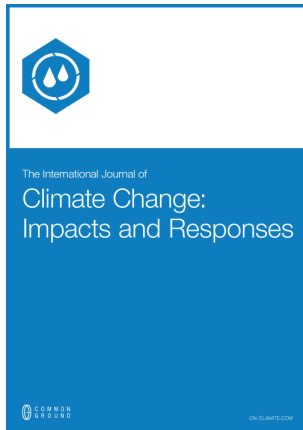
Editor



Candice Howarth, Senior Research Fellow and Knowledge Integrator, University of Surrey, UK

Reviewers

Articles published in *The International Journal of Climate Change: Impacts and Responses* are peer reviewed by scholars who are active members of the Climate Change: Impacts & Responses Research Network. Reviewers may be past or present conference delegates, fellow submitters to the journal, or scholars who have volunteered to review papers (and have been screened by Common Ground's editorial team). This engagement with the Research Network, as well as Common Ground's synergistic and criterion-based evaluation system, distinguishes the peer review process from journals that have a more top-down approach to refereeing. Reviewers are assigned to papers based on their academic interests and scholarly expertise. In recognition of the valuable feedback and publication recommendations that they provide, reviewers are acknowledged as Reviewers in the volume that includes the paper(s) they reviewed. Thus, in addition to *The International Journal of Climate Change: Impacts and Responses* Editors and Advisory Board, the Reviewers contribute significantly to the overall editorial quality and content of the journal.



Indexing

CAB Direct
China National Knowledge Infrastructure (CNKI Scholar)
Environment Index (EBSCO)
Environment Complete (EBSCO)
The Australian Research Council (ERA)
Ulrich's Periodicals Index

DOI

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2009

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Network Website:

on-climate.com



The Publication Process

Our long-time authors are no-doubt familiar with using our CGPublisher system to submit and track the progress of articles for publication. After fifteen years of dependable service, we are making preparations to give CGPublisher a well-deserved retirement. As we preparing for this exciting change, some of the familiar processes will be changing. Authors will still receive messages throughout each phase of the publication process and can contact support@cgnetworks.org with any questions or concerns.

Step 1: Review the Requirements

All article submissions must meet the Article Requirements listed on our Author Guidelines page: <http://cgnetworks.org/support/author-guidelines>. Before submitting your article, please thoroughly review these requirements, and revise your article to follow these rules. Initial submissions that do not meet these requirements will be returned to the author(s) for revision.

Step 2: Upload the Submission

Once you have revised your initial submission to meet the article requirements, please visit our Article Submission page: <http://cgnetworks.org/support/submit>.

Step 3: Checking Progress

Once your article is received, you will receive updates on the status of its progress. During this time, legacy submissions will continue to be managed in CGPublisher while newer submissions will be managed internally by the editorial staff. Authors of both newer and legacy submissions will continue to receive status updates on the progress of their article.

- CGPublisher users can see the status an article by logging into CGPublisher at www.cgpublisher.com and status updates will be sent via email from cgpublisher.com.
- Authors of newer submissions can learn the status an article by contacting articlestatus@cgnetworks.org and status updates will be sent via email from articlestatus@cgnetworks.org.

Step 4: Initial Submission Accepted for Peer Review

Submitted articles are then verified against the Article Requirements (listed in the Author Guidelines). If your article satisfies these requirements, your identity and contact details are then removed, and the article is matched to two appropriate referees and sent for review. Please note, during this time authors are eligible to be selected as a reviewer for other articles in this same stage. Full details regarding the rules, expectations, and policies on peer review can be found on our Publication Ethics page listed under the Peer Review Policies section and our Publication Ethics and Malpractice Statement section: <http://cgnetworks.org/journals/publication-ethics>.

Step 5: Peer Review Decision

When both referee reports are returned, and after the referees' identities have been removed, you will be notified by email and provided with the reviewer reports. Articles that have been rejected once in the peer review process are allowed a second opportunity to be reviewed by two new reviewers. To be reviewed by two new reviewers, you will need to make revisions based on the comments and feedback of the first round of review, and these changes must be detailed using a change note: <http://cgnetworks.org/support/change-note-journal-article>. If an article is not accepted by peer review after this second opportunity, it will be withdrawn from consideration.

Step 6: Membership Confirmation

If your article has been accepted or accepted with revisions, it will enter the membership confirmation stage. We require at least one author associated with the article to have a unique Network Membership or Conference registration: <http://cgnetworks.org/support/register-for-a-membership>. Please note, a paid conference registration includes a complimentary Research Network Membership, which will allow you to skip this step.





Step 7: Publication Agreement

Next you will be asked to accept the Publishing Agreement. If you are interested in Hybrid Open Access, this step is the best time to register for Open Access Publication: <http://cgnetworks.org/journals/hybrid-open-access>.

Step 8: Prepare the Final Submission

After the publication agreement is final, you will have thirty days to complete any revisions to your final submission and return your article. Please ensure your final submission meets the Final Submission Requirements before returning your article: <http://cgnetworks.org/support/final-submission-downloads-and-guides>. This includes such criteria as the correct use of the Chicago Manual of Style (seventeenth edition) and the other listed requirements: <http://cgnetworks.org/support/chicago-manual-of-style-citations-quick-guide>. Articles that have been accepted with revisions will require a change note to be included with the final submission. Articles that do not meet these requirements will be returned for revision until these requirements are satisfied.

Step 9: Final Checks (“Ready for Typesetting” in CGPublisher)

Once we have received the final submission of your article, our Publishing Department will give your article a final review. During this step, CGPublisher users will see a workflow status listed as “Ready for Typesetting,” indicating that the final submission is ready for inspection.

Step 10: Copy Editing and Proof Inspection

If the final submission meets the Final Submission Requirements, the article will enter Copy Editing. During Copy Editing, our editorial staff will note minor problems with citations, references, grammar, spelling, or formatting. The author(s) will be responsible for correcting these noted problems. Careful adherence to the article template and the citation style guide will greatly minimize the need for corrections. After all copy editing notes have been resolved, we will create a typeset proof for the author(s) to inspect.

Step 11: Article Publication

Individual articles are published “Web First” to our CG Scholar Bookstore: <https://cgscholar.com/bookstore>. After web-first publication, complete journal issues follow annually, biannually, or quarterly depending on the journal. Web-first published articles include a full citation and a registered DOI permalink. Be sure to keep your CG Scholar profile up-to-date (<https://cgscholar.com/identity>) and add your ORCID iD (<https://orcid.org/register>) to maximize your article visibility.

Submission Timeline

You may submit your article for publication to the journal at any time throughout the year. The rolling submission deadlines are as follows:

- Submission Round One – 15 January
- Submission Round Two – 15 April
- Submission Round Three – 15 July
- Submission Round Four – 15 October

Note: If your article is submitted after the final deadline for the volume, it will be considered for the following year’s volume. The sooner you submit, the sooner your article will begin the peer review process. Also, because we publish “Web First,” early submission means that your article will be published with a full citation as soon as it is ready, even if that is before the full issue is published.



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International Award for Excellence

The International Journal of Climate Change: Impacts and Responses presents an annual International Award for Excellence for new research or thinking in the areas of evidence of climate change, its causes, its ecosystemic impacts, and its human impacts as well as technological, policy, strategic, and social responses to climate change. All articles submitted for publication in *The International Journal of Climate Change: Impacts and Responses* are entered into consideration for this award. The winning article is selected from the ten highest-ranked articles emerging from the review process and according to the selection criteria outlined in the reviewer guidelines.

Award Winners, Volume No. 9

Judith Burnside-Lawry, Senior Lecturer, RMIT University, Melbourne, Australia

Morgan Wairiu, Deputy Director, Pacific Centre for Environment and Sustainable Development (PaCE-SD), The University of the South Pacific, Suva, Fiji

Elisabeth Holland, Director, (PaCE-SD), The University of the South Pacific, Suva, Fiji

Sarika Chand, Communications Officer, (PaCE-SD), The University of the South Pacific, Suva, Fiji

Rosa Fraquet, Professor, Universitat Autònoma de Barcelona, Bellaterra, Spain

For the Article

“Communication, Collaboration and Advocacy: A Study of Participatory Action Research to Address Climate Change in the Pacific,” *The International Journal of Climate Change: Impacts and Responses*, Volume 9, Issue 4, pp. 11–33

Abstract

The science of climate change is a complex issue that presents challenges for regions, nations, local governments, and communities. This article describes a participatory action research project designed to develop new knowledge of how community members react to climate change and communication’s role in strengthening local resilience. The project has grown organically from an initial study, undertaken by one researcher to examine communication of climate change at the local level, into an intersectoral, interagency study. Partners in the study are connected by one vision: to facilitate grassroots, upward planning of sustainable climate change adaptation led by local end-users, and to amplify the Pacific Island Countries perspective of climate change to the world. The study’s theoretical framework draws upon literature from international development, communication, social science, and public policy. A qualitative case study examines whether the use of a reflexive, communicative approach can facilitate cross-sector interaction between climate scientists, policy makers, and local end-users to plan, implement and evaluate sustainable approaches to climate change. The case provides an example of applying participatory action research (PAR) as a way to communicate complex climate science by using specific context and evidence-based local experiences. The study demonstrates how the use of participatory action research has fostered the creation of horizontal and vertical multi-sector networks that have improved communication of climate science, and collaboration amongst all partners-including local end-users-and strengthened local advocacy in climate-related policy and planning decisions for the Pacific. This study demonstrates the potential of PAR as a method for reducing disconnect between science-policy-local interaction, and to build local and global intersectoral collaboration. Evidence-based research shows the linkages between theory and practice for organizations tasked with building community resilience. This innovative synthesis can aid in building PAR-led climate change adaptation across prevention, preparation and adaptation activities for potential climate related hazards. Findings from this study are relevant to communities building resilience.



Network Membership and Personal Subscriptions

As part of each conference registration, all conference participants (both virtual and in-person) have a one-year digital subscription to *The International Journal of Climate Change: Impacts and Responses*. This complimentary personal subscription grants access to both the current volume of the journal as well as the entire backlist. The period of complimentary access begins at the time of registration and ends one year after the close of the conference. After that time, delegates may purchase a personal subscription.

To view articles, go to <https://cgscholar.com/bookstore> and select the “Sign in” option. An account in CG Scholar has already been made on your behalf; the username/email and password are identical to your CG Publisher account. After logging into your account, you should have free access to download electronic articles in the bookstore. If you need assistance, select the “help” button in the top-right corner, or contact support@cgscholar.com.

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For more information, please visit:

- <http://on-climate.com/journal/hybrid-open-access>
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Download the Library Recommendation form from our website to recommend that your institution subscribe to *The International Journal of Climate Change: Impacts and Responses*: <http://cgnetworks.org/support/recommend-a-subscription-to-your-library>.

Climate Change: Impacts & Responses Book Imprint

Aiming to set new standards in participatory knowledge creation and scholarly publication



Call for Books

Common Ground is setting new standards of rigorous academic knowledge creation and scholarly publication. Unlike other publishers, we're not interested in the size of potential markets or competition from other books. We're only interested in the intellectual quality of the work. If your book is a brilliant contribution to a specialist area of knowledge that only serves a small intellectual community, we still want to publish it. If it is expansive and has a broad appeal, we want to publish it too, but only if it is of the highest intellectual quality.

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- Out-of-copyright books, including important books that have gone out of print and classics with new introductions

Book Proposal Guidelines

Books should be between 30,000 and 150,000 words in length. They are published simultaneously in print and electronic formats and are available through Amazon and as Kindle editions. To publish a book, please send us a proposal including:

- Title
- Author(s)/editor(s)
- Draft back-cover blurb
- Author bio note(s)
- Table of contents
- Intended audience and significance of contribution
- Sample chapters or complete manuscript
- Manuscript submission date

Proposals can be submitted by email to books@cgnetworks.org. Please note the book imprint to which you are submitting in the subject line.



Call for Book Reviewers

Common Ground Research Networks is seeking distinguished peer reviewers to evaluate book manuscripts.

As part of our commitment to intellectual excellence and a rigorous review process, Common Ground sends book manuscripts that have received initial editorial approval to peer reviewers to further evaluate and provide constructive feedback. The comments and guidance that these reviewers supply is invaluable to our authors and an essential part of the publication process.

Common Ground recognizes the important role of reviewers by acknowledging book reviewers as members of the Editorial Review Board for a period of at least one year. The list of members of the Editorial Review Board will be posted on our website.

If you would like to review book manuscripts, please send an email to books@cgnetworks.org with:

- A brief description of your professional credentials
- A list of your areas of interest and expertise
- A copy of your CV with current contact details

If we feel that you are qualified and we require refereeing for manuscripts within your purview, we will contact you.

Climate Change: Impacts & Responses Conference

Curating global interdisciplinary spaces, supporting professionally rewarding relationships



Conference History

Founded in 2008, the International Conference on Climate Change: Impacts and Responses aims to create an interdisciplinary forum for the discussion of evidence of climate change, its causes, its eco-systemic impacts, and its human impacts. The conference also explores technological, policy, strategic, and social responses to climate change.

The International Conference on Climate Change: Impacts and Responses is built upon four key features: Internationalism, Interdisciplinarity, Inclusiveness, and Interaction. Conference delegates include leaders in the field as well as emerging scholars, who travel to the conference from all corners of the globe and represent a broad range of disciplines and perspectives. A variety of presentation options and session types offer delegates multiple opportunities to engage, to discuss key issues in the field, and to build relationships with scholars from other cultures and disciplines.

Past Conferences

- 2009 - Bharati Vidyapeeth Institute of Environment Education and Research, Pune, India
- 2010 - University of Queensland, Brisbane, Australia
- 2011 - Rio De Janeiro, Brazil
- 2012 - University of Washington, Seattle, USA
- 2013 - Port-Louis, Mauritius
- 2014 - University of Iceland, Reykjavik, Iceland
- 2015 - UBC Robson Square in Vancouver, Canada
- 2016 - NU University of Science (HUS), Vietnam National University (VNU), Hanoi, Vietnam
- 2017 - Anglia Ruskin University, Cambridge, UK

Plenary Speaker Highlights

The International Conference on Climate Change: Impacts and Responses has a rich history of featuring leading and emerging voices from the field, including:

- Alison Anderson, Professor, University of Plymouth, Plymouth, UK (2011)
- Ken Anthony, Principal Research Scientist, University of Queensland, Brisbane, Australia (2010)
- Thomas Pedersen, Professor, University of Victoria, British Columbia, Canada (2015)
- Gavin Schmidt, Director, Goddard Institute for Space Studies at the National Aeronautics and Space Administration (NASA), USA (2015)



Past Partners

Over the years, the International Conference on Climate Change: Impacts and Responses has had the pleasure of working with the following organizations:



Bharati Vidyapeeth Institute of Environment Education and Research, Pune, India (2009)



Climate Impacts Group, University of Washington, Seattle, USA (2012)



College of the Environment, University of Washington, Seattle, USA (2012)



Globalism Institute, RMIT University, Melbourne, Australia (2009)



Global Sustainability Institute (GSI), Anglia Ruskin University (2017)



Pacific Institute for Climate Solutions
Knowledge. Insight. Action.

Pacific Institute for Climate Solutions, Vancouver, Canada (2015)



UNIVERSITY OF MAURITIUS

University of Mauritius, Mauritius (2013)



University of Queensland, Brisbane, Australia (2010)



VNU University of Science, Hanoi, Vietnam (2016)



Vietnam National University, Hanoi, Vietnam (2016)

Become a Partner

Common Ground Research Networks has a long history of meaningful and substantive partnerships with universities, research institutes, government bodies, and non-governmental organizations. Developing these partnerships is a pillar of our Research Network agenda. There are a number of ways you can partner with a Common Ground Research Network. Contact us at support@on-climate.com to become a partner.





Conference Principles and Features

The structure of the conference is based on four core principles that pervade all aspects of the research network:

International

This conference travels around the world to provide opportunities for delegates to see and experience different countries and locations. But more importantly, the Climate Change conference offers a tangible and meaningful opportunity to engage with scholars from a diversity of cultures and perspectives. This year, delegates from over 25 countries are in attendance, offering a unique and unparalleled opportunity to engage directly with colleagues from all corners of the globe.

Interdisciplinary

Unlike association conferences attended by delegates with similar backgrounds and specialties, this conference brings together researchers, practitioners, and scholars from a wide range of disciplines who have a shared interest in the themes and concerns of this network. As a result, topics are broached from a variety of perspectives, interdisciplinary methods are applauded, and mutual respect and collaboration are encouraged.

Inclusive

Anyone whose scholarly work is sound and relevant is welcome to participate in this research network and conference, regardless of discipline, culture, institution, or career path. Whether an emeritus professor, graduate student, researcher, teacher, policymaker, practitioner, or administrator, your work and your voice can contribute to the collective body of knowledge that is created and shared by this network.

Interactive

To take full advantage of the rich diversity of cultures, backgrounds, and perspectives represented at the conference, there must be ample opportunities to speak, listen, engage, and interact. A variety of session formats, from more to less structured, are offered throughout the conference to provide these opportunities.



Plenary

Plenary speakers, chosen from among the world's leading thinkers, offer formal presentations on topics of broad interest to the community and conference delegation. One or more speakers are scheduled into a plenary session, most often the first session of the day. As a general rule, there are no questions or discussion during these sessions. Instead, plenary speakers answer questions and participate in informal, extended discussions during their Garden Conversations.



Garden Conversation

Garden Conversations are informal, unstructured sessions that allow delegates a chance to meet plenary speakers and talk with them at length about the issues arising from their presentation. When the venue and weather allow, we try to arrange for a circle of chairs to be placed outdoors.



Talking Circles

Held on the first day of the conference, Talking Circles offer an early opportunity to meet other delegates with similar interests and concerns. Delegates self-select into groups based on broad thematic areas and then engage in extended discussion about the issues and concerns they feel are of utmost importance to that segment of the community. Questions like "Who are we?", "What is our common ground?", "What are the current challenges facing society in this area?", "What challenges do we face in constructing knowledge and effecting meaningful change in this area?" may guide the conversation. When possible, a second Talking Circle is held on the final day of the conference, for the original group to reconvene and discuss changes in their perspectives and understandings as a result of the conference experience. Reports from the Talking Circles provide a framework for the delegates' final discussions during the Closing Session.



Themed Paper Presentations

Paper presentations are grouped by general themes or topics into sessions comprised of three or four presentations followed by group discussion. Each presenter in the session makes a formal twenty-minute presentation of their work; Q&A and group discussion follow after all have presented. Session Chairs introduce the speakers, keep time on the presentations, and facilitate the discussion. Each presenter's formal, written paper will be available to participants if accepted to the journal.



Colloquium

Colloquium sessions are organized by a group of colleagues who wish to present various dimensions of a project or perspectives on an issue. Four or five short formal presentations are followed by a moderator. A single article or multiple articles may be submitted to the journal based on the content of a colloquium session.





Focused Discussion

For work that is best discussed or debated, rather than reported on through a formal presentation, these sessions provide a forum for an extended “roundtable” conversation between an author and a small group of interested colleagues. Several such discussions occur simultaneously in a specified area, with each author’s table designated by a number corresponding to the title and topic listed in the program schedule. Summaries of the author’s key ideas, or points of discussion, are used to stimulate and guide the discourse. A single article, based on the scholarly work and informed by the focused discussion as appropriate, may be submitted to the journal.



Workshop/Interactive Session

Workshop sessions involve extensive interaction between presenters and participants around an idea or hands-on experience of a practice. These sessions may also take the form of a crafted panel, staged conversation, dialogue or debate—all involving substantial interaction with the audience. A single article (jointly authored, if appropriate) may be submitted to the journal based on a workshop session.



Poster Sessions

Poster sessions present preliminary results of works in progress or projects that lend themselves to visual displays and representations. These sessions allow for engagement in informal discussions about the work with interested delegates throughout the session.



Virtual Lightning Talk

Lightning talks are 5-minute “flash” video presentations. Authors present summaries or overviews of their work, describing the essential features (related to purpose, procedures, outcomes, or product). Like Paper Presentations, Lightning Talks are grouped according to topic or perspective into themed sessions. Authors are welcome to submit traditional “lecture style” videos or videos that use visual supports like PowerPoint. Final videos must be submitted at least one month prior to the conference start date. After the conference, videos are then presented on the network YouTube channel. Full papers based in the virtual poster can also be submitted for consideration in the journal.



Virtual Poster

This format is ideal for presenting preliminary results of work in progress or for projects that lend themselves to visual displays and representations. Each poster should include a brief abstract of the purpose and procedures of the work. After acceptance, presenters are provided with a template and Virtual Posters are submitted as a PDF. Final posters must be submitted at least one month prior to the conference start date. Full papers based on the virtual poster can also be submitted for consideration in the journal.



Friday, 20 April

8:00–9:00	Conference Registration Desk Open
9:00–9:30	Conference Opening—Phillip Kalantzis-Cope, Common Ground Research Networks, Champaign, USA
9:30–10:05	Plenary Session—Jonathan Berkey, International Sustainable Development, Middlebury Institute of International Studies, Monterey, USA <i>"Renewable Energy Power Shift"</i>
10:05–10:35	Garden Conversation and Coffee Break
10:35–11:20	Talking Circles
11:20–11:30	Transition Break
11:30–12:45	Parallel Sessions
12:45–13:45	Lunch
13:45–15:25	Parallel Sessions
15:25–15:40	Coffee Break
15:40–16:55	Parallel Sessions
16:55–17:00	End of Sessions

Saturday, 21 April

8:30–9:00	Conference Registration Desk Open
9:00–9:15	Daily Update—Phillip Kalantzis-Cope, Common Ground Research Networks, Champaign, USA
9:15–9:50	Michel Gueldry, International Relations and Sustainability Studies, Middlebury Institute of International Studies, Monterey, USA <i>"Approaches and Strategies for Engaging Climate Change Skeptics - and Their Limits"</i>
9:50–10:20	Garden Conversation and Coffee Break
10:20–12:00	Parallel Sessions
12:00–13:00	Lunch
13:00–13:45	Parallel Sessions
13:45–14:00	Transition
14:00–15:40	Parallel Sessions
15:40–15:55	Transition
15:55–17:10	Parallel Sessions
17:10–18:40	Closing Ceremony & Reception





Conference Dinner – Revival Bar + Kitchen

Tuesday, 17 April | 19:00 (7:00 PM) | Location: Le Bateau Ivre (2102 Shattuck Ave, Berkeley)

Revival Bar + Kitchen serves a menu designed to satisfy, replenish, and inspire. The cuisine holds up against the competitive Berkeley standard and is a great place to get locally sourced seasonal plates, set in a cozy atmosphere.

Delegates are welcome to choose a beef, fish, or vegetarian option.

Closing Reception

Wednesday, 18 April | 17:10 (5:10 PM) | Location: Clark Kerr Campus

On Wednesday, 18 April, immediately following the end of sessions, the Climate Change Conference and Common Ground Research Networks will host a closing reception at the conference venue. Join delegates and plenaries for drinks, light hors d'oeuvres, and a chance to converse!





Michel Gueldry

Approaches and Strategies for Engaging Climate Change Skeptics—and Their Limits



Michel Gueldry holds a PhD in international relations from the University of Toulouse (France). His background is in political science and international relations. He has taught at the University of Memphis (TN), Middlebury College (VT), Mills College (CA), the University of Oregon, Bryn Mawr College (Avignon, France), the Institut d'Etudes Politiques of Grenoble, the Institut des Hautes Etudes Européennes et Internationales in Nice (France), Leipzig University, the Wuppertal Institute, and the University of Augsburg. His current teaching and research focuses on connections between natural resources, conflicts, and security; economic theories and business models for sustainable development; intercultural communication, from utilitarian / managerial approaches to integrative / holistic practices; and an integration of environmental ethics, conservation psychology, intercultural studies, and spirituality for social change, especially sustainability. He is currently editing a new book on “new forms of insecurity in a globalized world,” such as climate change, ecosystems and natural resource issues, human gender and community challenges, technological challenges, and sub-and trans-national forces.

Jonathan Berkey

Renewable Energy Power Shift



For more than three decades, Jonathan has worked internationally on renewable energy systems in the US, Europe, and Africa. Serving as a Peace Corps volunteer in the mid-1980s in Morocco, he worked with the Ministry of Energy at the Center for Development of Renewable Energy in Marrakesh, promoting the use of solar and wind energy systems for water pumping throughout the Southern Sahara region. In 1986, Jonathan's team of Moroccan engineers and technicians installed the first modern wind turbine in North Africa near the town of Essaouira at an agricultural cooperative on the Atlantic coast, where the 200 MW Jebel Lahdid Wind Farm project is now being installed. As an Associate Peace Corps Director, based in East Africa from 1988 to 1992, Jonathan coordinated volunteer engineers and technicians developing water infrastructure projects, including research on mechanical wind pump and solar technologies appropriate for East Africa. As an adjunct professor for seven years at the Monterey Institute of International Studies, Jonathan has lectured on development and renewable energy system topics while also consulting with numerous companies developing solar- and wind-energy projects throughout central California. Jonathan has given talks on wind and solar energy development over the past decade to federal and state agencies and nonprofit organizations, including the Ecological Farming Association annual conference. In 2007, he was invited to speak at the International Renewables and Realities Conference hosted in Lolland, Denmark, addressing the theme: “Accelerating Climate Change Solutions: Californian Renewable Energy Policy Development.” Jonathan is a founding board member of Global Education Partnership, an international youth-education NGO established in 1994, which expanded globally from East Africa to Central America and Southeast Asia assisting rural schools with educational resources. He has recently established International School-to-School Partnerships (ISSP), with a mission to link teachers and students globally on science exchanges related to climate change topics, and is currently promoting “Power Africa Schools” an initiative to spur solar electricity development projects in rural communities across Africa. He currently serves as president of the board of directors of ISSP and is also a board member on the United Nations Association, Monterey Bay Chapter, recently moderating their second annual Youth Climate Summit in Monterey.





Haris Alibašić



Dr. Haris Alibašić is an assistant professor in the Legal Studies and Public Administration Department at the University of West Florida. Dr. Alibašić brings twenty-one years of expertise and experience in the public sector, including working for the United Nations Mission and the Office of High Representative in Bosnia and Herzegovina and directing energy, sustainability, and legislative affairs policies and programs for Grand Rapids, the second largest city in Michigan. In Grand Rapids, he promoted sustainable policies resulting in significantly reduced energy usage and cost and spurring significant renewable energy investments.

El'gin Avila



El'gin Avila is a first-year doctoral student studying environmental health sciences at the University of Arizona. He obtained his BS in psychology from Eastern Michigan University and his MPH in environmental health and policy from the George Washington University (GWU). During his MPH, he worked with the community to develop an app that displays air quality data in Bahia Brazil—specifically, the small town called Leandrino, where the data was collected by community members. His current research interests focus on disadvantaged and marginalized communities that are exposed to environmental contaminants and pollutants through various pathways and implementing policy changes that protect vulnerable communities.

Fabiano de Araujo Moreira



Fabiano is a PhD student in geography at the State University of Campinas (UNICAMP), Brazil. He graduated with a degree in geography from UNICAMP in 2011 and received his master's degree in geography in 2013, after spending time at the Universidad Nacional Autónoma de Mexico. From 2009 to 2010, Fabiano participated in academic-scientific exchange at the Universitat de Barcelona, Spain, with an international mobility grant from Santander. He received a scholarship for scientific initiation from FAPESP for 2007–2008. He also received scholarships from the Didactic Support Program for courses in geography of international relations in 2010, urban geography in 2012, and climatology in 2017. Fabiano is currently part of the Metropole Project (Belmont Forum/Fapesp)

Ans Irfan



Ans Irfan is a doctor of public health (DrPH) student at the Tufts University School of Medicine. He earned an MD in 2012 but decided to pursue public health practice instead of clinical medicine. He also holds an MPH from the George Washington University and a graduate certificate in migration studies from Georgetown University. He is a board-certified public health practitioner. His applied-research interests include public health practice, health equity, and health policy with a focus on climate equity and environmental justice. He is also an adjunct professor of public health at the George Washington University Milken Institute School of Public Health.

David Krantz



David Krantz is a Wrigley Fellow and National Science Foundation IGERT-SUN Fellow at Arizona State University's School of Sustainability, where he researches the intersection of environmentalism with public policy and culture, predominately focusing on religion. He serves on the board of directors of four nonprofits, including Interfaith Moral Action on Climate and Aytzim: Ecological Judaism, which he also runs. He has completed three master's degrees at New York University and at the University of California, Berkeley.



Sisi Meng



Sisi Meng is a visiting assistant professor in the Department of Economics at the University of Colorado, Denver. Her research interests include the areas of environmental and natural resource economics, the economic impact of natural disasters, and climate change. Before joining the economic program, Sisi earned a PhD degree in economics from Florida International University and an master of science degree in economics from University of Illinois at Urbana-Champaign.

Aemade Mistru Terefe



Mr. Aemade Mistru Terefe is currently doing research and is a student of Resource Economics and Sustainable Development at University of Bologna, Italy. He received his bachelor of science degree in applied chemistry from Hawassa University and spent more than six years working at international and national manufacturing companies in Ethiopia. Following this, Mr. Aemade then attended Adama Science and Technology University, earning his MBA before embarking on an academic career; he has both embraced teaching and doing research in areas related to green chemistry, climate change and its economic impacts, measuring sustainable development in developing countries, life-cycle assessment, and waste management.

Justin Udie



Justin Udie is a doctoral researcher at the Institute of Energy and Sustainable Development (IESD) at De Montfort University (UK) funded by the Nigerian Petroleum Technology Development Fund (PTDF). His research interest is in sustainability and climate change impact on vulnerable critical energy infrastructure. He holds a master's degree in natural resources (oil/gas) management from Coventry University in the UK and membership of key professional organisations, including Energy Institute (EI), International Environmental Management and Assessment (IEMA), and Society of Petroleum Engineers (SPE). Justin had won the prestigious National Youth Service Corps (NYSC) Presidents' Honour's award for community development.



Friday, 20 April	
08:00-09:00	Conference Registration Desk Open
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09:30-10:05	Plenary Session - Jonathan Berkey, International Sustainable Development, Middlebury Institute of International Studies, Monterey, USA
	"Renewable Energy Power Shift"
10:05-10:35	Garden Conversation & Coffee Break
10:35-11:20	Talking Circles
	Room 1 - Scientific Evidence Room 2 - Assessing Impacts in Divergent Ecosystems Room 3 - Human Impacts and Impacts on Humans Room 4 - Technical, Political, and Social Responses Room 5 - 2018 Special Focus: 'Engaging with Policy on Climate Change'
11:20-11:30	Transition
11:30-12:45	PARALLEL SESSIONS
Room 1	<p>Waterways and Water Resources</p> <p>Water Temperature Change and Morphology of Coastal River-deltas Ashish Mehta, University of Florida, Gainesville, Florida, United States Earl Hayter, United States Army Corp of Engineers, Washington D.C., -, United States Andrew Manning, University of Plymouth, Plymouth, United Kingdom</p> <p>The transport of water-borne suspended sediment, particularly flocculated cohesive clay particles, is known to depend on water temperature, which influences the viscosity of the suspension and, more importantly, electrochemical inter-particle bonds governing floc properties including size and density, hence the settling velocity. Increasing temperature decreases the settling flux as the bonds holding the flocs together become weaker and cause floc size to decrease and floc structure to become more open. This would mean that the location, morphological evolution and the size of muddy coastal river-deltas would be altered. To date, in fine sediment transport research limited attention has been focused on the role of fluid temperature, as most areas of engineering concern have been in the mid-latitudes. As a result only rudimentary anecdotal information is available on the differences in the morphodynamics of the more studied deltas and those in the cold regions. On the other hand, some experimental information has been compiled in the literature on the effect of temperature on the settling velocities of suspended flocs and their erosion at the bed. In the present paper we have summarized this information, which is then used to demonstrate likely scenarios on the effect of long-term water temperature change on delta morphology. We show that due to the high sensitivity of the floc properties on temperature, significant morphologic changes may ensue depending on the temperature anomaly. Increasing the temperature would form the delta further seaward (where it could be more susceptible to dissipation by wave action) and its rate of growth would slow down. In turn the role of the delta as a feature protecting the shoreline from erosion could diminish.</p> <p><i>Scientific Evidence</i></p>
Room 2	<p>Wildfire Conditions</p> <p>Prevention of Wildfire in a Climate Change Reality Janet Stanley, University of Melbourne, Melbourne, Australia</p> <p>The incidence of large wildfires is increasing internationally, along with the risk of a wildfire becoming catastrophic, where its spread is difficult to predict and it is all but impossible to extinguish without a natural suppressant such as heavy rain. At the same time, our knowledge of prevention of wildfire is narrow, limited, and at times incorrect, with a heavy reliance on environmental modification. Given that about 85% of fires are human initiated it is urgent that we gain better understanding of the role of humans and how to prevent these fires being lit. This paper will present outcomes from current research based on an extensive 20 year data base from an Australian Arson Squad and Crime Stoppers on how to better identify the features of who is at greater risk of committing arson, thus initiate improved prevention responses, such as surveillance and putting protective initiatives in place. Findings will also be presented on a longitudinal study (6 waves over 8 years) on the propensity of the community to understand and report fire-lighting activity. These world first studies will be presented in an international context of prevention of wildfires</p> <p><i>Technical, Political, and Social Responses</i></p> <p>Wildfire: Getting What You Pay For Michael Mann, Washington D.C, United States</p> <p>Stemming from our research on effects of human settlement in wildfire prone areas, under conditions of climate uncertainty, we present data and a scenario that challenges us to view wildfire in a new light. In particular, we explore the compounding effects of climate change, land use change, and poor management, which leave our communities vulnerable to risk.</p> <p><i>Human Impacts and Impacts on Humans</i></p>

Please see the announcement board by the conference registration desk for any changes or additions to the above schedule.



11:30-12:45

PARALLEL SESSIONS

Room 3

Climate Governance

Governments in Australia and Climate Change Responses: How Knowledge Uptake Can Influence Policy

Tayanah O'Donnell, University of Canberra, Canberra, Australia

The potential for individuals and societies to adapt to climate change is framed by how governments can develop and implement effective strategies that cut across spatial, sectoral, and temporal challenges and opportunities (Adger, 2011). Each of the three tiers of government in Australia responsible for various regulation and policy can influence, either positively or negatively, adaptation priorities and agendas. The centrality of governments, as drivers of governance, to break down barriers to climate adaptation remains critical. This paper will discuss key policy changes in Australia, along with focus group findings. It concludes that the role of government for climate change responses remains critical, and that the research community can contribute a sound evidence base for these responses.

*Technical, Political, and Social Responses***Local Climate Governance in Germany**

Denise Keele, Western Michigan University, Kalamazoo, Michigan, United States

Cities are vulnerable and face unique climate change challenges; however, cities also have distinctive powers and resources within multilevel governance systems to address both mitigation and adaptation to global climate change. The European Union and specifically Germany are recognized as climate leaders, and most previous scholarship has focused on national and international policy adoption. Based on over sixty interviews with local government officials, this research describes the policy responses, challenges and opportunities of the thirty-four urban districts (city level administrative units) located in two Länder (e.g. States) of Germany, Bavaria and Baden-Württemberg. Emphasis will be placed on the role of the city within federalist systems with contrast and comparisons to the United States.

*Technical, Political, and Social Responses, 2018 Special Focus: Engaging with Policy on Climate Change***Climate Change Secretariat Initiatives to Achieve the National Climate Change Policy in Sri Lanka**

Vindya Hewawasam, University of Tsukuba, Tsukuba, Japan

Kenichi Matsui, University of Tsukuba, Tsukuba, Japan

In order to build a climate resilient nation, the government of Sri Lanka established the Climate Change Secretariat (CCS) within the Ministry of Environment. It became the National Focal Point (NFP) to the United Nations Framework Convention on Climate Change (UNFCCC) in 2008. Accordingly, the CCS adopted the National Climate Change Policy (NCCP) in 2012 with an aim to minimize adverse consequences. The CCS coordinates and implements climate change related activities, including NCCP. This study examines CCS's adaptation initiatives by using an analytical framework. This framework consists of six criteria: namely, feasibility, effectiveness, acceptability, equity, impacts and implementation. The analysis mainly focuses on CCS's adaptation activities from 2010 to 2017. Further this study provides a comparative analysis of the climate change policy and initiatives taken by Bangladesh and Japan to identify positive trends, gaps, present and future needs of the NCCP. Finally, this study makes recommendations that may improve the NCCP.

Human Impacts and Impacts on Humans

Room 4

The Science of Change

Dynamo Speed Control and Tectonics: Modeling Earth as a Shunt Wound DC Machine

Greg Poole, Industrial Tests, Inc., Rocklin, California, United States

The Sun's slow periodic flux transfer to the Earth, the low frequency of Schumann Resonance, and the fixed DC voltage of the capacitor direct us toward direct current (DC) machines for electrical modeling purposes. The Earth exhibits dual characteristics of a motor generator set by motoring the mechanical Earth around its axis, while at the same time generating energy for its spherical capacitor. It follows that electrical and mechanical output of the Earth are powered by the magnitude of the flux transfer events, the constant DC voltage supply and any potential nuclear contribution within the core. Like an induction furnace, powerful magnetic flux from the Sun partially melts the outer iron core of the Earth and magnetizes the inner solid iron core. The solid inner magnetic core acts as a rotating armature similar to a DC machine. All electrical machines experience no load and full load power loss while in operation. Speed control of large rotating DC machines is well understood and has been applied in industry for over a century. Speed can be changed either by varying the field resistance and/or the armature resistance. The characteristic of a constant speed DC machine is such that a change in field resistance will cause a compensatory change in armature resistance to maintain velocity. In the case of the earth, a decrease in armature resistance results in an increase in volume of the iron core, which may result in greater seismic and volcanic activity. Climate change may be the direct result of changes in soil and sea water resistance, which we lump together as field resistance.

Scientific Evidence

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11:30-12:45

PARALLEL SESSIONS**Is Fracking Kosher?: The Role of Climate Change in the Jewish Response to the Unconventional Extraction of Fossil Fuels**

David Krantz, Arizona State University, Tempe, Arizona, United States

As hydraulic fracturing, AKA fracking, has increased in both use and prominence over the last decade around the world, religious communities have taken notice. How has the Jewish community responded? This paper/presentation will compare the response to fracking among Jewish organizations in the United States and Israel. How does the prospect of climate change affect their decision making? To what extent have Jewish groups in both countries worked together? What are the similarities and the differences to the approaches taken by Jewish activists in both countries? What do Jewish groups see as their religious obligations to either support or oppose fracking? Other questions that will be addressed include: Why did Jewish organizations take the stances that they did? What new organizations have sprung up in response to fracking? What inspired their leaders to fight for or against fracking? How have these organizations worked with both secular groups as well as within an interfaith context? And to what extent have Jewish individuals involved in the fracking debate within secular organizations been informed and inspired by Jewish values in pursuing their work on fracking? While many of the larger Jewish organizations merely issued policy statements on fracking, what may come as some surprise is the variety of activities among smaller Jewish groups and individuals — including fracking wells being dug at Jewish summer camps, a Jewish photography exhibit on fracking, and even rabbis being arrested at fracking protests.

Technical, Political, and Social Responses

Room 5

Health and Wellness**Temperature and Emergency Room Visits from Mental Health-Related Outcomes**

Rupa Basu, California Environmental Protection Agency, Oakland, California, United States

Temperature and morbidity has been explored previously. However, the association between temperature and mental health-related outcomes, including violence and self-harm, remains relatively unexamined. We obtained daily counts of mental health-related emergency room visits involving injuries with external cause from the California Office of Statewide Health Planning and Development from 16 California climate zones from 2005 to 2013, and combined them with data on mean apparent temperature, a combination of temperature and humidity. Using Poisson regression models, we estimated climate zone-level associations, then used random-effects meta-analyses to produce overall estimates. Analyses were stratified by season (warm: May-October; cold: November-April), race/ethnicity, and age. A 10-degree Fahrenheit increase in same-day mean apparent temperature was associated with a 4.8% (95% confidence interval, 3.6-6.0%), 5.8% (4.5-7.1%), and 7.9% (7.3-8.4%) increase in visits for mental health disorders, self-injury/suicide, and intentional injury/homicide, respectively, during the warm season. High temperatures during the cold season were also positively associated with these outcomes. Variations were observed by race/ethnicity, age group, and sex, with Hispanics, Whites, 6-18 year olds, and females at greatest risk for most outcomes. Increasing mean apparent temperature was found to have acute associations with mental health outcomes and intentional injuries, and warrants further studies in other locations.

*Human Impacts and Impacts on Humans***Temperature and Term Birth Weight in California**

Rupa Basu, California Environmental Protection Agency, Oakland, California, United States

Reina Rau, University of California, Berkeley, Berkeley, California, United States

Dharshani Pearson, California Environmental Protection Agency, Oakland, California, United States

Brian Malig, California Environmental Protection Agency, Oakland, California, United States

Few epidemiologic investigations have explored adverse birth outcomes from ambient temperature exposure. In a retrospective cohort study conducted in California from 1999 to 2009, we examined apparent temperature, a combination of temperature and relative humidity, and term low birth weight

(LBW) among 43,629 full-term LBW infants and 2,032,601 normal weight infants. We relied on birth certificate data provided by the California Office of Vital Statistics and meteorologic data from the California Irrigation Management Information System, the US EPA, and the National Climatic Data Center. After considering several exposure apparent temperature metrics, we found that full gestational (13.0%; 95% confidence interval: 4.1, 22.7% per 10 degrees Fahrenheit (°F) increase in apparent temperature) and third trimester exposure (15.8%; 5.0, 27.6%) had the greatest associations for term LBW above 55°F and 60°F, respectively. First month of exposure exhibited no significant risk, while first trimester had a significantly negative association, and second trimester, last month and last two weeks had slightly increased risks. Mothers who were Black, older, delivered male infants, or gave birth during the warm season conferred highest risk. Our findings provide further evidence for risk of adverse birth outcomes from high temperatures for pregnant women, particularly for vulnerable subgroups.

Human Impacts and Impacts on Humans

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11:30-12:45	PARALLEL SESSIONS
	<p>Climate Action Co-benefits and Community Planning: Uncovering the Synergies and Trade-offs Robert Newell, University of Victoria, Victoria, Canada Engaging in climate action through integrated sustainability strategies can yield benefits for communities in a more effective way than through compartmentalized approaches. Such strategies can result in co-benefits, that is, community benefits that occur from acting on climate change that extend beyond mitigation and adaptation. For example, creating more walkable cities can be a strategy for reducing greenhouse gases, but can also lead to healthier communities with lower rates of obesity and hypertension. Climate strategies with co-benefits can result in 'win-win' situations, and thus comprise best practices for community planning. However, this planning approach also presents challenges, as it requires understanding complex relationships between community development practices and identifying synergies. In addition, some co-benefit strategies might also have associated trade-offs that should be taken into consideration when exploring a particular development path. This research examines climate action co-benefits and trade-offs in order to develop a comprehensive picture of the relationships and potential effects of implementing certain plans and strategies. The research consisted of collecting data on climate action efforts occurring in 11 BC (Canada) communities and coding it to identify climate strategies, co-benefits and trade-offs. Relationships between codes were then identified through a coding matrix, which subsequently were used to build a conceptual model of the multitude of co-benefits and trade-offs that stem from community adaptation and mitigation. Such a model can be used to gain a holistic impression of the advantages and disadvantages associated with different plans and strategies, which in turn can inform integrated community planning and decision-making. <i>Technical, Political, and Social Responses</i></p>
12:45-13:45	Lunch
13:45-15:25	PARALLEL SESSIONS
Room 1	<p>Global Implications</p> <p>Environment Protection via Optimal Global Economic Restructuring: Stochastic Data Envelopment Analysis Approach Alexander Vaninsky, Hostos Community College, New York, New York, United States This paper introduces an approach to environment protection based on proper economic restructuring of global economy. It is suggested that countries and regions voluntarily made changes in their economic structures so that the amounts of greenhouse gases decrease together with energy consumption, while the gross domestic product (GDP) per capita and the use of renewable energy – increase. A model is suggested that allows to evaluate the level of success in achieving this goal. Stochastic Data Envelopment Analysis with a Perfect Object is used as a mathematical tool. We use the indicators of GDP per capita and the share of renewable energy as inputs, and energy intensity of the GDP and energy carbonation as inputs, with all measured as the shares of global total. We estimate the current efficiency index and compute its gradient. Finally, we derive a system of differential - algebraic equations that guide the global economic restructuring in locally optimal way. A case study of the global economy 2015 is analyzed based on the information of the U.S. Energy Information Administration. <i>Technical, Political, and Social Responses</i></p> <p>Energy Ships for the Transition to an Emission-free Global Economy by 2050 Max Platzer, University of California Davis, Davis, California, United States Nesrin Sarigul-Klijn, University of California Davis, Davis, California, United States Land-based and off-shore based renewable power generation encounters significant resource and political constraints. In contrast, the wind power available in many ocean areas far exceeds the global power needs. Therefore, in 2009 we proposed to convert the ocean wind power into propulsive sailing ship power which, in turn, makes it possible to convert the relative water flow power between the moving ship and the stationary water into electric power by means of ship-mounted hydro turbines. The electric power delivered from the hydro turbines is then used to split the seawater into hydrogen by means of electrolysis, the hydrogen is compressed and stored in tanks and transported to shore. We will present the major results of the techno-economic and socio-political aspects of the "energy ship concept" studies which we conducted since 2009 and we will show that fleets of hydrofoil-borne autonomously operating sailing ship convoys enable the large-scale production of hydrogen, the large-scale energy storage in the form of hydrogen or of electro-fuels made from hydrogen, the production of potable water as a byproduct of converting hydrogen into electricity, and the extraction of carbon-dioxide from the sea water. <i>Technical, Political, and Social Responses</i></p>

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13:45-15:25

PARALLEL SESSIONS**Room 2 A Focus on Carbon Emissions****Comparing International Views on Climate Change Issues and Climate Change Policy**

Eric Jamelske, University of Wisconsin-Eau Claire, Eau Claire, Wisconsin, United States

James Boulter, University of Wisconsin-Eau Claire, Eau Claire, Wisconsin, United States

Climate change is the most important environmental/societal issue facing our world today. Because of the global causes/consequences of climate change, international cooperation is essential in developing, implementing and financing successful mitigation policy action. Moreover, public support for action around the world will likely be a significant determining factor regarding if/when climate change mitigation policies will be enacted. In particular, China and the United States are of great interest given that they are the largest greenhouse gas polluters and the largest economies. Vietnam is also of interest because they represent a smaller/poorer country with significantly lower GHG emissions. We will present comparisons from data collected in 2015 and 2017 from surveys conducted in these three respective countries. Ultimately, we will focus on support for an international climate treaty and willingness to pay for the costs of addressing climate change. Overall, we find more skepticism and denial and varying views in the United States compared to China and Vietnam. We also find more support for an international treaty and higher willingness to pay in China and Vietnam compared to the United States.

Technical, Political, and Social Responses, 2018 Special Focus: Engaging with Policy on Climate Change

Comparative Analysis of Energy and Emissions for Sustainability Rating: A Case Study

Mehran Dadkhah, California State University, Fresno, Fresno, California, United States

Fariborz M. Tehrani, California State University, Fresno, Fresno, California, United States

This paper presents the results of a case study to compare various performance measures of a sample project in relation to sustainability. The presented case is the construction of an undercrossing bridge designed to reduce traffic congestion and enhance safety at the existing at-grade intersection of a major ring road. Results include input energy and carbon dioxide emissions during construction based on actual data obtained from the site as reported by the contractor. In addition, an analysis of cost breakdown, including materials, equipment, and labor, for major construction activities, such as earthmoving, is provided. Application of sustainability rating using ISI (Institute for Sustainable Infrastructure) ENVISION is presented to allow a comparative analysis on various performance measures, including resource allocation and impacts on natural world. Conclusions of this paper enable project managers and sustainability professionals to identify and evaluate challenges and opportunities of similar projects in respect to sustainable development.

Human Impacts and Impacts on Humans, Technical, Political, and Social Responses

Climate Change Mitigation Policy and Electric Vehicles: The Relationship between the Percentage of Renewable Energy and the Lifecycle Carbon Dioxide Emissions

Ryan Cornell, Colorado Technical University, Colorado Springs, Colorado, United States

This project quantifies the carbon dioxide emissions produced by electric vehicles (EVs), as a function of renewable energy. These values are compared to the emissions for internal combustion engines (ICE) of varying efficiencies. Many studies quantify carbon dioxide emissions based on a static grid, but this fails to accurately measure the long-term potential of electric vehicles. My model disaggregates grid-based and non-grid-based emissions, which allows production-based emissions to accurately reflect the percentage of renewable energy that is entered into the model. I employ Argonne National Laboratory's GREET Model and a variety of meta-analyses to determine the emissions per kWh and per gallon. The model also allows for the manipulation of a variety of variables other than the percentage of renewable energy, including: EV efficiency, miles per gallon, and battery-based emissions. The lifecycle EV carbon emissions for a vehicle powered by the 2016 US grid is 30.82 metric tons, while the emissions for an EV powered by 100% renewable energy is 6.3 metric tons. An average internal combustion engine vehicle (25.4 miles per gallon) is responsible for 68.38 metric tons of carbon dioxide over its lifetime, while an ICE vehicle with a utopian efficiency of 80 miles per gallon accounts for 25.5 metric tons of carbon dioxide.

Technical, Political, and Social Responses

Room 3 Reciprocal Reliance**Agriculture's Role as a Terrestrial Carbon Sink**

Neal Samuel Eash, University of Tennessee, Knoxville, Tennessee, United States

Bruce Hicks, University of Tennessee, Knoxville, Tennessee, United States

Joel Oetting, University of Tennessee, Knoxville, Tennessee, United States

Deb O'Dell, University of Tennessee, Knoxville, Tennessee, United States

With the 1985 Farm Bill and its conservation compliance mandate, US agriculture leaped forward in ways that reduced erosion and improved soil structure...for at least a few years. Alas, recent trends in the past few decades have seen a tillage relapse/rebirth and with it the loss of the recently sequestered C acquired through conservation compliance's minimal tillage practices. While there are many arguments for why more tillage is being used today, one important factor is that rainfall patterns have changed since my early days on the farm necessitating the perceived need for tillage to dry the soil for planting. Using 120 years of local rainfall data we will show how the farmer's climate has changed, how the farmer has reacted to these changes, and why it is imperative that soil management be addressed and included in policy in climate change mitigation. Micrometeorology/eddy covariance data from Tennessee, Ohio, as well as southern Africa (Lesotho and Zimbabwe) Africa, will provide evidence that soil can be an important sink for carbon dioxide. Soil can play a very important and passive role in climate change mitigation if policies help provide action.

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13:45-15:25

PARALLEL SESSIONS**Role of Livestock in Driving Climate Change: Dietary Change is Essential to Meet the Paris Agreement's Targets**

Peter Stevenson, Compassion in World Farming, Surrey, United Kingdom

A review of the literature shows that technical mitigation measures and increased productivity will be insufficient to prevent an increase in the GHG emissions produced by the livestock sector. Research shows that on a business-as-usual basis our diets alone could by 2050 take us over the Paris Climate Agreement's targets. Studies establish that the Paris targets cannot be met without a shift to healthier diets with reduced meat and dairy consumption. Transitioning toward diets that are in line with standard dietary guidelines could reduce global food-related emissions by 29–70%. This would also produce environmental, nutritional and animal welfare co-benefits. Focus group research in the USA, China, Brazil and the UK demonstrate a general belief that it is the role of governments to encourage and incentivise efforts to reduce unsustainable levels of meat consumption. Measures to encourage dietary change could include: awareness raising, nutrition education, sustainable dietary guidelines, initiatives by retailers and chain restaurants to promote less emissions-intensive diets, public procurement policies that provide meals with reduced emissions, economic incentives and taxation measures that encourage farmers and consumers to decrease the proportion of meat and dairy produced and consumed.

*Technical, Political, and Social Responses***Perceptions of Fishers to Climate Change in Puerto Rico's Coastal Communities**

Karin Jakubowski, University of New Haven, West Haven, Connecticut, United States

Tarsila Seara, University of New Haven, West Haven, Connecticut, United States

Coral reefs provide important resources to Puerto Rico's commercial fishers, recreational anglers, and ornamental collectors and exporters. However, the degradation of coral reefs and the decline in fishery resources that live in and depend upon these ecosystems have serious consequences of both ecological and socioeconomic nature. Climate change is also considered a major aspect affecting the well-being of coastal communities worldwide including fishing resource dependent communities. For these reasons, there is a strong need to understand what factors influence the perceptions and behaviors of fishers around the reef. Factors that can affect perceptions of the environment and behaviors towards that environment include education, fishing experience, knowledge about environmental issues, and local ecological knowledge. This study investigated the perceptions of fishers and other stakeholders within coastal communities in Puerto Rico by interview and survey. Such findings can inform and engage resource users and the public as well as inform management decisions tightly linked to ecosystem goods and services to address climate change and other important pressures on coral reef fishing systems, while focusing on supporting community resilience at a local scale.

Human Impacts and Impacts on Humans

Room 4

Insecurities at Sea Level**Flood, Rebuild, Repeat: How Flood Insurance Can Trap Homeowners**

Rob Moore, Natural Resources Defense Council, New York, New York, United States

In the U.S., flood insurance is usually the only timely assistance owners of repeatedly flooded homes can access easily, but it generally pays to repeatedly rebuild in the same vulnerable location. For homeowners who want to move, assistance is hard to find. The U.S. spends relatively little purchasing flood-prone properties, even though it is often cheaper than rebuilding. When assistance is offered, it can take years of waiting. More than 30,000

"severe repetitive loss properties" have flooded an average of five times and the U.S. spent \$5.5 billion to repeatedly rebuild these homes. NRDC estimates that sea level rise will put 0.82-2.57 million homes in an identical situation by century's end, costing the U.S. \$143b-\$447b. NRDC has developed a proposal to pre-approve interested low-income homeowners and guarantee them a future buyout, eliminating the years long waiting and uncertainty common to current efforts.

*2018 Special Focus: Engaging with Policy on Climate Change***Greenhouse Gas Emitting Activities at Sea: Sources and Solutions**

John Duff, University of Massachusetts, Boston, Massachusetts, United States

The oceans of the world serve as the setting within which substantial climate change driving activities reside. This presentation highlights two major sea-borne greenhouse gas emitting activities: international shipping and offshore energy production. It outlines governance authorities and mechanisms that currently apply, and the prospects for new or evolving approaches to reducing such emissions. Part One outlines the history and status of international shipping as well as the governance authorities and mechanisms that currently apply to those seaborne activities. It reflects upon the prospects for new or evolving approaches to monitoring, measuring and managing those activities in an effort to reduce such emissions. Part Two employs a similar approach with regard to GHG emissions associated with offshore hydrocarbon development. Part Three considers the factors that distinguish the very different approaches employed to identify, evaluate and manage GHG emissions from the two types of offshore activity reviewed. Part Four examines recent/ongoing efforts to develop and implement legal/regulatory approaches to reducing GHGs from each of these ocean use sectors.

Technical, Political, and Social Responses

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PARALLEL SESSIONS**Climate Change Adaptation in Coastal Cities of Developing Countries**

Tu Dam Ngoc Le, University at Buffalo, Buffalo, New York, United States

Coastal cities in developing countries are increasingly susceptible to the adverse impacts of climate change due to the combination of climatic and non-climatic factors. In responding to this global climate issue, cities can make a significant contribution to local efforts. For nearly two decades with the international assistance, many coastal cities in developing and least-developed countries have made significant progress in shaping their climate action plans to adapt to climate change. A systematic analysis of these local efforts, however, is understudied. This study aims to explore the adaptation planning practices in coastal cities of developing countries regarding planning methodology and the formulation of adaptation strategies. It utilizes a content analysis of 37 documents of vulnerability assessment and climate adaptation plans in 27 coastal small and medium-sized cities in developing and least developed countries. The study shows a prevailing community-based approach in adaptation planning in these local contexts, in which local knowledge is an important input for the planning process. The finding illustrates a strong linkage between vulnerability assessment and the formulation of adaptation strategies. Spatial vulnerability assessment offers a great opportunity for the identification of vulnerable places, while non-spatial assessment explores the root causes of vulnerability. The two methods complement each other to inform adaptation options and policies. The spatial visualization, however, is hindered in many cities due to data availability. A framework for the combination of these two methods and ways to overcome the limitation are recommended.

Technical, Political, and Social Responses

Spatial Heterogeneity and Household Preferences for Sea Level Rise Adaptation Plan in Florida

Sisi Meng, University of Colorado, Denver, Colorado, United States

Accumulating evidence indicates that global sea levels have been rising at an accelerating rate. This trend, linked with global warming, is posing a great risk to the communities living in the low elevation coastal areas. Florida is particularly vulnerable to the effects of sea level rise (SLR) due to its low topography, porous geology, subtropical climate, and densely populated coastal counties. This study aims to understand public preferences and produce estimates of economic value for sea level rise adaptation projects. Specifically, a series of choice experiments embedded in a household survey of Florida's selected communities were used to: examine the determinants of households' preferences for short term adaptation plans and long term adaptation plans; identify the spatially heterogeneous preferences in household choices, by incorporating detailed spatial information generated by Geographical Information Systems (GIS) into the survey data; investigate the differences and similarities in perceptions and preferences among Florida's yearlong and seasonal residents. The empirical results can provide important inputs to the design of optimal adaptation plans and mitigation policies to avoid risks posed by climate change-induced sea level rise.

Human Impacts and Impacts on Humans, 2018 Special Focus: Engaging with Policy on Climate Change

Room 5

Administration and Management**Auditing Climate Change Responses in Canada**

Kimberley Leach, Auditor General of Canada, Ottawa, United States

Katie Olthuis, Auditor General of B.C., Victoria, Canada

Amy Hart, Auditor General of B.C., Victoria, Canada

Kristin Lutes, Auditor General of Canada, Ottawa, Canada

Carol Bellringer, Auditor General of British Columbia, Victoria, Canada

The audit offices of all provinces and territories in Canada, collaborated together and with the Office of the Auditor General of Canada (OAGC) to conduct their own independent audit work to determine the extent to which Canadian governments met commitments to reduce GHG emissions and adapt to climate impacts. This paper will discuss the overall project and an adaptation case study from the Office of the Auditor General of British Columbia (OAGBC). Audit offices designed a conceptual approach based on accepted adaptation processes found through literature review and measured government action against this framework (risk assessment, adaptation plan or strategy, implementation of plan, monitoring and reporting). To complete this work OAGC and OAGBC followed accepted performance audit methodology which largely involves qualitative research techniques (document review and key informant interviews) and consultation with subject matter experts in the field. Results from the OAGBC audit highlight strengths and weaknesses of the provincial approach to adaptation, and led to recommendations for government on how to move adaptation forward in the province. The audit identified key climate-related risk areas in the province and highlighted challenges faced by government in addressing these risks.

2018 Special Focus: Engaging with Policy on Climate Change

A Nexus of Sustainability and Resilience Planning: Observations of Emerging Practices and Policies

Haris Alibašić, University of West Florida, Pensacola, Florida, United States

Local governments' approach to climate action planning varies based on the type of municipal leadership, financial resources available to resilience planning, and a community level commitment to addressing the threats of climate change. Several cities deployed climate change plans in their operations. While using different approaches, the intended outcomes of climate change plans in cities are similar. The paper reviews programs and policies for implementing climate resilience measures, and how cities approach climate change indirectly, by specific targets embedded in sustainability planning or directly through funding climate action planning in city's operations. The key outcomes related to climate change action and resilience planning are transparency, accountability, measurements, reporting requirements, annual review, and progress report-related adjustments.

2018 Special Focus: Engaging with Policy on Climate Change

13:45-15:25	PARALLEL SESSIONS
	<p>Assessing the Impact of the Western Climate Initiative on Quebec industrial facilities David Talbot, École Nationale D'administration Publique, Quebec City, Quebec, Canada Julien Hanoteau, -, -, Euromed, Marseille, -, France Since 2013, Quebec (Canada) has implemented a greenhouse gas emissions trading system (ETS) as part of the Western Climate Initiative. This carbon monetization has aroused strong reactions particularly in the industrial sector where companies feared a loss of competitiveness on world markets. The objective of this article is to assess the impact of this regulation on Quebec industrial plants. In order to do so, we compared the performance of regulated facilities in Quebec with other Canadian facilities of the same NAICS sectors but from different provinces, thus evolving in other regulatory contexts (tax or no regulation) on a period of 5 years. Conditional difference in differences OLS regressions results show that regulated plants in Quebec have reduced their GHG emissions about 10 percent faster than non-regulated plants in the rest of Canada. They have also reduced employment about 7 percent faster. However, the implementation of the Quebec carbon ETS had no significant impact on the efficiency of production with respect to GHG emissions. These results suggest that during the period 2013-2015, regulated facilities in Quebec did not adapt to the program through a change in their production process or technology that would affect carbon intensity. They responded mainly by adjusting production scale and employment. This contrasts with the results of previous studies on the early stage effects of the European carbon ETS on French and German facilities and firms. European industry adapted through changes in GHG intensity of production, not scale. This raises question about the efficiency of the Quebec ETS to induce innovation in industrial facilities. Other studies on the early stage effects of the British Columbia (Canada) carbon tax scheme reveal that facilities adapted to it by cutting employment, but that effect has been mitigated thanks to the positive effect of a green fiscal reform that accompanied the carbon tax. This challenges the initial allocation scheme of the carbon permits in the Western Carbon Initiative, underlying the importance of recycling appropriately the carbon rent. <i>Technical, Political, and Social Responses</i></p> <p>Promoting Dialogue on Campus and within Community Colleen Bye, Developmental Mathematics, Utah Valley University, Orem, Utah, United States James Brandt, Utah Valley University, Orem, Utah, United States Bryan Lacerda, Utah Valley University, Orem, Utah, United States Diana May, Utah Valley University, Orem, Utah, United States Erin Call, Utah Valley University, Orem, Utah, United States Michelle Li Szhen Teh, Utah Valley University, Orem, Utah, United States The study includes a comparison to national data using the New Ecological Paradigm (NEP) scale. Additionally, they will discuss methods of creating opportunities for discussion on campus and beyond. They will describe an event at their college, Sustainability Day, that was created to provide current research and factual information and, more importantly, to promote civil discourse. Issues of sustainability have become highly politicized; for example, research shows that the largest factor concerning one's beliefs toward climate change is one's political affiliation, which is mainly due to an increase in the use of social media as a primary news source. Consequently, many have formed confirmation biases that have led to highly polarized nation. UVU is a very conservative campus with 80% of its reporting to be Ladder Day Saints. This event hosted a question and answer session on climate change, a round table discussion concerning energy, and speakers presenting on a variety of sustainability topics. Representatives from over 24 local and national organizations provided service opportunities and pertinent data and research. Finally, they will describe their efforts to gain a commitment towards sustainability from their college president and establish a strategic plan for growth. <i>Human Impacts and Impacts on Humans</i></p>
15:25-15:40	Transition
15:40-16:55	PARALLEL SESSIONS
Room 1	<p>Problematic Heat Stressors</p> <p>Social Impacts of Climate Change-related Occupational Heat Stress and Adaptation Strategies of Workers Victor Fannam Nunfam, Edith Cowan University, Perth, Australia Kwadwo Adusei-Asante, Edith Cowan University, Perth, Australia Eddie Van Etten, Edith Cowan University, Perth, Australia Kwasi Frimpong, Edith Cowan University, Perth, Australia Jacques Oothuizen, -, -, Edith Cowan University, Perth, -, Australia Adverse effects of occupational heat stress due to climate change on working populations are subtle but considerably harmful. Yet trajectories of social dimensions and impacts of climate change-related occupational heat stress to safety and health, productivity, and social well-being concerns of workers are often overlooked and relegated as minor issues in social impact analyses of occupational heat stress due to climate change. This paper offers a conceptual framework based on a review and synthesis of the literature from 2007 to 2017 on social impacts of climate change-related occupational heat exposure on workers' safety and health, productivity, and social well-being in the context of sustainable development. A sustained global, national, institutional, and individual collaborative involvement and financial support for research, improved social protection and adaptation strategies can reduce exposure and boost the resilience and adaptive capacity of workers to facilitate the sustainable development goals. <i>Human Impacts and Impacts on Humans</i></p>

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15:40-16:55

PARALLEL SESSIONS**Managing the Heatwave Phenomena**

Natalie Batshon, Macquarie University, Sydney, Australia
 Stephen Smith, Macquarie University, Sydney, Australia
 Vincent Pang, University of New South Wales, Kensington, Australia

Heatwaves is a phenomena that has been faced around the world for decades and its impact and occurrence is increasing at an increasing rate. However research towards Heatwaves, particularly within Green IS has been limited. As a result, this paper addresses this research gap by conducting and presenting an exploratory study on Heatwaves. The paper conducts primary and secondary studies to understand the Heatwave phenomena and explains the importance of using information systems to develop systems, methods and policies that help manage Heatwaves and their impacts. Primary research undertaken includes conducting a focus group and numerous interviews. Members who attended the focus group were directly impacted by the multiple severe Heatwaves that struck New South Wales (NSW) Australia during its December 2016 to February 2017 summer. The research undertaken is significant as it aims to increase understanding of Heatwaves among all those who are impacted by them. Additionally, the paper argues the importance of having a unified global definition of Heatwaves and the importance of developing systems, methods and policies that aim to directly manage Heatwaves.

Technical, Political, and Social Responses

Room 2

Compromises in Air Quality**"Right to Clean Air" but What Went Wrong?: A Case Study on Opportunities and Obstacles to Communicating Climate Change on Social Media in Thailand**

Teerada Chongkolrattanaporn, Chulalongkorn University, Bangkok, Thailand

Climate change campaigns in Thailand have faded in the past few years due to a change in government policy. Thus, non-governmental organizations have to be more active in conducting campaigns to raise awareness and encourage Thai citizens to change their behavior to mitigate climate change. Greenpeace (Thailand) is one the major campaigners who energetically promotes this issue. "Right to Clean Air" is a recent campaign designed to tackle air pollution problem and to educate about climate change. Greenpeace does not only use online platforms to disseminate information, but also to gain more supporters. In 2016, Greenpeace members wore black t-shirts when they ran in a marathon organized to celebrate Her Majesty the Queen's birthday. This led to outrage on social media such as Facebook and Twitter. Thus, this research investigates Greenpeace's Facebook fanpage to examine the trend of people's responses to the campaign. Results showed that negative comments outweighed positive ones. Framing analysis was conducted to determine the most prominent frames presented in the Facebook platform. The "climate change" frame was hardly mentioned by the public, while the "attack on NGO" frame was mentioned the most.

Technical, Political, and Social Responses

Electric Vehicles on the Rise while Decarbonizing the Grid

Nilmini Silva-Send, University of San Diego, San Diego, California, United States

California though not a country is well placed to transition to a low carbon economy in the electricity and transportation sectors. 50% of Zero Emission Vehicle (ZEV) sales in the US in 2015 were in California, where ZEVs enjoy consistent policy support. The latest goal is for 1.5 million ZEVs on the road by 2025 and incentives are provided by federal, state, regional and many local entities. More ZEVs will increase electricity loads and GHG emissions. However, California law mandates 50% renewable electricity by 2030, and some cities are implementing a 100% renewable electricity mandate pushing this limit higher in some places. Therefore, transportation electrification is not expected to increase GHG emissions and less gasoline on roads means immediate local co-benefits from reduced N₂O, SO₂ and particulates. Using the example of San Diego county, this presentation will show how policies to increase transportation electrification simultaneously with increased renewables in grid electricity intersect to the point at which electrification of transportation reduces overall GHG. These are policies which can be adapted for developing countries and smoggy cities to further clean energy and its benefits to air and the climate.

Technical, Political, and Social Responses

Room 3

Eco-development**Eco-Innovation: Perspectives from a Theoretical Approach and Policy Analysis**

Natasha Hazarika, City University of Hong Kong, Hong Kong
 Xiaoling Zhang, Northern Arizona University, Flagstaff, Arizona, United States

Limiting the impacts of climate change and building a resilient world is one of the biggest policy challenges today. It has been widely recognized that for controlling the costs of climate change adaptation and mitigation in the long run, environmentally sound technologies or eco-innovations need to be developed and adopted which would help curb the climate issues in future. Eco-innovation is defined as production, assimilation or exploitation of a product, process, service or business method which, in any stage of its life cycle, would result in reduction of environmental risk, pollution and other negative impacts as compared to conventional technologies or approaches. However, unlike regular innovations, eco-innovations are not self-enforcing and are associated with the double externality problem. Therefore, it is emphasized that eco-innovations need govt. intervention in the form of supportive policy instruments on priority. Off late, factors like consumer demand, plans and programs as well as the competitiveness of the firms have been considered as equally important. However, the interaction among these driving forces has not been fully traced out. Also, the theory on eco-innovation is found to be at a nascent stage which does not resonate with its dynamics as it is traditionally studied under the neo-classical economics theory.

Technical, Political, and Social Responses

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Labor Leading on Climate: Using Climate Mitigation Policy to Create Family-sustaining Jobs

Mijin Cha, Occidental College, Los Angeles, California, United States

Lara Skinner, Cornell University, Ithaca, New York, United States

This paper details an initiative in New York State that developed climate policy in coordination with the labor movement. By placing the labor movement at the center of climate policy development, two sometimes disparate movements are brought together and the economic realities of climate mitigation and adaptation are given appropriate attention. Moreover, given the economic and personal sacrifice fossil fuel workers have given to provide the fuel that powered the growth of the American economy, there is a moral obligation and duty to ensure a just transition to a clean energy economy. The purpose of this work is to highlight the need for climate mitigation and adaptation policies to expand their focus beyond just the environment and include the economic realities of climate change mitigation and its impact on workers and communities.

Technical, Political, and Social Responses, 2018 Special Focus: Engaging with Policy on Climate Change

Room 4

Revising Policy**Ocean Acidification Post-Paris: Gauging Law and Policy Responses in Light of Emerging Scientific Projections**

David VanderZwaag, Dalhousie University, Halifax, -, Canada

Katja Fennel, Dalhousie University, Halifax, Canada

M. Cecilia Engler, Dalhousie University, Halifax, Canada

Scientific knowledge on the impacts of increased atmospheric CO₂ on the ocean's biogeochemistry, marine species, and marine ecosystems has grown exponentially in the last decade. The emerging evidence and projections makes a strong case for precautionary and preventative mitigation and adaptation responses to ocean acidification (OA) at multiple levels, including substantive and urgent reductions in CO₂ emissions. Although policy and legal responses to OA at the national, regional and international level have lagged behind, there is growing momentum for a robust response to "the other CO₂ problem". The paper addresses the opportunities and challenges of incorporating the threat of OA in mitigation and adaptation actions under the United Nations Framework Convention on Climate Change (UNFCCC) and the Paris Agreement. For that purpose, it: briefly describes the international legal and policy instruments relevant for OA, and justifies the focus on the global climate regime; provides a critical assessment of the role of OA in the climate negotiations leading to the Paris Agreement; assesses the implications of the Paris Agreement and its implementation mechanisms for OA, including scientific and legal challenges; and suggests possible avenues for strengthening the international legal response to OA in the post-Paris context.

Technical, Political, and Social Responses, 2018 Special Focus: Engaging with Policy on Climate Change

Integrating Carbon Pricing into Renewable Energy Regulatory Reform

Ross Astoria, University of Wisconsin, Parkside, Kenosha, Wisconsin, United States

New York state is leading the nation in reconfiguring its state policy around the technological characteristics of renewable energy resources. In particular, the New York Public Service Commission is undertaking a complete revision of the regulatory framework for the electrical power sector. Called "Reforming the Energy Vision" the Commission initiative is transitioning the regulatory framework away from one which presupposes centralized, fossil generation to one configured around decentralized, renewable technologies. In re-aligning the regulatory framework away from incumbent fossil infrastructure and to renewable technologies, carbon pricing plays an ambiguous role. There are presently three different carbon prices in New York, that generated by the RGGI cap-and-trade, the social cost of carbon, and that built into the Value of Distributed Energy Resources. The Commission has, therefore, commenced harmonizing the integration of the carbon pricing into the REV proceeding. This paper will trace the coursing of a carbon price through the regulated system with the purpose of assessing the relative importance of carbon pricing versus other reforms meant to align the regulatory framework with renewable technologies. Lessons learned from New York's reforms will inform mitigation and pricing efforts in other jurisdictions.

2018 Special Focus: Engaging with Policy on Climate Change

Climate Change Effects: Responsibility without Accountability

Christa Isabelle Stünzi, University of Bern, Bern, Switzerland

The legal response to addressing the consequences for the climate change phenomenon is based on the legislation on environmental protection. While it is praiseworthy and necessary that climate change issues are addressed on a global rather than a regional or national level, creating new concepts, agreements and guidelines will not effectively lead to improved climate conditions. One fatal legal flaw remains: No responsibility without accountability! In my paper, I argue that sufficient legal tools exist for governing the environment and the negative consequences of climate change. What we need, however, is to rethink the system in which these rules are put in action. In both international and domestic law, accountability is always at the very center of each responsibly claim. It is fundamental not to look at environmental burdens as criminal lawyers would do (the polluter pays) but through the lens of a risk manager. By doing so the international legislator needs to be understood from the top down, as a common problem with a solidarity responsibility. This approach is not new. Implementing a concept by which a common responsibility exists would mean that natural resource must be shared and exploited in the interest of mankind with regard to the inter-generational equity. With this we would establish a legal concept of responsibility without accountability enabling better responses to climate change. So we don't need more international agreements but we need to act on the ones we have.

Technical, Political, and Social Responses



15:40-16:55

PARALLEL SESSIONS

Room 5

Responding to Change**Alarming Climatic Tendencies at the Critically Endangered Brazilian Midwest Savannas**

Leandro Oliveira Salles, Federal University of Rio de Janeiro, Rio de Janeiro, Brazil

As the most threatened savanna biome in the world, the Cerrado Hotspot faces a critical moment demanding urgent conservation actions before it gets too late to revert the damages produced by vectors of frontier development that have already jeopardized more than 80% of its native vegetation. Thousands of springs drain from the Cerrado, crucially contributing to the maintenance of eight of the twelve main Brazilian Drainage Basins. The savanna vegetation remain somewhat green nearly all year long essentially due to its extended roots that can often reach the water table and also to an excess of Amazonian humidity that is driven towards the region by high atmospheric winds sustaining a stable rainy season. Despite of these conditions, data sets amassed by our research group (encompassing the last 50 years) strongly support tendencies of aridification at multiple scales including that of the entire Cerrado. This drought-stress tendency has been also corroborated by our recent years of intense fieldwork at a key region of the Cerrado (the Serra Geral range) that stands out by its contrasting scenarios, where regions of high endemism rate and Protected Areas are located almost adjacent to one of the most recent and important agribusiness frontiers in the country. The alarming forecast for this central region of the South American continent could be synthesized by a tendency of progressive increase in maximum and minimum temperatures as well as a mild reduction trend of absolute humidity apparently due to the rapid expansion of the agribusiness coupled with the excessive destruction of the vegetation cover.

*Assessing Impacts in Divergent Ecosystems***State-level factors in Metropolitan Climate Activism**

Carl Hand, Valdosta State University, Valdosta, Georgia, United States

Dana Williams, Valdosta State University, Valdosta, Georgia, United States

As nation states equivocate over meaningful climate change agreements, hundreds of cities worldwide and in the US have joined to promote climate change policies and actions. Many US cities have taken a leadership role in promoting ameliorative public policy and best practices, overcoming significant disincentives for doing so, particularly low levels of public salience and unreliable federal support and resources. Several of these evolving networks are now in existence, including the United States Conference of Mayors Climate Protection Agreement. The US Conference of Mayors plays a significant role in facilitating best practices as well as recognizing cities on the vanguard of climate leadership. Research to date has examined the factors explaining metropolitan climate activism, including potential climate risk, the influence of carbon intensive industries at the local level, and the role of community environmental capital. Less understood is the role that state-level energy policy and socio-political factors play influencing metropolitan climate activism. This research underscores the significance of political partisanship, both in terms of state environmental politics and statewide Democratic voting record, for understanding metropolitan climate activism.

*Technical, Political, and Social Responses***Climate Impacts on African Diaspora: Expanding the Articulation of Climate Justice**

Samuel Grant, Lead Consultant, The Public Policy Project, Saint Paul, Minnesota, United States

This paper will present data on climate impacts on the African diaspora using a complex environmental justice analysis. It is argued that the complexity of climate impacts on the African diaspora require a more comprehensive and locally nuanced framework for climate justice in order to nourish both local climate resilience and substantive global agreements that do not extend the harms of 600 years of colonialism now with its extension through carbon colonialism. A study is currently being conducted on the ten nations in the diaspora with the largest African population and the climate justice analysis done indicates need for expanding our sensibilities and approaches to the realization of deep climate justice. A set of recommendations are made, based on analysis, about what such an expanding definition, platform and approach might entail.

Human Impacts and Impacts on Humans

16:55-17:00

End of Sessions

Saturday, 21 April	
08:30-09:00	Conference Registration Desk Open
09:00-09:15	Daily Update
09:15-09:50	Plenary Session - Michel Gueldry, International Relations and Sustainability Studies, Middlebury Institute of International Studies, Monterey, USA
	"Approaches and Strategies for Engaging Climate Change Skeptics - and Their Limits"
09:50-10:20	Garden Conversation & Coffee Break
10:20-12:00	PARALLEL SESSIONS
Room 1	<p>Innovation Showcase</p> <p>The Energy Net: The Free Enterprise Solution to Solve Global Climate Change Tim Kaelin, Impact Analytics, West Palm Beach, Florida, United States Free enterprise has proven to be the most powerful force on Earth. America, the most powerful nation was built on free enterprise. Whenever invoked, free enterprise asserts its will, be it industrial revolution (1760-1840), the tech boom of the 1990's. If you can guide it toward a goal, it will surpass your most optimistic expectations. The Energy Net is a solution based in free enterprise. It strives to emulate the 1990's Tech Boom in a number ways, allowing 100's of thousands of Americans to innovate, invest and contribute to the American ideal, dramatically improving our economy and creating jobs, stemming the tide of Radical Islam, and solving Climate Change completely. <i>2018 Special Focus: Engaging with Policy on Climate Change</i></p>
Room 2	<p>Responsive Policy for Stakeholders</p> <p>Climate Change, Migration and Conflict: The Chittagong Hill Tracts in Bangladesh Rafiqul Islam, Dhaka University, Dhaka, Bangladesh Climate change and conflict is a much-talked topic with the increasing of climate change events and its impacts on human livelihood and security. This presentation will highlight this human concerning issue of how the climate events, e.g. floods, sea-level rise, drought and disasters are impacting on human displacement; and consequently generating conflict when the displaced people migrate to another place. The case of this presentation is Bangladesh. As one of the most climate affected countries, Bangladesh has already suffered from mass displacement and social and political violence. In Bangladesh, many people affected by the environment and climate have migrated and settled in the urban centres and the Chittagong Hill Tracts (CHT) in Bangladesh. The CHT is a conflict-prone hilly area inhabited by the ethnic minority people. The influx of migrated people to this region has complicated the socio-economic condition of the CHT, which has consequently complicated the conflict and peace-building efforts. This paper will explore how climate change-induced displaced people have migrated and settled in the CHT and complicated the socio-economic conditions, which have resulted in a long-standing social conflict in the region. This paper will also propose some policy recommendations to manage conflicts and build peace. <i>Human Impacts and Impacts on Humans</i></p> <p>Transformative Scenario Planning Workshops in Namibia and India Teresa Perez, University of Cape Town, Cape Town, South Africa Transformative Scenario Planning (TSP) has been successful in bringing about change in issues characterised by conflict, but has yet to be applied to climate change topics. The Adaptation at Scale in Semi Arid Regions (ASSAR) project experimented with TSP as a way to bring together scientists, policy makers, and community members, to tackle adversity exacerbated by climate variability. I observed TSP workshops held in Namibia and India that focused on water problems. Based on transcripts from semi-structured interviews I report on the different ways that influential stakeholders spoke about their agency: specifically, the contribution that the TSP methodology had made to their past routines, present decision-making and future planning. My findings showed that the value of the process lay not necessarily with helping identify new ideas about climate adaptation. Rather, activities encouraged participants to cling less rigidly to habitual ways of thinking and to working in silos. Consequently people across the social system were able to think creatively, in the long-term and appreciate the opportunities that working collaboratively might bring. The implication is that setting aside time for powerful stakeholders to be self-reflective, could be an important precursor to formulating and implementing climate change policies. <i>Technical, Political, and Social Responses</i></p> <p>Heritage Monitoring Scouts across Florida: Archaeologists and Citizen Scientists Respond to Climate Change Sarah Miller, Florida Public Archaeology Network, Pensacola, Florida-, United States Laura Clark, Florida Public Archaeology Network, Pensacola, Florida, United States The Florida Public Archaeology Network (FPAN) launched the citizen science-based Heritage Monitoring Scout (HMS Florida) program statewide during the fall of 2016 in part to assist Florida's Division of Historical Resources, which currently does not have the budget or policy permissions in place for climate change concerned initiatives. Fortunately, the program was in place a month before Hurricane Matthew and helped stewards document conditions and threats to sites in northeast Florida. During the first year, 233 volunteers signed up and submitted over 312 monitoring forms from across the state. This paper will discuss the challenges of developing a program that addresses impacts of climate change in a denial state, education and awareness for managing cultural resources given global climate change obstacles, and assessing the value of the community education component of the program. Impacts on cultural resources reported by the community from Hurricane Irma will also be discussed. <i>Technical, Political, and Social Responses</i></p>

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10:20-12:00

PARALLEL SESSIONS**Climate Change, Global Interdependence and Bargaining Leverage: A Neoclassical Realist Critique of Why South Korea Adopted a Carbon Cap and Trade System**

Benedict DeDominicis, Catholic University of Korea, Bucheon-si, Gyeonggi-do, South Korea

South Korean diplomatic bargaining leverage is enhanced through South Korea acquiring global leadership positions in promoting sustainable development. Global governance trends in addressing the greenhouse gas emission causes of climate change create opportunities for South Korea to benefit in terms of its power capabilities. They include diplomatic bargaining leverage deriving from South Korean representatives' high profile in supporting global multilateral treaty initiatives and their implementation organizations. South Korea benefits diplomatically from increasing global awareness of political economic interdependence for national sustainable development. Competition for influence by the United States and China in the post-Cold War international environment had included vying for leadership in global sustainable development initiatives. South Korea's geographic and institutional location at a nexus where US and Chinese focus their competition creates greater opportunities as well as dangers. South Korea aims to direct their competition into global sustainable development promotion with South Korea a leading proponent of these initiatives. As a lesser power, South Korea must accommodate this competition, while seeking to mitigate it to avoid regional and global interdependence from being undermined. Korean nationalism is the primary factor motivating Seoul's green international development promotion policy. Korea's experience of foreign domination since the turn of the last century has critically shaped prevailing expectations regarding American foreign policy towards northeast Asia. The US Trump administration's decision to withdraw from the 2015 Paris Agreement and the Trans Pacific Partnership disturbs these established Korean attitudes regarding US commitments to globalization.

Technical, Political, and Social Responses

Room 3

Implications for Agriculture**Impact of Climate Change on the Overwinter Boundary of Armyworm**

Xi-Jie Li, Nanjing Agricultural University, Nanjing, Jiangsu, China

Winter temperature warming is one of the most important characters in global change. Distribution boundary of some species in winter were reported shifted. The distribution of armyworm (*Mythimna separate*), an important phytophagous insect whose host can be various, was also limited by low temperature. In order to analyze the impact of winter temperature on overwinter boundary of armyworm, isotherm developing trend in decades and annual fluctuation of potential overwinter area derived from daily measured data were applied to display the change of armyworm's overwinter boundary during 1951 to 2014 in eastern China continent. We found that in the context of global warming, which was caused by the increased "warm-winter" frequency, the overwinter boundary shifted northward by different latitudinal distances among years. Comparing with cold winter, the northern limitation shifted northward for 0.5 - 1.5° (latitude) in warm-winter. Our results also suggested that the north overwinter limit had northward shift and the available overwintering area for armyworm extended. Furthermore, it could be concluded that winter temperature warming has been a possible threaten for crop production in China.

*Assessing Impacts in Divergent Ecosystems***Influence of 2015-2016 El Niño on the Occurrence of Rice Planthoppers in China**

Bao-Ping Zhai, Nanjing Agricultural University, Nanjing, Jiangsu, China

The objective of this research is to determine the influence of El Niño on the occurrence of rice planthoppers in China, so as to illustrate the occurrence regularity of rice planthoppers under extreme weather. The northward migration processes of rice planthoppers in the next year (2016) after an event of El Niño were analyzed based on the data of the weather over the East Asia migration field and population sizes of rice planthoppers monitored by light traps. The light trap catches of rice planthoppers in nine provinces of southeast China in the latest decade were statistically analyzed. The 2015-2016 El Niño was one of the strongest events since 1980s. This event resulted in significant influences on the weather of East and Southeast Asia. It caused the unprecedented worst drought in Indo-China peninsula, and heavy rain and floods in the south and east of China. That suppressed the rice planthopper from population development. It was found that the impacts of this El Niño on rice planthoppers are not only related to the own property of this extreme meteorological event, and some certain short-term weather events during the El Niño also might be crucial for the population development of rice planthoppers.

Assessing Impacts in Divergent Ecosystems

10:20-12:00

PARALLEL SESSIONS

Impact of Irrigation and Organic Supplements on N₂O Emissions from Fruit Orchards and Vegetable Farms in Australia and Vietnam, and Policy Options for Mitigation

Phi Hung Nguyen, Northern Mountainous Agriculture and Forestry Science Institute, Phu Tho, Viet Nam

Gordon Rogers, University of Sydney, Sydney, Australia

Kelvin Montagu, Western Sydney University, Penrith, Australia

Peter Ampt, University of Sydney, Sydney, Australia

Agriculture is a major contributor to greenhouse gas emissions, and these are likely to be affected by the cropping practices on different crop systems. This study measured seasonal and annual emissions of N₂O from the typical fruit and vegetable farms in NSW Australia (cherry, apple, babyleaf spinach, processing tomato and sweet corn) and intensive vegetable production farms in Vietnam (mustard, cabbage and choyson). The studies provided baseline N₂O emissions and in Australia, evaluated the impact of organic mulches, compost and well managed sub-surface irrigation on emissions. In Australia, the apple and cherry orchards, and the baby spinach and processing tomatoes the baseline N₂O fluxes were low, with both orchards averaging about 6g N₂O-N ha⁻¹ day⁻¹, on babyleaf spinach about 20g N₂O-N ha⁻¹ day⁻¹ and for processing tomatoes on sub-surface drip irrigation emitting 3.1g N₂O-N ha⁻¹ day⁻¹. In contrast, sweet corn emissions averaged 137g N₂O-N ha⁻¹ day⁻¹, and this was attributed to higher nitrogen fertilizer applications and frequent overhead irrigation. Adding compost or organic mulch around the apple or cherry trees increased N₂O emissions by about 2.7 and 3.8 times greater than the site controls, respectively. In Vietnam, N₂O emissions from four vegetable farms were related to management practices including tillage, fertilizer and irrigation. Peak emissions ranged from 54g to 179g N₂O-N ha⁻¹ day⁻¹ immediately after tillage and top dressing fertilizer.

Human Impacts and Impacts on Humans

Room 4

Impacts on Humans

Impacts of Climate Change to Tourism Development in the Mekong Delta Region of Vietnam

Van Da Huynh, Can Tho University, Can Tho, Can Tho, Viet Nam

Awais Piracha, Western Sydney University, Penrith, Australia

Mekong Delta Region of Vietnam is forecasted to have one of world's most severe impacts from climate change. There is a big knowledge gap in research on climate change impacts on tourism in this area. While climate change's impacts on agriculture and fisheries have received much attention from authorities and researchers, impacts on tourism have largely been ignored. Tourism modes that are predominant in the Delta such as ecotourism, islet tourism, national parks tourism and mangrove forests tourism are highly vulnerable to climate change. This paper presents findings from a field study the authors conducted to fill the research gap on climate change's impact on tourism in Mekong River Delta. The study based on questionnaires and interviews of local tourism leaders, tourism businesses and tourists discovered that climate change is a real challenge for region's tourism businesses and there are significant gaps in climate change awareness among key tourism stakeholders. The study also unearthed that in climate change adaptation for tourism resources and infrastructure, local authorities and tourism businesses are not heeding global climate change scenarios. Tourism relies on agricultural, fisheries and other sectors of economy. Most of these related sectors can be successfully adapted to climate change. Although it has become an interdisciplinary issues climate change is adaptable in tourism sector. The resilience and adaptation process for tourism in Mekong River Delta will be effective if there is strategic planning based on bottom up approach is considered during tourism planning in the region. Increasing the awareness and readiness of the stakeholders is also very important elements to tackling climate change. Moreover, vulnerable tourism businesses in low and flat delta such as Mekong needs more attention and practical actions from international organizations and local entities in the era of climate change threats.

Human Impacts and Impacts on Humans

Economic Determinants of Land Use Change in Mexico

David Ricardo Heres, Centro de Investigación y Docencia Económicas, Mexico City, Mexico

Griselda Priscila Mortera, Griselda Priscila Mortera, Mexico City, Mexico

Mexico's territory contains a wide range of ecosystems that host a high degree of biodiversity and forests represent a third of the total area of the country. During the last century, however, the forest cover in Mexico has been reduced to half its original size. Importantly, as part of the global efforts to mitigate climate change, Mexico has committed to conserve forests that contain and are capable of sequester large amounts of carbon. As major drivers of deforestation are still present in the country, for these policies to be effective it is necessary to identify the determinants of land use changes. The objective of the study is to explain land-use transitions between 2002 and 2011 based on economic returns in different uses. Our econometric estimations are based on a sample of almost 200,000 polygons that cover the whole country and for which we have information on land use, economic returns in competing uses, land type, access to roads, and socio economic conditions. As expected, our preliminary results indicate that agricultural returns are the main driver of deforestation and that the required compensation for conserving forests can be substantial in areas with high productivity in competing uses. Based on the results from this model, further research will be conducted to estimate the carbon sequestration supply curve in Mexico.

Technical, Political, and Social Responses, 2018 Special Focus: Engaging with Policy on Climate Change

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10:20-12:00

PARALLEL SESSIONS

New Fascism: The Retrofit of Karl Marx in the Quest for the Fully Capitalized Planet in the Age of the Climate Change Apocalypse

Wendy Lynne Lee, Bloomsburg University of Pennsylvania, Bloomsburg, Pennsylvania , United States

Indeed, it is precisely because climate change presents a potentially irrecoverable environmental crisis that the disregard of mounting evidence demands an equally potent pretext. Marx, I'll argue, provides just that pretext. Weaponized as the enemy of free markets or deified as the hero the worker's state, "Marxism" provides the ideological pretext for maintaining the myth of inexhaustible resources. Whether cast as the foe of "Making America Great, Again!" job creation in the manufacturing or mining sectors of the U.S. economy, or as the champion of Xi Jinping's "Chinese Dream," whether as foil or inspiration, a suitably retrofitted Marxism has been deployed by both leaders to legitimate unsustainable economic policies. However otherwise different, Donald Trump and Xi Jinping personify what I will call the new fascism: confronted with an existential threat the magnitude of climate change, both will reach for the most effective, ideologically reliable tool at their disposal to help dispel the growing recognition that the conquest of capital is responsible for climate change: "Marx." This paper traces how the potential impacts of climate change are mediated via the essentially nationalist commitments of two otherwise very different leaders. That the machinations of capital accumulation are responsible for greenhouse gas emissions is well-established, but the ways in which our response to--or denial of--climate change is ideologically disposed--that deserves greater exploration. The impacts of climate change, after all, are not only environmental, but social, economic, and geopolitical, particularly for developing world countries or regions like rural China which I discuss at some length. My argument is that Marx--if not always in name--plays an important role as spoiler (for Trump) or as hero (Xi) in what amounts to achieving the same ends: the preservation of multinational capitalist venture regardless the clear warnings about its role in global warming.

Human Impacts and Impacts on Humans, Technical, Political, and Social Responses

Tourist Responses to Potential Climate Change Impacts in Florida: The Filter of Social Representations

Roberta Atzori, California State University, Monterey Bay, Seaside, California, United States

Alan Fyall, University of Central Florida, Orlando, Florida, United States

Florida, one of the most visited tourist destinations in the world, holds one of the most "unenviable" positions in terms of its vulnerability to climate change with the effects already visible, particularly on its coastal areas. Beside the physical impacts of climate change, society's perception of climate change, and the response to it at various decision-making levels, have become critical issues. This paper presents the perspective of tourists who have previously visited Florida, in a hypothetical scenario of changed climatic conditions. The main purpose of this study was to understand whether, with the implementation of adaptation strategies directed to limit negative impacts of climate change, the likelihood of tourists to return to Florida would improve in comparison with a future in which no action is taken at the state level to address climate change. In this scenario, the filter of social representations in shaping tourists' perspectives was used as a system of explanation of different tourist responses. The results of this study show that predicting shifts in tourism demand based on stated visitation intentions requires caution. These can encourage future researchers to pursue a more critical way of exploring the meaning behind tourists' stated responses, which could lead to expanding our current understanding of how climate change will transform tourism demand across different destinations.

Technical, Political, and Social Responses

Room 5

Imperatives for Change

Fracking: An Often Overlooked Cause of Climate Change

John Ray, University of Montana, Missoula, Montana, United States

Hydraulic fracking, whereby sand, water and chemicals are injected at very high pressure to fracture shale oil rock in order to release natural gas, negatively affects climate change directly by releasing methane gas during the fracking process and indirectly by increasing our dependence on fossil fuels. Methane gas is much more potent as a greenhouse gas than is CO2. Some studies have found that methane gas leakage from fracking produces more potent greenhouse gas emissions than does coal. Fracking also contributes to climate change because by making natural gas cheaper and more plentiful, fracking encourages the greatly increased use of natural gas, thereby increasing greenhouse gas emissions. While burning natural gas per unit is less harmful to our climate than coal, by increasing the use of natural gas fracking contributes to global warming. In addition, natural gas processing and compressing plants significantly contribute to CO2 emissions. Shale oil from fracking also has led to a significant increase in refining petroleum, which also contributes directly to global warming. This paper discusses in depth the direct and indirect effects of fracking on climate change. Fracking and the use of the natural gas that it produces is not the benign alternative to coal.

Assessing Impacts in Divergent Ecosystems

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10:20-12:00	PARALLEL SESSIONS
	<p>Resilient Infrastructure and Climate-Related Disasters : Building Climate Disaster Resilience, and Reducing post-disaster Recovery Time Francesca O'Hanlon, Blue Tap, Cambridge, United Kingdom To achieve the Sustainable Development Goals set by the United Nations in 2015, improving resilience to climate-related disasters is essential. Certainly, under the umbrella of international development, disaster resilience is viewed as an increasingly essential element of poverty reduction. A person living in a developing country is 150 times more likely to be affected by disaster than a person living in wealthier nations. As a percentage of GDP, economic losses in the face of a disaster can be 20 times greater in developing countries than high-income countries. This is, in part, caused by the higher risks associated with the geophysical location of developing nations, but also because many cities in low GDP countries suffer from a lack of resilient infrastructure to provide for, and protect populations. Infrastructure services often go unnoticed by society when functioning at full capacity. It is only when they fail that society's dependence on these services is made fully clear, and in these cases, the consequences can be devastating. This is particularly true for vulnerable populations. Service disruption or failure can lead to economic and societal consequence that significantly delay the length of recovery after a disaster. This paper examines historic events where the failure of two critical infrastructure services, electricity and water has significantly inhibited the disaster recovery process in low and medium income countries. The paper states that in order to build resilient communities, infrastructure systems must be designed and managed to deal with the increased hydrometeorological threats that populations face in the 21st century. The paper argues that critical infrastructure should be viewed as a socio-technical system, and to protect against extreme weather events, should be designed not only with a reduced probability of failure in mind, but also with the aim to reduce negative consequences when failure does occur. Several recent cases of disruption in water and electricity services in the wake of climate disasters are assessed to analyse what the consequences of critical infrastructure failure are on the recovery time after a natural disaster. Case studies of the recent extreme weather events that impacted Puerto Rico, Dominica and Barbuda are used to study the impact of critical infrastructure failure on society. The disaster and recovery process is described and a new set of indicators that defines a successful post-disaster recovery are developed. A comparison is made between the consequences of critical infrastructure failure in high-income countries and the consequences of critical infrastructure failure in lower income nations. Finally, the role of building resilience into infrastructure services is discussed to see how, in the wake of failure of these services, societies can continue to re-build after a catastrophic climate-related disaster. The paper concludes that failure of critical infrastructure services plays a key role in prolonging the emergency phase after a weather-related disaster, and the failure of these services significantly impacts the nature of the recovery process. <i>Technical, Political, and Social Responses</i></p> <p>Providing Awareness and Outreach on Climate Change to Consumers: Data from Local Governmental and Advocacy Efforts in California Illustrating Roadblocks and Success Stories Sri Lekha, University of Nebraska, Lincoln, Nebraska, United States Climate change is a global problem affecting everyone, yet there is a significant shortfall in consumer awareness on ways to positively impact the environment. This presentation will discuss data from interviews with governmental, utility, advocacy and outreach organizations on the measures taken by these entities to promote consumer awareness on climate change, and the successes and failures, of such measures. The session will also discuss the various cultural, demographic and geographical roadblocks that exist in creating consumer awareness among different cultures and demographics and highlight efforts that were successful in overcoming the obstacles. The session is aimed at creating a dialogue on effective practices in creating grassroots consumer awareness on personal practices to mitigate climate change that can propel research, innovation, policy and advocacy work in this cause. <i>Human Impacts and Impacts on Humans</i></p>
12:00-13:00	Lunch
13:00-13:45	PARALLEL SESSIONS
Plenary Room	<p>Focused Discussions</p> <p>How a Physics Professor Saved Italy from Big Oil Maria D'Orsogna, California State University Northridge, Los Angeles, California, United States What is the role of non-elected scientists in environmental decision making? We review Italy's recent offshore drilling ban, an example of science-activism and community engagement through technology and social media. Can science and social media work together to raise awareness and help set environmental policies? What responsibilities do professional scientists studying climate change have in communicating with the general public and calling for action? Should scientists engage with adversarial policy makers and push for environmentally conscious decisions? What are the proper avenues for action outside academia? What is the emotional cost of full-fledged activism? As a case study, we will review Italy's recent 12-mile ban on offshore drilling. Establishment of the ban was influenced by a scientist-turned-activist who used social media, town-hall meeting lectures and public debates to create awareness among the general public, expose corruption, coordinate letter writings, raise awareness and spur action. We discuss how, by engaging with the community and pushing boundaries, scientists and educators can truly make a difference. <i>Technical, Political, and Social Responses</i></p>

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Room 3 Virtual Lightning Talks**Picturing Climate Change in Thunder Bay: Reflections on a Photovoice Project**

Lindsay Paige Galway, Lakehead University, Thunder Bay, Canada

Climate change is a wicked problem characterized by uncertainty, complexity, and the need for multi-level action. Although climate change is a global phenomenon, it is experienced locally and community level awareness and adaptation are imperative. Against this backdrop, a community photovoice project was developed and conducted by researchers from Lakehead University and The City of Thunder Bay. The objectives of the project were: to document and explore ideas about building resilience to climate change in Thunder Bay; to use photographs to raise community awareness about climate change; and to build momentum for climate change adaptation. Photovoice participants included members of the Thunder Bay Adaptation Working Group. Three workshops were held between July and September 2016. The introductory workshop provided an overview of the photovoice process and an opportunity for the group to finalize objectives and guiding questions. The second workshop focused on sorting, describing, and synthesizing photographs taken by participants. In the final workshop, emergent themes were identified, a community message was crafted, and those photographs that best represented the emergent themes and community message were selected. The final outputs from this project included a community photo exhibit entitled "Picturing Climate Change in Thunder Bay: Urgency, Hope and Action" and a project website.

Technical, Political, and Social Responses

Preservation of Human Rights in Iran's Climate Change Policy

Ali Kiani Neyestanaki, University of Tehran, Tehran, Iran

Borna Bateni, University of Tehran, Tehran, Iran

Adverse impacts of climate change on the human right to benefit from adequate conditions of life, in an environment of a quality that permits a life of dignity and well-being, have necessitated the role of States to apply a human rights-based approach to their climate change policies; meaning an assessment on to which extent, climate change will impede improvements of human well-being, and prevention of unjust and discriminatory climate change strategies. Iran, signatory to the 1992 Rio de Janeiro Earth Summit, 2005 Kyoto Protocol and 2015 Paris agreement, has shown to be trying to act in compliance with international integration about the climate change matter. Mitigation policy of Iran is also reflected in Iran's Sixth Five-Year National Development Plan (2017), the 2025 Vision of Iran, the National Communications of Iran to UNFCCC and numerous environmental legislation. In this paper, after providing a survey of interrelationship between human rights and climate change, we scrutinize the effect of the human rights-based approach on Iran's climate change policy, by examining Iran's treaty obligations, regulations and governmental decrees.

2018 Special Focus: Engaging with Policy on Climate Change

Environmentalism and the Machine: Questioning the Human/nature Dualism for a Sustainable Future

Melusine Martin, James Cook University, Cairns, Australia

The conventional connotation of the term "ecology" implies seeing everything as connected, as constituting a whole that is greater than the sum of its parts. Yet the human/nature dualism is still predominant in environmental thinking. It is an aspect of Western culture and of Western discourses on nature protection that defines humans and nature as opposite. As scientists identify further support for the biophilia hypothesis while researching the effects of nature on brains, the notion of wilderness as "unspoiled" nature is slowly evolving to encompass human beings, and human beings are evolving to consider themselves part of nature. This conference paper, made following a literature based research methodology, offers a critical analysis of studies questioning the human/nature dualism in green thought. I argue that some aspects of environmentalism (deep ecology among others) are still a practice determined by Western culture in a postindustrial context, and that they are an expression of the human/nature dualism. I call on individuals to rethink human-nature disconnectedness by digging deeper to the problem's cultural roots. New social and cultural approaches to climate change come from changing our beliefs about nature and our ideas about our place in nature.

Technical, Political, and Social Responses

Room 4

Workshop**Visualizing Science: Using Artistic Experiences to Communicate Climate Change**

Sally Graves Machlis, University of Idaho, Moscow, Idaho, United States

Delphine Keim, University of Idaho, Moscow, Idaho, United States

Scientists seek to understand the vexing problems facing humankind including public health, the environment, and natural and manmade disasters. It is often difficult to explain the vastness of their research or the problems they seek to answer to the general public. Some of the issues we face such as climate change are so complicated and frightening that much of the population chooses to not even look at the science. Facts, maps, and charts often serve those who are already concerned with our unsustainable trajectory. Art can be a compelling avenue for communication. It can help us understand what it means to be human. It can connect us to our feelings and emotions. While scientists seek to convey knowledge through research and data, artists seek to change culture through their unique vision. In this workshop the authors will share the recent collaboration between artists and scientists at the University of Idaho visualizing scientific research. Participants will be led through a structured exercise to visualize an aspect of their research similar to the process used at UI. They will be guided with a series of prompts to uncover an early scientific fascination. What is the earliest experience of their research focus? Modeling the artistic creative process, participants will have the opportunity to create a visual/emotional interpretation of a specific aspect of their scientific research using 3-D media (plastic clay) and/or a 2-D media (colored pencils and oil pastels). Materials provided.

Human Impacts and Impacts on Humans

Hall

Posters**Potential Geographical Distribution of Aedes Aegypti in Colombia under Climate Change Scenarios**

Cristiam Victoriano Portilla Cabrera, National University of Colombia, Bogotá, Colombia

John Josephraj Selvaraj, National University of Colombia, Bogotá, Colombia

The dengue, chikungunya and Zika viruses are arboviruses transmitted to humans through the bite of the *Aedes aegypti* female mosquito. Currently, the vector represents a potential epidemiological risk in several countries of Latin America and the Pacific. However, little is known about geographical distribution and environmental suitability for this mosquito under projected climate change scenarios. Using a maximum entropy species distribution model (MaxEnt) based on presence only records from Global biodiversity information facility (GBIF), elevation (SRTM) and climatic variables (WorldClim), we produced environmental suitability maps of this mosquito for present and future geographic distribution. The future distribution was constructed based on General Circulation Model (GCM) Center for Atmospheric Research's Community Climate System Model (CCSM4) for the 2050s and 2070s projected under the RCP 2.6, 4.5 and 8.5 climate change emission scenarios described by Intergovernmental Panel on Climate Change (IPCC). The model estimated that some departments of the Caribbean (La Guajira, Atlántico, Magdalena, Córdoba, Sucre, Bolívar and Cesar), Pacific (Valle del Cauca, Huila, Quindío, Risaralda, Cauca, Caldas, Antioquia and Nariño) and Andean (Tolima, Boyacá, Cundinamarca, Santander and Norte de Santander) regions of Colombia have a high probability of distribution of mosquito under present and future conditions. The results also indicate that the area susceptible to the presence of this vector species (*Aedes aegypti*) will tend to reduce, concentrating in some departments of Colombia under climate change scenarios.

*Human Impacts and Impacts on Humans***Climate Change, Natural Disasters, and Suicide**

Ans Irfan, George Washington University, Washington, D.C., United States

Natural disasters are projected to increase due to climate change. Mental health is not a well-researched area in public health, particularly as it relates to environmental health and in the aftermath of natural disasters. The suicide is a leading cause of mortality in the world and is the 10th leading cause of death in the U.S. This already high suicide rate and an increase in climate-induced natural disasters warrants researching this area of mental health. The objective of this systematic literature review is to explore the relation between natural disasters and suicide rates among the affected population in the aftermath of natural disasters. This research was produced thorough a systematic literature review following PRISMA methodology. Four digital databases, PubMed, Scopus, Cochrane, PsycINFO, were utilized to conduct a thorough systematic literature review. After applying the predetermined inclusion and exclusion criteria and reviewing the literature in detail, out of 895 articles, seven studies were included in the final literature review. Most of the studies (n=5) included in this review found a positive correlation between suicide rates and natural disasters. The suicide rates varied for different natural disasters and some studies found an increase of up to 40% after certain natural disasters such as recurring floods. Heatwaves, flooding, and droughts were associated with an increase in suicide while tsunamis and hurricanes were not.

*Human Impacts and Impacts on Humans***Impacts of Climate Change on the Risk of Forest Fires in the Paraná State, Brasil**

Ronaldo Soares, Federal University of Paraná, Curitiba, Paraná, Brazil

Tatiane Ho, Federal University of Paraná, Curitiba, Paraná, Brazil

Antonio Carlos Batista, Federal University of Paraná, Curitiba, Paraná, Brazil

Alexandre França Tetto, Federal University of Paraná, Curitiba, Paraná, Brazil

Forest fires are a global phenomenon resulting from the interaction between climate, fuels and human activities. Fires are also a critical component in the dynamics of planet earth and atmospheric. Recent advances in remote sensing have demonstrated the importance of fires on a global scale. The weather and climate are the major factors affecting the activities of the fire and are changing due to climate change caused by man. There is an expectation of most researchers that changes in climate over the next 100 years will cause a major impact on forest ecosystems. The aim of this study was to determine the zoning of forest fire risk for the state of Paraná, since the two scenarios predicted by the Intergovernmental Panel on Climate Change (IPCC) in 2013. For this were used maps of vegetation, fuel moisture, Monte Alegre Formula (FMA), slope, slopes orientation, population density and road system. The determined values were then used to compose the Forest Fires Zoning Risk (ZRIF) per decade for the Paraná State. The results showed that for both scenarios, between 2010 and 2100, there will be an increase in the extreme risk class of 9.64% in the best scenario and 9.88% in the worst case scenario. It was concluded that, if the IPCC predictions were confirmed, there will be an increase in the number of occurrences by forest fires in the state of Paraná, which will require integrated actions to prevent forest fires to minimize environmental damage.

Scientific Evidence

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Climate Change, Agricultural Pesticide Use, and Establishing Exposure Risks for Agricultural Communities

Katie Fellows, University of Washington, Seattle, Washington, United States

Climate change is expected to influence agricultural pest dynamics and pesticide application timing and rate, but to date no research has quantified this relationship. This project assesses the association between climate change and agricultural pesticide use, utilizing a combination of climate science, agricultural assessment, and public health methods to further understand the spatial and temporal impact of climate change underlying the relationship between pesticide exposure and human health by testing whether climate is historically associated with insect pest populations and pest management strategies such as pesticide use, and whether climate change will result in increased pest populations and insecticide use under future climate projections. The project investigates insecticide use on almonds grown in the Central Valley, utilizing the states Pesticide Use Reporting database. Historical and future climate data comes from ten statistically downscaled global climate models. The historical association between climate and pesticide use is then modeled and applied to future climate projections to project pesticide use in 2050. Changing pesticide application impacts risk of human exposure to these chemicals, and the corresponding adverse health outcomes. A geospatial risk assessment of future exposure in California maps potential exposure risk, identifying areas with the greatest human health hazard.

Human Impacts and Impacts on Humans

Impacts of Climate Change on Agriculture Water Use in the Central Valley, California

Lisbeth DaBramo, Lawrence Berkeley National Laboratory, Berkeley, California, United States

Helcio Blum, Lawrence Berkeley National Laboratory, Berkeley, California, United States

Raghavendra Suribhatla, INTERA, Austin, Texas, United States

The Central Valley in California accounts for approximately 10% of the total U.S. farm production and 94% of the irrigation water used in the state. The agricultural water demand is sustained by a combination of local and imported surface water and local groundwater supplies. Projections of climate change indicate reduction in snowpack volumes in the northern Sierra Nevada and surface water flows, and a consequent shift towards increased supply from local groundwater. The recently-passed Sustainable Groundwater Management Act (SGMA), on the other hand, might restrict groundwater pumping to reduce overdraft and prevent other undesirable results. This study examines the impact of projected changes in precipitation and temperature on crops water demand, surface water supply, and on groundwater use under alternative policy constraint scenarios. We rely on downscaled precipitation and temperature datasets and projections of surface water deliveries. We use an integrated surface water-groundwater model of the Central Valley to estimate groundwater pumping and simulate groundwater levels for alternative climate trajectories. The latter will eventually indicate the likelihood that groundwater pumping will be maintained at historical levels with no impacts on agriculture water supply. It will also inform future research on agriculture climate adaptation strategies and their energy impacts.

Human Impacts and Impacts on Humans

The Shadow System for the Adaptive Capacity to Climate Change: The case of Santos, Brazil

Fabiano de Araujo Moreira, State University of Campinas, Campinas, Brazil

As part of the comprehensive Project Metropole (Belmont Forum), this research aims to analyse the shadow system – understood as the informal interactions between communities and networks at different scales inside the organisations structures that do not count as official, but may be effective due to their greater agility – and its importance for the local adaptive capacity given the advent of climate change in the highly strategic and dynamic municipality of Santos, Brazil. For the analysis were considered the results of Adaptive Capacity Index (ACI), developed by researchers from King's College London, applied to 24 local agents that have the responsibility to create the rules of the city from the government, civil and private sector. The ACI determine the adaptive capacity of Santos through analysing the factors that affect the planning of necessary adaptation measures and policy changes within the social context of the region, but the focus for this presentation will be the considerations regarding the shadow system: the interviewees in Santos strongly emphasised these informal relationships as a way to circumvent the limitations caused by regular restructuring and modification of job descriptions and responsibilities within government agencies. With this study it was possible to observe that the shadow system is partly responsible for a significant change in the organisational and governmental capacity of Santos, enabling the organisations to overcome barriers such as periodic government overhaul, which causes policy discontinuity, and that shows the importance of considering these informal relations to strengthen the adaptive capacity of the municipalities.

Technical, Political, and Social Responses

Biomass Burning Impact on Aerosol Characteristics and Radiative Forcing over Middle Indo-Gangetic Plain

Nandita Singh, Banaras Hindu University, Varanasi, India, Varanasi, India

Indo-Gangetic plain is one of the most densely populated regions of the world encompassing the northern and eastern India, Pakistan, and virtually all Bangladesh. Every year extensive post-harvest agricultural residue burning occurs during October-November (Rice) and April-May (Wheat) over the North-West Indo-Gangetic Plain (IGP). The emissions from the prime burning locations transported over thousands of kilometers downwind, covering the IGP from west to east and central Himalayan region. The biomass burning (BB) emissions potentially influence Earth's radiation budget, atmospheric chemistry, impacting air quality and risks to human health. In 2016 and 2017, BB has played a noticeable role in unexpected severe smog and haze episodes over Delhi that overlapped with the stable atmospheric condition. Present submission focuses the impact of BB on aerosol characteristics, its radiative properties, and long-range transport over middle-IGP during the October-November, 2016 by analyzing ground-based and satellite-retrieved observations. The average aerosol loading was found high ($362 \pm 211 \mu\text{gm}^{-3}$) with the maximum of $734 \mu\text{gm}^{-3}$ and AOD550 (0.55 ± 0.22) raised to a maximum of 1.92. The average black carbon ($8.6 \pm 3.1 \mu\text{gm}^{-3}$) was found high and positive delta C values (2.4 ± 1.0). The estimated shortwave atmospheric radiative forcing was found positive with higher values ($95 \pm 65 \text{ Wm}^{-2}$) with an average heat rate of 3 Kday^{-1} . The current findings were found higher than the other reported in IGP during previous years which suggests that there is an increase in atmospheric warming over middle IGP. It may lead to change in regional climate such as increase in temperature, alteration in precipitation cycle and drought.

Scientific Evidence

The Effects of Temperature and Humidity on Hand, Foot and Mouth Disease in California, 2005-2013

Dharshani Pearson, California Environmental Protection Agency, Oakland, California, United States

Hand, foot and mouth disease (HFMD), a highly infectious illness marked by fever, blisters and sores mainly affecting children, is quickly emerging in California following a large upsurge in Asia during the last decade. Climate change-induced variations, including effects to precipitation, temperature and humidity, could contribute to HFMD development and spread in California. In this study, we used a two-stage time-series study design to examine the effects of temperature and humidity on developing HFMD using California Emergency Room data from 2005 to 2013. In addition to looking at overall cases, we also looked at vulnerability among race/ethnicity, age groups and sex by examining effect modification across groups. This is the first study exploring association between HFMD and climate exposures in California. Climate conditions in California are different from Asian countries, where most previous HFMD studies were conducted. Our findings will provide new insight on the climatic effects on an emerging infectious disease.

Human Impacts and Impacts on Humans

Observed Changes in Extreme Hydroclimatic Events in Central America

Hugo Hidalgo, Director, Center for Geophysical Research, University of Costa Rica, San Pedro, San José, Costa Rica

Previous studies have shown that most of Central America has been experiencing warming trends during the last 30-50 years, while precipitation annual totals have not changed much. Warming alone can exacerbate the effects of droughts as potential evapotranspiration increases, causing drier soils and higher aridity. It is evident that the demand of water from the atmosphere has becoming larger. Central America is a region known to be impacted by wet and dry extreme events. Within the scenario of higher aridity, severe and sustained droughts can produce a larger number of impacts in the region. But also, wet extreme events are the cause of severe impacts. Analysis of observed precipitation extremes show a trend toward more severe events in recent years. In this presentation, recent trends in different hydroclimatic variables as well as in metrics representing extreme events are analyzed.

Scientific Evidence

Monitoring Changes of Mangrove Trees in Rabigh Lagoon Swamps Using Remote Sensing and GIS

Mohammed Aljahdali, Professor, King Abdulaziz Univeristy, Jeddah, Makkah, Saudi Arabia

Due to changes caused by human impacts on the hydrology of Rabigh lagoon system, approximately 49.35% of the originally 490 hectares of mangrove forests have been destroyed between 1987 and 2012. However, during 2013 to 2015, it has been noticed that some healthy mangrove trees exist along the lagoon with 30% of enhancement in terms of number as compared with past seasons. The main objective of this study is to detect the changes of mangrove forests canopy in Rabigh lagoon using remote sensing and imaginary. To fulfill this objective Landsat images acquired between 1987 and 2015 were used for analysis. The images were calibrated, smoothly filtered, and radiometrically corrected, and then human constructions, Normalized Difference Vegetation Index (NDVI), mangroves distribution and changes between 1990 and 2015 were estimated. The data indicate that the degradation of mangrove cover is started in 1988 when the lagoon was mostly enclosed by a passageway. The passageway was partly modified in 1990, where the mangrove forests linked again with the open system of Red Sea through narrow streams. The recharged water in the swamp was low until 2012 where the lagoon was mostly liberated. Mangrove forests were severely degraded between 1990s and 2000 especially in the islands and the northern parts of the lagoon. The total area of mangrove forests was decreased from 490.4 ha in 1990 to 286 ha in 2000 and to its lowest amount of 248.8 ha in 2012. In contrast, the mangroves area

Human Impacts and Impacts on Humans

Exploratory Analysis of the Climatic and Anthropogenic Drivers of Wildfires

Erin Finestone, ENVIRON International Corporation, Arlington, Virginia, United States

Wildfires are an ecological disturbance intrinsic to many forest, shrub land and grassland ecosystems and play an important role in shaping these ecosystems. Despite the necessary (and often) beneficial role of wildfires, they have numerous harmful on and off site effects. From a public health perspective, wildfires adversely affect human mental and physical health. There is rising concern that these undesired health outcomes will intensify in the future as climate models predict an increase in wildfire frequency, severity, and extent throughout the United States. This study seeks to understand what anthropogenic and environmental factors are key drivers for wildfire incidence in the state of Oregon and develop risk maps for the region. Descriptive statistics, ANOVA, spatial analysis, and multivariate logistic regression were employed to achieve these goals. The results of this study can help local public health departments and land managers prepare for wildfire risk and vulnerability in the face of climate change.

Human Impacts and Impacts on Humans

The Social Influence of Graphic Design on Climate Change: Presenting Climate Change in a Visually Compelling Way

Jong Yoon Kim, California State University, Chico, California, United States

Graphic Design, also known as communication design, is the art and practice of planning and projecting ideas and experiences with visual and textual content. We, graphic designers, are professionally trained to inform audiences in visually effective way, such as innovative logo designs, engaging web designs, and creative packaging designs. But there's another avenue of design that does well when sourced to the crowd that can have significant impacts outside of profit margins: socially influential design. Today, we are facing on severe climate change threatening humans. Climate is changing. During the 20th Century Earth's average temperature rose 0.6° Celsius (1.1°F). While climate has changed throughout Earth's history, this is the first time that humans are the main cause. As a graphic designer and an educator, I have come up with several questions based on scientific information to ask ourselves and to inform audiences; How do we know climate change is real? Why is climate change happening? What are the effects of climate changing? What is the effective ways of presenting climate change to solve the problems? I am convinced that the quality of design plays a bigger role in our lives than ever before. Designers are not only good at designing functionalities but also good at solving problems, and especially in recognizing problems that people didn't previously consider to be problems at all. This poster/exhibition session will feature various possibilities of graphic design tools and methods connecting scientific information to visual communication.

Technical, Political, and Social Responses



Using Complex Network Analysis to Evaluate a Changing Electrical Landscape

Vanessa Wolf, Student, Pasadena City College, Pasadena, California, United States

The distribution of electricity through the power grid is of fundamental importance to the functioning of society, yet remains an infrastructure-level contributor to greenhouse gas emissions. At present the grid is mostly centralized. However, diversified energy production, as a way to reduce fossil fuel usage and mitigate climate change, may radically change its topology. Increases in small-scale renewable generation sources, such as from solar panels and wind turbines, have already begun to impart a more distributed character to power generation compared to the power-station model which has until now dominated the electrical landscape. Additionally, the implementation of microgrids in future infrastructure may introduce new topologies with unique characteristics. We model the electric grid as a complex network and perform a statistical Complex Network Analysis. In particular we investigate the topological properties of a model of a single neighborhood (or microgrid) with the grid radiating from a single substation, as distributed generation from secondary sources increases over time.

Technical, Political, and Social Responses

Climate Change and Its Effects on the Hydrophysical Approach to Quantitative Morphology in Catchments

Lazaro Nonato Vasconcellos De Andrade, University of the State of Bahia, Salvador, Brazil

In the cartography evaluation, quantitative analysis of elements that characterize hydrographic networks in geomorphology has a methodology. However, with the development of remote sensing techniques, the studies that associate the behavior of the environment and the cartographic measurements have been made possible in order to identify the evolution of the flow in watersheds and, as such, to understand water scarcity in the rivers. The use of Horton's quantitative morphology, together with spatial and temporal analysis techniques of remote sensing, was applied in the study of how changes in climate and their consequences in the environment can be measured by the estimation of hydrophysical parameters.

Scientific Evidence

Mobile Apps that Fight the Challenges of Climate Change

Nanhee Kim, California State University, Chico, California, United States

Climate change is no longer a new term to us. From drought to global warming, climate change affects our lives in critical ways. Climate change not only affects our environment; it will eventually affect the livability of our eco-system. Many factors influence Earth's climate but the evidence indicates that a large part of climate change is caused by human activities. These are factors that we can and should address. Due to the seriousness of this issue, climate conscious groups have acted to raise awareness of the climate change and how people can reduce the negative effects of climate change. Design has played an important role in raising social awareness and has served to solve some of society's substantial issues. The growth of technology and the evolution of mobile app usage suggest that mobile apps have a role to play in raising awareness of relevant social issues. Engaging mobile apps could capture these new social media audiences and produce greater social awareness of sensitive topics. This study evaluates mobile apps that aim to advance user awareness of climate change and help to develop a healthier eco-system. These are mobile apps intended to impact the effects and causes of climate change on the environment. This research discusses the limitations and strengths of the mobile apps in addressing the social and economic aspects of climate change.

Human Impacts and Impacts on Humans

Relatively Stable Response of Fruiting Stage to Warming and Cooling Relative to Other Phenological Events

Shiping Wang,, Chinese Academy of Sciences, Beijing, China

Lili Jiang, Chinese Academy of Sciences, Beijing, China

Yaoming Li, Institute of Tibetan Plateau, Chinese Academy of Sciences, Beijing, China

Plant phenology is the recurrence of life history events. Impacts of climate change and human activity on phenology were significant in the Qinghai-Tibetan Plateau, and warming and optimal grazing advanced the timings of green-up and flowering but delayed the end date of senescence. However, fruiting time kept relative stable compared with other phenophases. Warming prolonged the duration of plant activity period which was mainly derived from prolonged flowering duration as well as other reproductive phenophases. These changes mainly attributed to changes of temperature, moisture and grazing. Warming and wet, moderate grazing contributed to advance and lengthen phenophases, whereas warming and drought led to delay and shorten phenophases. Changes of phenophases had significant influences on structure and function of populations, community, ecosystem and productions and lives of pastoral and tourism.

Assessing Impacts in Divergent Ecosystems

Vulnerability Assessment of Critical Oil/Gas Infrastructure to Climate Change Impact in the Niger Delta

Justin Udie, De Montfort University, Leicester, Leicestershire, United Kingdom

Subhes Bhattacharyya, De Montfort University, Leicester, Leicestershire, United Kingdom

Leticia Ozawa-Meida, De Montfort University, Leicester, Leicestershire, United Kingdom

The Niger Delta is the energy hub of West Africa. Critical energy infrastructure built around this coastal area are under severe threat of climate change impacts. This provoked the need for a crucial investigation of the vulnerability of these infrastructure with the view to suggesting possible adaptation strategies for sustainable energy exploration in the region. We used Analytic Hierarchy Process (AHP) of Multicriteria Decision making Analysis (MCDA) to illuminate vulnerable oil/gas infrastructure after randomly selecting seven (7) assets upon an intensive exploratory survey. In addition, adequate scoping and review of literature revealed seven (7) AHP criteria that were used to engage stakeholders in the industry for focus group interviews. Analysis of result revealed a high vulnerability of critical oil/gas infrastructure due to; proximity between climate threat windows and location of infrastructure; exposure of these assets to direct sunlight upon the rising ambient temperature is causing rapid corrosion of carbon-steel infrastructure. The investigation further revealed that assets located in inundated areas (4.5 m asl) with weak adaptive capacities due to age and obsolescence are more vulnerable to flood, storms and rising Atlantic tides. We proposed infrastructure upgrade, decommissioning and substitution of carbon steel systems with glass reinforcement epoxy made systems.

*Assessing Impacts in Divergent Ecosystems***Climate Change and Its Impact on Humans' Lives : A Human Rights Perspective**

Marlene Payva Almonte, University of Liverpool, Liverpool, England, United Kingdom

The rise of sea-levels, floods, droughts, water scarcity, heavy precipitations are vividly evidencing the tremendous impact of climate change on people's lives worldwide, particularly, in the least developed areas, giving a sense of urgency of measures to address the problem through collective climate action whereby human rights should be an essential component. In the last years the role of human rights has slowly and gradually been accepted in different fields of the climate change debate and literature. The scope and potential of this role remains to be seen. A few decades ago, it would have been unthinkable to consider human rights and its mechanisms as having a space in the climate change debate, which was almost regarded as scientific and technical. Today, there is no doubt that human rights have a role to play in addressing the major global challenge of climate change. The harmful effects of climate change on a range of human rights has widely been recognized in a number of documents and scientific reports including the Human Rights Council resolutions, reports of the United Nations Special Rapporteur on Human Rights and the Environment, scientific reports of the Intergovernmental Panel on Climate Change, among others. The Paris agreement consolidates the universal recognition of the importance of human rights in addressing the challenges that climate change poses to humankind.

*Human Impacts and Impacts on Humans***Disasters, Displacement, and Dysfunction: The Capacity of Emergency Housing Policies to Assist "Climate Refugees" in Natural Disasters**

Matthew Moore, California State University, Easy Bay, Hayward, California, United States

Chandrakala Ganesh, California State University, Easy Bay, Hayward, California, United States

In 2005, Hurricane Katrina displaced approximately a quarter of a million people in New Orleans, Louisiana, over half the city's population. 12 years later there remain serious and persistent concerns about the policies, programs, and procedures in place to mitigate housing displacement caused by natural disasters associated with climate change. The Federal Emergency Management Agency (FEMA) estimates that it can provide short-term shelter for up to 50,000 individuals, a fraction of the number displaced in such a disaster. Most communities rely instead on state and local emergency programs; frequently, these plans are simply to use schools and public buildings as temporary shelters, with no long-term solutions. Compounding the problem, homelessness has exploded as economic inequality has increased, with tent encampments becoming ubiquitous on city streets and in parks. Existing programs already struggle to serve these populations. In a future displacement event, existing emergency housing programs would likely be overwhelmed. Our paper will conduct a systematic policy analysis of current emergency-housing programs at the federal, state, and local levels, evaluate the likely ability of these programs to affectively mitigate significant displacement caused by climate-change related natural disasters, and suggest policy solutions to sustainably improve the capacity of these programs.

*Technical, Political, and Social Responses***Climate Change and Internal Migration in Brazil**

Claire Brunel, American University, Washington, D.C., United States

Yuanyuan Maggie Liu, American University, Washington, D.C., United States

Global warming affects productivity in climate-sensitive sectors thereby creating income shocks, especially for rural households in poor countries. Internal migration represents an important channel through which households can cope with these shocks. Recent empirical work suggests that high migration costs could be a significant impediment to relocation for poor households. Using the state of road infrastructure as a proxy for migration costs, we exploit exogenous variation in temperatures and precipitation rates across 137 mesoregions in Brazil and examine the response of long-run bilateral migration flows between 1980 and 2010. The empirical evidence is based notably on a novel road dataset we constructed by digitizing historical maps of the road networks, combined with geospatial data on climate factors and bilateral migration data from decennial censuses. Our results suggest that migration costs act as a significant deterrent of climate-driven relocation.

Human Impacts and Impacts on Humans

14:00-15:40

PARALLEL SESSIONS

Room 2

Economic Challenges

Economic Evaluation of Large Weather Events Due to Climate Change: Floods in Atlantic Canada

Yuri Yevdokimov, University of New Brunswick, Fredericton, Canada, Fredericton, New Brunswick, Canada

Yuliya Burina, University of New Brunswick, Fredericton, New Brunswick, Canada

Stanislav Hetalo, University of New Brunswick, Fredericton, New Brunswick, Canada

Historically Atlantic Canada is vulnerable to flooding. Destructive consequences of these events have been seen in the past and are expected to occur in the future specifically due to climate change. The goal of this study is to establish a relationship between socio-economic, climate change as well as direct flood factors and economic loss from floods. The study attempts to assess economic consequences of floods as the most frequent, damage-causing extreme weather event in Atlantic Canada. Evaluation of the above mentioned relationship is done on the basis of statistical analysis based on data collected from Canadian Disaster Database, database of Environment Departments and Local Governments of Maritime Provinces. The study concludes that economic impact from floods in Atlantic Canada is negative and statistically significant, and it depends on climate change. Expected economic loss from floods evaluated in this study represents the upper bound for potential investment into mitigation measures.

Assessing Impacts in Divergent Ecosystems

British Columbia's Carbon Tax to Combat Climate Change: Lessons for Taiwan

Tsung-Sheng Liao, National Chung Cheng University, Chiayi, Taiwan

Among instruments to reduce greenhouse gases, the carbon tax tool represents a promising but politically controversial approach. British Columbia, Canada, introduced a broad and consumption-based carbon tax in 2008. The carbon tax rate was \$10 per ton of carbon dioxide equivalent (CO₂e) emissions initially, increased to \$30 per ton in 2012, and covers 70 percent of British Columbia's greenhouse gas emissions. The introduction of the tax had faced immense challenges, but turns out to be a successful innovation in climate action. This article explores background and context of British Columbia's use of the carbon tax to reduce greenhouse gas emissions. The author examines and focuses on challenges involved and solutions for them. Then, by comparing background facts and circumstances of British Columbia and Taiwan, this article lays out what challenges Taiwanese Government may confront with and what solutions the Government can employ if the carbon tax tool becomes necessary to deal with greenhouse gas emissions in Taiwan.

Technical, Political, and Social Responses

Disbursement Process of Climate Funding in Adaptation Fund, Least Developed Countries Fund and Green Climate Fund: How Far Aligned with the Adaptation-Needs of LDCs

Badiul Alam, Macquarie University, Sydney, Australia

Least Developed Countries (LDCs) are the most vulnerable countries to the adverse impacts of climate change because of their less resilient power and poor economic condition. The UNFCCC, Kyoto Protocol and the recent Paris Agreement, all international treaties on climate change have acknowledged the vulnerability of these LDCs and have given responsibility to the developed countries to supply financial resources for the implementation of adaptation activities in these countries. But the LDCs have complaint about disbursement process and the funding mechanism of these international Climate Funds. In the Adaptation-finance architecture, a central challenge is to design institutions that can channel funds effectively for the implementation of adaptation activities in the fund-receiving countries. The question as to how far these Climate Funds are meeting the adaptation-needs of the LDCs and promoting the country-ownership has become central in the climate change and adaptation-finance nexus. In that context, this paper will investigate into the challenges of decision-making, disbursement process and overall management of some selective international Climate Funds such as AF, GCF and LDCF from the adaptation-perspective of the Least Developed Countries. As outcome, this paper will contribute in legal and policy reforms in the overall management-arena of international climate change adaptation finance.

2018 Special Focus: Engaging with Policy on Climate Change

Room 3

Adaptation and Mitigation

Adapting to Climate Change in Tennessee: University of Tennessee Extension Approaches to Adapting to More Droughts and More Floods

Forbes Walker, University of Tennessee Extension, Knoxville, Tennessee, United States

It is anticipated that Tennessee will experience more floods and more droughts in the future. This will affect agriculture in the state in different ways.

University of Tennessee (UT) Extension personnel are working closely with landowners and producers to provide practical and cost-effective strategies for managing and coping with changes in climate patterns especially during periods of rainfall deficient and droughts. This paper will summarize the ongoing applied research and extension efforts of UT Extension to provide livestock with adequate forages during the summer months, as well as extend the grazing season and improve irrigation efficiency for row-crop and nursery crop agriculture. This work is in part supported by a USDA NIFA Water for Agriculture grant awarded to the University of Tennessee in collaboration with Tennessee Technological University, University of Memphis, Middle Tennessee State University and the University of Tennessee at Martin to study the effects that climate change may have on agricultural production in the Tennessee and Cumberland River Basins in the coming decades.

Technical, Political, and Social Responses

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Adaptation of Asia-Pacific Forests to Climate Change

Guangyu Wang, University of British Columbia, Vancouver, Canada

John Innes, University of British Columbia, Vancouver, Canada

Climate change is an immense threat to the stability and productivity of forest ecosystems in the Asia-Pacific region. Potential changes to or loss of forests will have drastic environmental impacts on biodiversity, ecosystem function and resilience, as well as immense socio-economic impacts on people and economies dependent on forest resources and ecosystem services. Despite their importance, there is a lack of information and tools focused on Asia-Pacific ecosystems and economies, which are necessary to understand the potential effects of climate change and develop regionally-specific adaptation and mitigation strategies. The project Adaptation of Asia-Pacific Forests to Climate Change aims to address this lack of knowledge and tools and to increase the adaptive capacity of Asia-Pacific forest ecosystems. This objective has been achieved through: development of a high-resolution climate model, ClimateAP, applicable to any location in the region; development of ecological models to project how climate change will affect suitable climatic conditions, regeneration, and productivity of forest tree species; development of tools to assess the most effective local management strategy based on management objectives and projected impacts of climate change; evaluation of models to assess forest fire risk and the relationship between forest fire and climate change; assessment of ecosystem carbon storage using LiDAR; and evaluation of how vegetation dynamics respond to climate change using remote sensing technology. All project outputs were developed with ease of communication in mind, as to ensure that information can be clearly disseminated and easily understood. This is necessary to allow for project findings to be used in the development of effective policy and sustainable forest management strategies related to adaptation and mitigation of forests to climate change.

*Assessing Impacts in Divergent Ecosystems***Communities Led Drought Mitigation in the Thar Desert, India**

Prakash Tyagi, GRAVIS, Jodhpur, India

Thar Desert of India is severely drought prone region with severe food and water insecurity and deep rooted poverty. While perennial droughts have always been an issue in Thar, Climate change has manifested in the unpredictability and shifts in rainy seasons in recent years. Overall precipitation has been higher recently but rains were neither spread out as per traditional rainy seasons, nor did it come when most useful for agricultural needs. In the absence of structures that could store water for household use and agriculture, and with existing agricultural seasons and practices, farmers are not able to make use of this water for agriculture or household purposes. GRAVIS has been addressing drought mitigation in Thar for over 3 decades. Over last few years, looking at above aspects, GRAVIS has taken up a Communities led Drought Mitigation Program focusing on climate resilience. The program has three main components – innovating/ improving designs of rainwater harvesting structures maximizing storage capacity, innovations around crops and introducing new agro-horticultural practices suiting new rainfall patterns, and capacity building on climate change. The program is reaching covering over 100,000 farming households. In last 5 years, farmers have registered 50 to 60% increase in crops cultivated and water stored. GRAVIS envisions to scale-up the program.

*Technical, Political, and Social Responses***Transforming Saskatchewan Power Grid: Policies and Potentials**

Jane Akpan, University of Regina, Regina, Canada

Global warming caused by the emission of Greenhouse Gas (GHG) represents a potential threat to human and the ecosystem. To this effect, Canada pledged to reduce GHG emission in 2030 by 30% below the 2005 emissions level, beginning from the electricity sector. Most provinces responded to this call; Ontario phased out coal electricity with the aid of incentive mechanisms that boost investments in clean electricity generation. Quebec has a cap-and-trade scheme in place, the province of British Columbia has a carbon tax scheme. However, Saskatchewan is yet to adopt a policy framework, though it emits the highest per capita GHG (67.1 tonnes per person) in Canada. More so, 75% of electricity generated in Saskatchewan comes from fossil fuel-based power plants, which suggests that transforming the electricity generations towards cleaner alternatives may help the province in its efforts to reducing GHG emission.

Technical, Political, and Social Responses

Room 4

Divergent Impacts**Effects of Experimental Warming on Invasive *Rhamnus Catharica* as Compared to Native Temperate and Boreal Tree Species**

Kerrie Sendall, Georgia Southern University, Statesboro, Georgia, United States

Peter Reich, University of Minnesota, St. Paul, Minnesota, United States

Rebecca Montgomery, University of Minnesota, St. Paul, Minnesota, United States

Artur Stefanski, University of Minnesota, St. Paul, Minnesota, United States

Our manipulative open-air experiment in northern Minnesota addresses the potential for climate warming to alter tree function and species composition at the boreal-temperate forest ecotone through effects on juvenile phenology, physiology, and growth. The goal of this study was to compare plant functional traits of tree species from three groups (invasive temperate, native temperate, and native boreal) grown under two temperature regimes (ambient and warmed 3.4 °C belowground and aboveground) to determine whether an aggressive invasive species is differentially sensitive to climate warming than common native species. We found significant effects of warming on growth that differed among species. Native boreal species showed a decline in growth under the warming treatment, while native temperate and the invasive temperate (*Rhamnus cathartica*) species generally responded positively to warming. However, the invasive *R. cathartica* showed the largest increase in growth. This growth response to warming by the invasive species does not appear to be driven by differences in growing season length, as all species extended their growing season in the warmed plots. Percent leaf nitrogen was also not a driver of growth per se, as this trait was largely unaffected by the warming treatment. However, while specific leaf area (SLA) of both native groups did not vary among treatments, SLA of *R. cathartica* declined significantly in the warming treatment, causing increased area-based leaf nitrogen concentrations. Area-based photosynthetic rates followed a similar pattern, increasing in the warming treatment for *R. cathartica*, but remaining stable or declining in the two native groups. Our growth and leaf trait results suggest that invasive *R. cathartica* may outgrow and outcompete the native species in northern Minnesota under climate change.

*Assessing Impacts in Divergent Ecosystems***Degree of Households Vulnerability to Climate Variability in Nigeria**

Abiodun Emmanuel Awoyemi, Pennsylvania State University, Centre County, Pennsylvania, United States

Oluwafunmiso Adeola Olajide, University of Ibadan, Ibadan, Nigeria

The broad objective of the study will be to examine the degree of vulnerability of households to climate variability in Nigeria. The specific objectives are to determine; the socio-economic characteristics of the households in the study area, the relationship between crop production and rainfall pattern, the vulnerability of households to climate variability in the study area and the effect of climate variability on agricultural productivity. The methods of analysis that will be used in this study includes; descriptive analysis, correlation analysis, principal component analysis (PCA) Household Vulnerability Index (HVI) and multiple regression (Hausman Test). Households Vulnerability Index (HVI) will be used to measure the vulnerability of households to climate variability in Nigeria using the integrated vulnerability approach. The findings of this study will help the stakeholders to know the relationship between climate variables and their productivity. The vulnerability study will help them to know how sensitive and how exposed they are to climate change. Therefore, it is envisioned that the outcome of this research will contribute in the design programme through an elaborate of the degree of household's vulnerability to climate variability which will enable the policy makers to formulate policies that will be beneficial to all.

*Assessing Impacts in Divergent Ecosystems***Assessing Climate Change Impacts on Cultural Ecosystem Services: A Case of Riverine Ecosystem of Ujjain City, India**

Rama Pandey, School of Planning and Architecture, Bhopal, India

Parikshit Mehta, Panchayat & Rural Development Department, Government of Madhya Pradesh, India

In India, rivers are venerated as spiritual and heavenly entities and this belief results in multifarious rituals and customs being practised along their banks. Cultural Services that are ordained by riverine ecosystems in India in the form of religious rituals and pilgrimages happen to be more than any other country in the world. Therefore in India, Cultural Ecosystem Services (CES) play an important role in the well being of people as they provide the necessary mental succour and is an integral part of their religious and spiritual practices. The fast pace of urbanization, development activities and spiritual tourism is leading to extensive degradation of riverine ecosystem. This along with drastic impacts of climate change in the form of extreme events along rivers and adjoining areas are affecting the provision of CES. The city of Ujjain, an ancient riverine settlement, is considered as cultural and spiritual capital of central India. The riverine ecosystem of Ujjain has already suffered degradation due to over-exploitation of CES and now facing new threat of climate change. In this study, components of the ecosystem such as river, lakes, ponds and urban green have been tracked over a period of time and assessed for its degradation. Perception survey of stakeholders is conducted to ascertain the difference in level of CES and to find possible interventions to mitigate climate change impacts on riverine ecosystem that leads to sustainable use of CES for human well-being.

Assessing Impacts in Divergent Ecosystems

14:00-15:40	<p>PARALLEL SESSIONS</p>
	<p>Salmon Punks Collaborative: An Educational Strategy for Inculcating Sustainability Proactivism Jennifer Woodcock-Medicine Horse, Montana State University, Bozeman, Montana, United States The Salmon Punks Collaborative (SPC) is a culminative proposal based on 104 in-person qualitative interviews conducted at ten major museums in the United States, funded by NSF-EPSCoR and a Smithsonian Research Fellowship. SPC is designed to be a collaborative, interdisciplinary, cross-institutional Citizen Science and Citizen Art program, educating and inspiring Indigenous and non-Indigenous youth about climate change and proactivism. SPC will empower children to create social and technical solutions to global climate change by educating, mentoring, and supporting their environmental scholarship and communicative abilities. The SPC could reside at either a university or a museum, inviting collaboration with their local school district, tribal communities and senior citizens. The pilot program will be a scalable Citizen Science project focused on the pollinators - bees, bats, butterflies, birds - which are critically import to our food supply, sensitive to climate disruption, found in many localities, and familiar to children. SPC will create K-12 pollinator data collection exercises, teaching increasingly complex academic skills. Students will be mentored by environmentally knowledgeable seniors; First Nations/Tribal youth will be supported in appropriately sharing traditional ecological knowledge. SPC will bring Citizen Science and Citizen Artist students together with faculty and museum staff to conceptualize and create scientifically sound, emotionally evocative exhibits and programs to meaningfully convey their scientific findings. Following a successful pilot phase, SPC could expand to include sister communities, and to interconnect globally with similar programs. <i>Technical, Political, and Social Responses</i></p>
Room 5	<p>Late Additions</p> <p>India's Response to Global Climate Change Samsher Singh, Central University of Gujarat, Gandhinagar, Gujarat, India Natural environment plays a distinctive role in the life of large section of the Indian population. The Intergovernmental Panel on Climate Change's definition of climate change as "long term changes in temperature, humidity, clouds and rainfall and not to day to day variations (IPCC 2007). This research examines the concept of climate change and how the emergence of climate change as a global phenomenon raise challenges for India. India is among the most vulnerable country when it comes to thee impacts of changing climate. And despite of several international multilateral negotiations, how India change its position in the global climate change scenario. This research addresses the ultimate global environmental governance challenge: climate change. It explores three key questions: Who is responsible for climate change? Who is affected by its consequences? Who should act in response? Climate change requires a global response, encompassing the North and the South, local and Global communities, and the public and private sectors. As environmental issues have traditionally played a secondary role in the India's policy formulation; the emergence of climate change as a global phenomenon has raised challenges for India. The fourth IPCC assessment report lists multi-sectoral impacts of climate change (IPCC, 2007). Some of the major sectors that will be adversely affected are coastal ecosystem, agriculture, water resources, natural habitat and biodiversity including the possibility of large scale displacement of communities. <i>2018 Special Focus: Engaging with Policy on Climate Change</i></p> <p>Climate Change Governance beyond the Paris Agreement: An Interregional Assessment of Kyoto's Legacy Alicia Guzmán León, Common Ground Research Networks, Champaign, Illinois, United States Kyoto covered 14% of emissions; the new framework faces the challenge to govern 96% of them. The United States potential withdrawal and the percentages of those countries that have not yet ratified, still leaves the UNFCCC with three fourths of the emissions to take care of. Is the UNFCCC ready for this qualitative leap? When assessing the more pressing challenges of the Paris Agreement, three aspects become relevant. First, the scarcity of reliable information threatens to erode the UNFCCC's legitimacy. This weakness violates one of the basic functions of governance, which is information-sharing. Only the developed countries' contributions are being accounted and disseminated. The omission of the resources invested by the developing world to combat climate change skews theoretical analysis, limits accuracy in policy and has the potential to alienate the South against adopting climate policies, it questions the regime's legitimacy. Second, the quality of financing for the developing regions is poor. Loans represent a majority share of the climate finances and are swelling the debt of the developing countries, especially in Latin America. Third, Kyoto's leaves as legacy, a governance model predominantly hierarchical both at general climate finances as well as in REDD+. Once the Paris Agreement momentum fades, there is only room for policy to be effective. This article examines Kyoto's legacy and uses it as framework to project climate change governance beyond the Paris Agreement. <i>Technical, Political, and Social Responses</i></p> <p>International Law, Politics and Climate Activism: Efforts of the Marshall Islands in Response to Rising Sea Levels Shannon Torrens, University of Sydney, Sydney, Australia The Marshall Islands, a small Pacific Island state faces significant challenges with respect to climate change, rising sea levels and governance issues. In this context, the work of the Marshall Islands in pursuing these issues through international law, diplomacy and existing legal frameworks is examined, such as through the United Nations Framework Convention on Climate Change (UNFCCC), the Pacific Islands Forum (PIF) and finally through the International Court of Justice (ICJ) in The Hague. Over the past five years the Marshall Islands has taken on a leadership role with respect to climate change issues in the Pacific Islands region through the climate change activism of the late former Foreign Minister of the Marshall Islands, Tony de Brum. Working with other world leaders and UN officials on climate change issues Minister de Brum sought to bring climate change issues to the forefront of political debate and to encourage powerful states to consider the plight of Pacific Island countries in their negotiations at the UNFCCC, pushing for change through both bilateral and multilateral efforts. In doing so Minister de Brum illustrated how the legal, political and cultural are interconnected with respect to climate change. This paper discusses these concerns from an international governance perspective to provide an examination of the legal and diplomatic strategies employed by the Marshall Islands to combat climate change issues and to contextualise these issues alongside the experiences of other Pacific Island states. <i>Technical, Political, and Social Responses</i></p>
15:40-15:55	<p>Transition</p>

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Room 1 Impacts and Responses**Geophysiological Treatment of an Ailing Earth from Space: Self-Replication Technology is Essential**

Alex Ellery, Carleton University, Ottawa, Canada

Current approaches to climate mitigation are insufficient to solve the problem of climate change. In analogy to medical practice, we submit that baseload clean energy source are required (antibiotic) together with geoengineering (analgesic). We have highlighted space technology as offering these solutions - solar power satellites in geostationary orbit around Earth and space-based solar shields at the L1 Sun-Earth Lagrange point. The chief hurdle is the high cost of launch assets into space. We propose to eliminate this cost barrier by implementing self-replication technology based on 3D printing techniques applied to material resources on the Moon. This eliminates the launch cost problem. We have been making progress in developing the underlying capabilities that will realise self-replication technology. The ability to 3D print electric motors and electronics is key to the construction of robotic machines from lunar material. This work will be described. If self-replication technology can be implemented even in a simple way it opens the possibility of exponential growth in productive capacity on the Moon. Constellations of both solar power satellites and solar shield modules - our treatment of choice - become feasible at very low cost.

Technical, Political, and Social Responses

Role of Leadership in Adoption of Waste-to-Energy in Nigeria

Jahan Moghadam, Georgia State University, Atlanta, Georgia, United States

Karen D. Loch, Robinson College of Business, Georgia State University, Atlanta, Georgia, United States

The use of Renewable Energy (RE) has considerably increased in the last several years. Innovative forms of sustainable alternative energy production, such as solar and wind, have now become a recognized energy sources. Following suit, this paper has reviewed Waste-to-Energy (WtE), an innovative and evolving form of RE, and its possible adoption in Nigeria, a developing country, to address both the energy crisis and the pollution problem, both contributors to climate change. The theoretical framework of this paper utilizes the genesis of Fishbein and Ajzen's theory of reasoned action (TRA), expanding on renewable energy studies using TRA and the leadership-led change framework in order to explain leaders' behavior to adopt WtE in Nigeria. A survey of 184 leaders affirmed that Nigeria's energy crisis is a major contributor to serious air, water and land pollution. The extent to which these leaders acknowledge the need for change, believe they possess the ability and authority to affect this change predicts the likelihood of the adoption of WtE.

Technical, Political, and Social Responses

Room 2 Adaptive Strategies**Resilient Spaces that Mitigate Adverse Effects of Climate Change and Enhance Human Health and Wellbeing**

Omar Youssef, University of Arizona, Tucson, Arizona, United States

The southwest has witnessed unprecedented transformation and its cities are becoming centers for urban growth. The goal of this research is to develop resilient spaces that demonstrate adaptation techniques; mitigating the adverse effects of climate change and promote healthy living. The impact of environmental attributes was measured, objectively, and non-obtrusively. Transitional Spaces were assessed by, the analysis of the climatic and microclimatic forces, the built and human environment forces; a survey on occupants that frequently visit pre-selected sites; and test 3 indoor and outdoor locations where people spend at least 30-45 minutes in a transition space to allow for metabolic adaptation, sweat regulator vasomotor, dilation and adjustment of the pupil, and the regulation of skin temperature. Combining spatial design with health parameters, architects are able to make decisions that will reduce energy consumption, decrease the impact on climate change; ultimately protect the natural world and support future life.

Technical, Political, and Social Responses

Teaching Science of Climate Change to Primary and Secondary Teachers in Spanish

Camilo Ruiz, Department of Math and Science Education, University of Salamanca, Spain

Santiago Andrés-Sánchez, Department of Math and Science Education, University of Salamanca, Spain

Fernando Almaraz-Menéndez, MediaLab, University of Salamanca, Spain

Laura Delgado-Martín, Department of Math and Science Education, University of Salamanca, Spain

Diego Corrochano-Fernández(1), Department of Math and Science Education, University of Salamanca, Spain

María-Isabel Asensio-Sevilla, Department of Applied Mathematics, University of Salamanca, Spain

Teresa Martín-García, MediaLab, University of Salamanca, Spain

Miguel Ángel Gimeno-González, MediaLab, University of Salamanca, Spain

Anne-Marie Ballegeer, Department of Math and Science Education, University of Salamanca, Spain

Jesús-Manuel Sampedro-Gómez, MediaLab, University of Salamanca, Spain

Education, capacity building and awareness have been identified as effective tools to build Climate Change resilience, mitigation and adaptation. In order to mobilize the society we need well informed citizens that can answer what is Climate Change, what are its causes and consequences. Only then we will be able to produce the changes needed to reach the goals of the Paris Agreement. But the resources to educate about this important issue are scarce. We have identified an important lack of high quality, evidence based educational resources about this topic in Spanish, a language with 477 million native speakers. Massive Online Open Courses (MOOC) are a valuable tool that can help us to fix this situation. In this paper, we describe the design and the making of a MOOC on the Science of Climate Change for primary and secondary teachers in Spanish. This MOOC is designed around the principles of evidence based facts, scientific rigor and actuality. We have analyzed the public school curricula in Spain and use these contents to build the structure of our course. The course is aligned with the consensus emanated from the IPPC and its reports. The focus is to bring scientific data and consensus to the reach of Spanish speaking teachers. The MOOC contains high quality videos, figures, graphs and other didactic resources which could be used by the teachers on their own lessons. The course will be offer by MiriadaX web portal on the summer of 2018 (<https://miriada.net/home>) users from all over the world will be able to use it. In the discussion forums of the MOOC we will highlight the global aspects of the problem and encourage the discussion between Spanish speaking teachers all over the globe. Also, for the first time we will use Big Data to create a diagnostic tool to evaluate the level of engagement and establish a good estimation of the impact of our project. By preparing teachers, the schools and communities will be better equipped to face natural hazards and reduce disaster risk. This project will help to mobilize the society through education, and to create a new positive narrative around young climate leaders that convey urgency and hope, away from pessimist and into imperative action.

Technical, Political, and Social Responses

Anthropogenic Activities and Climate Change: Impacts on Rural Dwellers

Geraldine Ibe, Forestry and Environmental Management, Michael Okpara University of Agriculture, Umudike, Nigeria

Excessive anthropogenic activities lead to environmental consequences, vulnerability on Non-Timber Forest Products and climate change shocks. Human contributions to climate change; its result on NTFPs and livelihood was assessed. Data was obtained using stratified-simple random method from 9 villages out of 26 villages in Ohafia. 216 households were interviewed using a well structured questionnaire. Frequency findings show that 87.5%, 53.2% and 35.7% engage in bush burning, fertilizer usage and deforestation. 59.7% use motorcycle for transportation; 55.6% use firewood to cook. Over 30% use insecticides and generator sets, 88% practice indiscriminate waste burning that emits gases which contributes to acid rain, deteriorate plant life, damage soil fertility and increase river acidity. There is an indication of desertification, 52.8% lack knowledge on the contribution of their daily activities to climate change, while 17.1% were certain. Bush burning is a central theme and its effects on human settlement and the ecosystem are increasingly damaging. 72.2% and 64.4% stated that increased temperature and heavy rainfall have decreased NTFPs yield in the last four years. Over 35% said climate change has decreased plant species and biodiversity due to massive deforestation. 54.2% have no access to safe drinking water, 29.6% have faced starvation and health challenges. The people were vulnerable due to lack of campaign on environmental management and alternative plans. Vulnerabilities could be reduced through campaign on embracing climate change plans, funding through government and foreign countries' collaboration, re-training extension workers. Local policies should be formulated through a consolidated effort using modern approaches and techniques.

Human Impacts and Impacts on Humans

Room 3

Public Welfare**Indicators for Vulnerability Assessment of Human Health to Climate Variability**

Meena Sehgal, The Energy and Resources Institute, New Dehli, India

Populations in emerging economies such as India, depend on natural resources and on weather patterns for food and water security, putting them at higher risks from climate change. We have created an index of nutrition to determine vulnerability of the population. This nutrition index has been created to rank nutritional status at small area (district) level in developing countries such as India. This nutrition index includes parameters such as underweight, wasting, stunting, and anaemia, for children under five years and, mothers. The index has been computed using log values of parameters and weights assigned based on Principal Component Analyses. The data for related health variables was obtained from the most recent national survey, National Family Health Survey (NFHS-4). The NFHS is a large-scale, multi-round survey and is based on representative state level sample of households throughout India. Using an existing agricultural vulnerability index to climate change for the districts of India we have identified the districts presenting both- extremely poor nutrition rank and high agricultural vulnerability to climate change. This approach would help identify and provide targeted interventions.

Human Impacts and Impacts on Humans

Climate Change and Ecopedagogy: What Role for the University in Global Environmental Change?

David Humphreys, The Open University, Milton Keynes, United Kingdom

Climate change is the greatest public welfare problem of our age. It calls for a public education endeavour in its broadest sense, one involving not just the academy and students but the global public. Ecopedagogy offers the prospect of a new curriculum, a radical approach to education that opposes those political and economic structures that generate environmental problems while working with social movements to generate an alternative politics. It challenges those engaged in environmental education to rethink how they teach agency to students and what the role of the educator should be in teaching citizens to think through how they should respond to environmental degradation. This paper examines the relevance of ecopedagogy as a teaching model at the Open University in the United Kingdom. It presents some examples of teaching on agency and environmental issues from OU environment modules that encourage students to evaluate what their role should be in responding to climate change and global environmental degradation.

Technical, Political, and Social Responses

The Impact of Hurricane Maria in Puerto Rico : Rapid Assessment of the Damage and the Massive Environmentally Driven Displacement

Nuria Del Alamo Gomez, University of Salamanca, Salamanca, Spain

Camilo Ruiz, Professor, Universidad de Salamanca, Salamanca, Spain

Puerto Rico was devastated in September of 2017 by the Hurricane Maria. The island suffered catastrophic damage, including almost total destruction of its deteriorated electrical grid. For weeks in Maria's wake, most of the island's population suffered from flooding and lack of resources, compounded by the slow relief process. In this paper we discuss about the exodus that started as a consequence of the hurricane within the socio political status of Puerto Rico. We start by discussing the degree of destruction after the hurricane using a rapid assessment of the night time lights and comparing it to the population density. This method provides an accurate description of the impact of the Hurricane Maria and the slow pace of recovery, which explain to some extent the large migration that followed the hurricane. We also discuss the impossibility to call these migrants climate refugees. First, because a direct causal relation between Climate Change and this environmental displacement is hard to establish, although it is clear that it influences the process. On the other hand, these migrants can not be called refugees as they do not cross an international frontier and their migration is not due to one of the reasons included in international treaties. The situation of Puerto Rico is an important case to understand the effects of Climate Change on migrations and how it can amplify, accelerate and enhance social and political crisis to produce profound and grievous changes in our societies.

Human Impacts and Impacts on Humans

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15:55-17:10	PARALLEL SESSIONS
Room 4	<p>Development Outcomes</p> <p>Impacts of Climate Change on Livelihood and Mangrove Resources in Bangladesh Momen Majumdar Mohammad Sayed, University of Tsukuba, Japan, Tsukuba, Japan Sundarbans is the largest mangrove forest with a trend of declination due to climate change which results from coastal aquaculture. The objective of this study is to find the impacts of climate change on livelihood and natural resources as well. A structured questionnaire survey to randomly selected 150 houses was conducted in 2017. This study reveals that climate change is a result of both natural and anthropogenic activities. Huge patches of agriculture land had already been converted into shrimp pond, meanwhile the main input like shrimp fry were collected from wild. On the other hand, cyclone Aila in 2007 changed the livelihood. At present, from sample households, 55% engaged in coastal aquaculture, while 52% were engaged in shrimp culture. The average shrimp pond area was 0.18 ha, three times higher than paddy field. Most alarmingly, 86% shrimp pond owners depends on shrimp fry from forest, whether fully or partially. Climate change also impact on homegardens. Homegardens were decreasing significantly and in many case replaced by mangrove species. 95% forest dependent households collect fuelwood while they enter forest for collection of resources. Livestock decreased significantly as a result of climate change. Finally this study draws a clear picture that, climate change results over extraction of forest resources due to change in livelihood in Sundarbans adjacent villages. <i>Human Impacts and Impacts on Humans</i></p> <p>From Confrontation to Long-term Cooperation: A Case Study of Russia and Western Arctic Nations Fazolat Nasretdinova, UNESCO, Paris, France This research addresses prospects for long-term cooperation between Arctic nations in the Arctic region. The Arctic was chosen due to the increased global interest in the region, which can be attributed to its geopolitical implications and natural resources. Current relations between Western Arctic nations and Russia may be characterized as tense and non-cooperative. No single structure for cooperation has been created which might unify their interests in light of the political, economic, and security considerations at play. Due to the recent political events and disagreements regarding Russian foreign policy, the Western Arctic nations boycott Russia and prevent cooperation, a policy which renders equal interaction in developing and exploring the region. In order to address the state of conflict, this thesis analyzes three options: focus on cooperation, isolate Russia, and do nothing. The positive and negative implications for the region's development, as well as for cooperation among the Arctic nations, will be addressed. Through the application of game theory as a methodological tool, I classify each of the options mentioned above as win-win, win-lose, and lose-lose scenarios, respectively, and illustrate their outcomes and consequences. Through this policy analysis, I focus on cooperation is chosen as the preferred option, as it best resolves current confrontations and issues between the Arctic nations. Research's conclusions provide us with answers to the research questions: Is cooperation between the West and Russia desirable in the Arctic region? Is cooperation possible among the Arctic nations, in the short-term and/or long-term? <i>Technical, Political, and Social Responses</i></p> <p>Working Equids' Contributions to Climate Change Adaptation Angela Varnum, Colorado State University, Fort Collins, Colorado, United States The global contributions of working equids (horses, donkeys, and mules) include transporting products and tourists, laboring in agriculture, and generating household income. Their use endures despite industrialization. The purpose of this study was to describe working equids' contributions to climate change resilience and human livelihoods in an area of Peru which is rated at significant risk for climate vulnerability. Ethnographic interviews were conducted with fifteen working equid owners and community members working in tourism and agriculture in the mountainous region surrounding Cusco, Peru. Recent climate variability and decreased harvest means agriculturally-dependent individuals have adapted by engaging in tourism activities which are strengthened by equids. Working equid power enables livelihood diversification and protection against climate impacts, supporting household well-being. Working equid use is not without significant environmental challenges, specifically the availability of grazing sources in the face of a shortened growing season. Working equids labor at the balancing point between traditional livelihoods and entrepreneurship, softening the climate factors which lead to human vulnerability. A more detailed understanding of the ways in which working equids absorb impacts of climate change and affect the environment can inform wider policies for their use in this and other tourism-dependent areas. <i>Assessing Impacts in Divergent Ecosystems</i></p>
17:10-18:40	Closing Ceremony & Reception

Please see the announcement board by the conference registration desk for any changes or additions to the above schedule.





Oluwaseyi Adebayo	University of Manitoba	Canada
Arfa Aijazi	University of California, Berkeley	United States
Jane Akpan	University of Regina	Canada
Badiul Alam	Macquarie University	Australia
Mohammad Alhashmi	King Abdulaziz Univeristy	Saudi Arabia
Haris Alibašić	University of West Florida	United States
Mohammed Aljahdali	King Abdulaziz Univeristy	Saudi Arabia
Gina Alvino	PLOS ONE	United States
Ross Astoria	University of Wisconsin, Parkside	United States
Roberta Atzori	California State University Monterey Bay	United States
Elgin Avila	University of Arizona	United States
Abiodun Emmanuel Awoyemi	Pennsylvania State University	United States
Rupa Basu	California Environmental Protection Agency	United States
Natalie Batshon	Macquarie University	Australia
Jonathan Berkey	Middlebury Institute of International Studies	United States
Francisco Boavista Pontual	University of California, Berkeley	United States
Washington Braga Filho	Pontifical Catholic University of Rio de Janeiro	Brazil
James Brandt	Utah Valley University	United States
Claire Brunel	American University	United States
Colleen Bye	Utah Valley University	United States
Erin Call	Utah Valley University	United States
Nathan Carlson	California Lutheran University	United States
Mijin Cha	Occidental College	United States
Teerada Chongkolrattanaporn	Chulalongkorn University	Thailand
Ryan Cornell	Colorado Technical University	United States
Tracy Crawford	Roots N Wings Montessory School	United States
Lisbeth DaBramo	Lawrence Berkeley National Laboratory	United States
Fabiano de Araujo Moreira	State University of Campinas	Brazil
Benedict DeDominicis	Catholic University of Korea	South Korea
Nuria Del Alamo Gomez	University of Salamanca	Spain
Maria D’Orsogna	California State University Northridge	United States
John Duff	University of Massachusetts	United States
Neal Samuel Eash	University of Tennessee	United States
Alex Ellery	Carleton University	Canada
M. Cecilia Engler	Dalhousie University	Canada
Katie Fellows	University of Washington	United States
Erin Finestone	ENVIRON International Corporation	United States
Lindsay Paige Galway	Lakehead University	Canada
Elias Gaveta	Peace Corps Malawi	Malawi
Samuel Grant	The Public Policy Project	United States
Yichao Gu	University of San Diego	United States
Michel Gueldry	Middlebury Institute of International Studies	United States





Alicia Guzman	Common Ground Research Networks	United States
Carl Hand	Valdosta State University	United States
Natasha Hazarika	City University of Hong Kong	Hong Kong
David Ricardo Heres	Centro de Investigación y Docencia Económicas	Mexico
Vindya Hewawasam	University of Tsukuba	Japan
Hugo Hidalgo	University of Costa Rica	Costa Rica
Tom Huber	University of Colorado	United States
Carole Huber	University of Colorado	United States
David Humphreys	The Open University	United Kingdom
Van Da Huynh	Can Tho University	Viet Nam
Geraldine Ibe	Michael Okpara University of Agriculture Umudike Nigeria	Nigeria
Ans Irfan	Tufts University	United States
Md Rafiqul Islam	Flinders University	Australia
Eric Jamelske	University of Wisconsin-Eau Claire	United States
Tim Kaelin	Impact Analytics	United States
Phillip Kalantzis-Cope	Common Ground Research Networks	United States
Denise Keele	Western Michigan University	United States
Delphine Keim	University of Idaho	United States
Ali Kiani Neyestanaki	University of Tehran	Iran
Jong Yoon Kim	Plymouth State University	United States
Nanhee Kim	California State University	United States
Patricija Kirvaitis	Common Ground Research Networks	United States
David Krantz	Arizona State University	United States
Bryan Lacerda	Utah Valley University	United States
Tu Dam Ngoc Le	University at Buffalo	United States
Wendy Lynne Lee	Bloomsburg University of Pennsylvania	United States
Sri Lekha	University of Nebraska	United States
Xi-Jie Li	Nanjing Agricultural Univeristy	China
Yaoming Li	Chinese Academy of Sciences	China
Tsung-Sheng Liao	National Chung Cheng University	Taiwan
Karen D. Loch	Georgia State University	United States
Kristin Lutes	Auditor General of Canada	Canada
Sally Graves Machlis	University of Idaho	United States
Michael Mann	George Washington University	United States
Larissa Mark	James Madison University	United States
Melusine Martin	James Cook University	Australia
Kenichi Matsui	University of Tsukuba	Japan
Diana May	Utah Valley University	United States
Ashish Mehta	University of Florida	United States
Sisi Meng	University of Colorado	United States
Sarah Miller	Florida Public Archaeology Network	United States
Jahan Moghadam	Georgia State University	United States





Momen Majumdar Mohammad Sayed	University of Tsukuba, Japan	Japan
Matthew Moore	California State University, East Bay	United States
Rob Moore	Natural Resources Defense Council	United States
Fazolat Nasretdinova	UNESCO	France
Robert Newell	University of Victoria	Canada
Hung Nguyen	Northern Mountainous Agriculture and Forestry Science Institute	Viet Nam
Laura Nixon	Alberta Energy Regulator	Canada
Victor Fannam Nunfam	Edith Cowan University	Australia
Tayanah O'Donnell	University of Canberra	Australia
Joel Oetting	University of Tennessee	United States
Francesca O'Hanlon	Blue Tap	United Kingdom
Sunmbo Olorunfemi	Royal Agricultural University	UK
Katie Olthuis	Auditor General of B.C.	Canada
Choose Omasanuwa	Leicester University	UK
Rama Pandey	School of Planning and Architecture Bhopal	India
Marlene Payva Almomte	University of Liverpool	United Kingdom
Dharshani Pearson	California Environmental Protection Agency	United States
Teresa Perez	University of Cape Town	South Africa
Travis Pitts		United States
Max Platzer	University of California Davis	United States
Greg Poole	Industrial Tests, Inc.	United States
Cristiam Victoriano Portilla Cabrera	National University of Colombia	Colombia
Reina Rau	University of California, Berkeley	United States
John Ray	University of Montana	United States
Poliana C. L. Raymer	Santa Monica College	United States
James Richards	University of California, Davis	United States
Camilo Ruiz	Universidad de Salamanca	Spain
Santi Sanglestsawai	Kasetsart University	Thailand
Tarsila Seara	University of New Haven	United States
Meena Sehgal	The Energy and Resources Institute	India
Kerrie Sendall	Georgia Southern University	United States
Jeffrey Seward	Hillsborough Regional Transit Authority	United States
Nilmini Silva-Send	University of San Diego	United States
Nandita Singh	Banaras Hindu University	India
Samsher Singh	Central University of Gujarat	India
Janet Stanley	University of Melbourne	Australia
Peter Stevenson	Compassion in World Farming	United Kingdom
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Prakash Tyagi	GRAVIS	India
Justin Udie	De Montfort University	UK
Alexander Vaninsky	Hostos Community College	United States
Angela Varnum	Colorado State University	United States
Ronaldo Viana Soares	Federal University of Paraná	Brazil
Forbes Walker	University of Tennessee Extension	United States
Guangyu Wang	University of British Columbia	Canada
Shiping Wang	Chinese Academy of Sciences	China
Vanessa Wolf	Pasadena City College	United States
Jennifer Woodcock-Medicine Horse	Montana State University	United States
Xiangmei Wu	California Environmental Protection Agency	United States
Yuri Yevdokimov	University of New Brunswick, Fredericton, Canada	Canada
Omar Youssef	University of Arizona	United States
Bao-Ping Zhai	Nanjing Agricultural Univeristy	China
Xiaobing Zhao	Northern Arizona University	United States









Third International Conference on Tourism & Leisure Studies

Hotel Princesa Yaiza
Canary Islands, Spain | **17–18 May 2018**
tourismandleisurestudies.com/2018-conference



Eighth International Conference on The Constructed Environment

Wayne State University
Detroit, USA | **24–25 May 2018**
constructedenvironment.com/2018-conference



Eighteenth International Conference on Diversity in Organizations, Communities & Nations

University of Texas at Austin
Austin, USA | **6–8 June 2018**
ondiversity.com/2018-conference



Twenty-fifth International Conference on Learning

University of Athens
Athens, Greece | **21–23 June 2018**
thelearner.com/2018-conference



Thirteenth International Conference on The Arts in Society

Emily Carr University of Art + Design
Vancouver, Canada | **27–29 June 2018**
artsinsociety.com/2018-conference



Sixteenth International Conference on New Directions in the Humanities

University of Pennsylvania
Philadelphia, USA | **5–7 July 2018**
thehumanities.com/2018-conference



Sixteenth International Conference on Books, Publishing & Libraries

University of Pennsylvania
Philadelphia, USA | **7 July 2018**
booksandpublishing.com/2018-conference



Ninth International Conference on Sport & Society

Florida International University
Miami, USA | **19–20 July 2018**
sportandsociety.com/2018-conference



Thirteenth International Conference on Interdisciplinary Social Sciences

University of Granada
Granada, Spain | **25–27 July 2018**
thesocialsciences.com/2018-conference



Eleventh Global Studies Conference

University of Granada
Granada, Spain | **30–31 July 2018**
onglobalization.com/2018-conference



Eleventh International Conference on The Inclusive Museum

University of Granada
Granada, Spain | **6–8 September 2018**
onmuseums.com/2018-conference



Aging & Society: Eighth Interdisciplinary Conference

Toyo University
Tokyo, Japan | **18–19 September 2018**
agingandsociety.com/2018-conference



Eighth International Conference on Health, Wellness & Society

Imperial College London
London, UK | **20–21 September 2018**
healthandsociety.com/2018-conference



Third International Conference on Communication & Media Studies

University of California at Berkeley
Berkeley, USA | **18–19 October 2018**
oncommunicationmedia.com/2018-conference



Eighth International Conference on Food Studies

University of British Columbia - Robson Square
Vancouver, Canada | **25–26 October 2018**
food-studies.com/2018-conference



Spaces & Flows: Ninth International Conference on Urban and ExtraUrban Studies

Marsilius Kolleg, Heidelberg University
Heidelberg, Germany | **25–26 October 2018**
spacesandflows.com/2018-conference



Ninth International Conference on The Image

Hong Kong Baptist University
Hong Kong SAR | **3–4 November 2018**
ontheimage.com/2018-conference



Fifteenth International Conference on Environmental, Cultural, Economic & Social Sustainability

UBC Robson Square
Vancouver, Canada | **17–19 January 2019**
onsustainability.com/2019-conference



Nineteenth International Conference on Knowledge, Culture, and Change in Organizations

UBC Robson Square
Vancouver, Canada | **21–22 February 2019**
organization-studies.com/2019-conference



Thirteenth International Conference on Design Principles & Practices

Saint Petersburg State University
Saint Petersburg, Russia | **1–3 March 2019**
designprinciplesandpractices.com/2019-conference



Fifteenth International Conference on Technology, Knowledge, and Society

ELISAVA Barcelona School of Design and Engineering
Barcelona, Spain | **11–12 March 2019**
techandsoc.com/2019-conference



Eleventh International Conference on Climate Change: Impacts & Responses

Pryzbyla Center, The Catholic University of America
Washington, D.C., USA | **16–17 April 2019**
on-climate.com/2019-conference



Ninth International Conference on Religion & Spirituality in Society

University of Granada
Granada, Spain | **25–26 April 2019**
religioninsociety.com/2019-conference



Twelfth International Conference on e-Learning & Innovative Pedagogies

Hotel Grand Chancellor Hobart
Hobart, Australia | **2–3 May 2019**
ubi-learn.com/2019-conference



Fourth International Conference on Tourism & Leisure Studies

Florida International University
Miami, USA | **16–17 May 2019**
tourismandleisurestudies.com/2019-conference



Ninth International Conference on The Constructed Environment

Centro Cultural Vila Flor
Guimarães, Portugal | **23–24 May 2019**
constructedenvironment.com/2019-conference



Nineteenth International Conference on Diversity in Organizations, Communities & Nations

University of Patras
Patras, Greece | **5–7 June 2019**
ondiversity.com/2019-conference



Tenth International Conference on Sport & Society

Ryerson University
Toronto, Canada | **20–21 June 2019**
sportandsociety.com/2019-conference



Twelfth Global Studies Conference

Jagiellonian University
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onglobalization.com/2019-conference



Seventeenth International Conference on New Directions in the Humanities

University of Granada
Granada, Spain | **3–5 July 2019**
thehumanities.com/2019-conference



Seventeenth International Conference on Books, Publishing & Libraries

University of Granada
Granada, Spain | **5 July 2019**
booksandpublishing.com/2019-conference



Twenty-sixth International Conference on Learning

Queen's University Belfast
Belfast, UK | **24–26 July 2019**
thelearner.com/2019-conference



Fourth International Conference on Communication & Media Studies

University of Bonn
Bonn, Germany | **26–28 September 2019**
oncommunicationmedia.com/2019-conference

Eleventh International Conference on Climate Change: Impacts & Responses

Pryzbyla Center,
The Catholic University of America
Washington, D.C., USA

16–17 April 2019

Founded in 2009, the International Conference on Climate Change: Impacts & Responses aims to create an interdisciplinary forum for the discussion of climate change, its causes, its eco-systemic impacts, and its human impacts. The conference also explores technological, policy, strategic, and social responses to climate change.

We invite proposals for paper presentations, workshops/interactive sessions, posters/exhibits, colloquia, innovation showcases, virtual posters, or virtual lightning talks.

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