**Proposed Research for African Scholar**

I propose that the research mentee would assist in working with me as lead faculty mentor, to develop research program at MSU that would address the nexus between climate change, conflict, gender, and migration. We would expect that issues such as human health and gender would be critical focuses within research on the nexus. The scholar would be invited to join a team of scholars working on developing this new area of convergence research. The other members of the workgroup are listed below:

**Workgroup Members:**

1. Mark Axelrod, Department of Fisheries & Wildlife and James Madison College
2. Stephen Gasteyer, Department of Sociology
3. Anthony Kendall, Department of Earth & Environmental Sciences
4. Amber Pearson, Department of Geography, Environment & Spatial Services
5. Yadu Pokhrel, Department of Civil & Environmental Engineering

**Background Information:**

Dating to the late 1990s, scholars such as Thomas Homer-Dixon (e.g. 1999) have forecast a link between climate change and conflict.[1] They argue that the impacts of climate change correlate with global conflicts. Indeed, climate change has produced devastating impacts in the early 21st Century, including increasing droughts, disruptive changes in precipitation patterns, wild fires, flooding, and increased impairment of water quality. In addition, highly disruptive conflicts and civil wars have destabilized much of the Middle East, along with parts of Asia, Africa, and Latin America. Journalists, politicians, and some policy makers have observed linkages between climate change and increasing conflict, but some scholars argue that the linkages are much less direct, at best, and spurious at worst (e.g. Meyer 2018[2]; Adams, et al. 2018[3]). Still, other scholars find linkages when looking at particular regions (e.g. Burke, Et al. 2009[4]).

Given these divergent views, this proposed work group aims to take up the call of scholars to investigate the relationship between climate change and the emergence, existence, elongation, and impacts of conflicts (e.g. Scheffran, et al. 2012[56]; Gemenne, et al. 2014). Our aim is to use this interdisciplinary forum to identify key interactions between climate change and conflict – developing new areas of investigation that move beyond current impasses in the literature.

[1] Homer-Dixon, Thomas. 1999. *Environment, Scarcity, and Violence.* Princeton, NJ: Princeton University Press

[2] Meyer, Robinson. 2018. Does Climate Change Cause More War? Science. *The Atlantic* February 12, 2018, accessed online from https://www.theatlantic.com/science/archive/2018/02/does-climate-change-cause-more-war/553040/

[3] Adams, Courtland, Tobias Ide, John Barnett and Adrien Detges. 2018. Sampling Bias in Climate-Conflict Research. *Nature Climate Change* 8: 200-203.

[4] Burke, Marshall B., Edward Miguel, Shanker Satyanath, John A. Dykema, and David B. Lobell. 2009. "Warming increases the risk of civil war in Africa." *Proceedings of the National Academy of Sciences* 106 (46): 10670-20674.

This workgroup will draw upon the considerable global scholarly expertise at MSU, to investigate the interactions between climate change and conflict. The scholarship to date makes clear that the interactions between these two phenomena are neither straightforward, nor predictable. Rather, they are coupled and interactive. Therefore, this workgroup seeks to dive deeper into these two phenomena as coupled, complex nested systems. Decades of research have demonstrated that natural resources scarcity, even of a critical resource such as water, has not generally led to armed conflict between nations (Wolf 2009)[7]. Indeed, Wolf, et al. (2006) argue that "water can be a pathway to peace."[8]

And yet, climate change clearly creates conditions that may exacerbate, or spark conflicts. Increasing ferocity of storms and droughts, for instance, may lead to migration, which, in turn, may destabilize some societies.[9] To understand the dynamics of this interaction it will be necessary to investigate historical and predict future likely biophysical interactions resulting from climatic changes. Our team will work on ways to couple these interactions with analysis of social systems and processes – demographics, level of development, level of inequality – and governance systems. Further, we will seek to understand the effects of these interactions in terms economic wellbeing, health, environmental conditions, etc.

A critical first step will involve definition – what do we mean by conflict? Scholars generally refer to conflict as violent wars or declared civil wars (e.g. Scheffran, et al. 2012). Might that be limiting in understanding the interaction between conflict and climate change? On the other hand, some scholars (e.g. Selby, et al. 2017) argue that evidence of climate change related biophysical effects are overstated. It will additionally be necessary to better define the evidence of impacts of climate change and their effects on social conditions.

Additionally, we will want to think systemically about how the dual processes of climate and conflict relate to feedback loops. We fully expect to be able to draw on frameworks such as the Food, Energy, Water Nexus (FEW), where MSU has shown particular expertise (Pueppke, 2018)[10].

Conflict often results from numerous factors, including food and water, or other critical resource scarcity, but may also lead to processes that exacerbate conditions of scarcity. Critical among these impacts are migration, as people flee economic crisis (sometimes in part triggered by climate induced ecological conditions such as drought), civil or state violence. These migration flows may themselves create conditions of scarcity, or exacerbate conditions that lead to conflict.

The implications of climate change and conflict cut across social, technical and engineering specializations. Researching the nexus of climate change and conflict necessarily involves attention to ecological processes, technology and infrastructure, social processes and conditions (including in particular public health), politics, governance, and security.

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[5] Jürgen Scheffran1,*, Michael Brzoska2, Jasmin Kominek1,3, P. Michael Link1,4, Janpeter Schilling1,5

[6] Gemenne, Francois, Jon Barnett, W. Neil Adger, Geoffrey D. Dabelko. 2014. Climate and security: evidence, emerging risks, and a new agenda. *Climatic Change* 123(1): 1–9.

[7] Wolf, Aaron. 2009. A Long Term View of Water and International Security. *Journal of Contemporary Water Research and Education* 142: 67-75.

[8] Wolf, Aaron, Annika Kramer, Alexander Carius, and Geoffrey D. Dabelko. 2006. Water Can Be a Pathway to Peace, Not War. *Navigating Peace* 1, accessed online from https://www.wilsoncenter.org/sites/default/files/NavigatingPeaceIssue1.pdf

[9] Scheffran, et al. see above

[10] Pueppke, Steve. 2018. http://water.msu.edu/the-food-energy-water-nexus/

In this initiative, we aim to bring together a multi-disciplinary team to model the interactions of climate and conflict. Our team will include sociologists (migration, environment), political scientists (governance), geographers, and engineers, at MSU and partner institutions in Europe, Australia, the Middle East, Africa, and Asia. This would include a better understanding of the connection between these trends, specifically modeling and ground-testing interactions among them. With this initiative, we aim to better comprehend the processes and feedbacks, as well as depicting the optimal conditions for applications of technologies to mitigate impacts.

The fact that conflict and climate change are and will continue to be two of the most serious global challenges in the indefinite future makes such an initiative highly attractive to many global funders. Given the relevant expertise of the workgroup, the emphasis on interdisciplinary research at MSU, and the reputation of MSU in global engagement makes a large-scale initiative on conflict and climate change a highly promising prospect for external funding and high impact scholarly results.

**Research Questions**

Given the complexity of these interactions, we will begin with basic, definitional research questions, but then evolve to more complex questions over the lifespan of the grant. We will begin with an effort to ensure that we understand the key findings and conflicts in the existing literature on this topic. To do this our research questions will include:

1) What do we mean by conflict?
    a. How is conflict defined in the existing literature on interactions with climate change? How flexible are the definitions? What are the efforts to depict conflict beyond cross-border or declared civil wars?
    b. What are the indicators of conflict?
    c. What are the defined impacts of conflict? When there are hostilities, beyond mortality, what are the indicators used to measure the impact of climate change or conflict?
2) How does the literature define the effects of climate change?
    a. What are the biophysical indicators that a given event – drought, flooding, excessive heat, for instance – relates to climate change?
3) How might we establish the impacts of events, even if they can be associated with climate change? How, for instance, might we establish, beyond conjecture, that waterborne disease outbreaks relate to periods of flooding or drought?
4) How do we establish the interaction between climate change and conflict – what kinds of research might help us to better depict the interactions between climate change and conflict? What kinds of data, indicators, and analytical methods would help us to establish correlation, or even better, causality?
5) To what extent have there been efforts to measure the role of changed policies and adoption of technologies to mitigate climate change impacts and/or conditions of conflict?
6) What are the opportunities for future research in this area?
7) Are there other institutions we may want to partner with to address new or better defined research questions?

While politicians and activists frequently allude to risk of conflict from climate change, they largely base these assertions on anecdotal evidence. Rigorous research is far from being able to make such a bold statement of causation. Scholarly research based on the he two methodologies dominating quantitative work on this problem have yielded inconclusive results.[11] Therefore, it is critical that we develop a better understanding of conflict drivers, mechanisms and impacts as this will lead to the better development of mitigations. Further, we can research the impacts, such as health and economic, to areas affected by mass migration due to conflict. It is

[11] Salehyan, I. From climate change to conflict? No consensus yet. J. Peace Res. 45, 315–326 (2008).

our expectation that these investigations would secure external funding for this research especially if our research is to improve decision and policymaking, based on sound science from objective experts, in affected countries.

**Workgroup Composition**

On January 24, 2019, a group of approximately 15 MSU faculty met to discuss the possibilities of a large-scale interdisciplinary initiative on conflict and climate change. Interest by the attendees to pursue such an initiative was overwhelmingly positive and the group collectively decided that future regular engagement was necessary to develop an innovative research framework that builds on MSU strengths and that would widely appeal to funders. Consistent and meaningful faculty engagement, especially when focusing on two large and enormous areas such as conflict and climate change is critical due to the availability of the staggering amount of research directions. Therefore, such a large initiative has potential to derail quickly without sufficient team cohesion, especially when many of the workgroup members do not interact on a regular basis. ITBI funding represents an effective mechanism for the promotion of essential team building on a regular basis. Such support is essential, especially since the workgroup consists of faculty members from five (5) different MSU colleges (CSS, CNS, CANR, EGR and JMC). The core workgroup will consist of the following MSU faculty:

**Mark Axelrod** holds a joint appointment in James Madison College and the Department of Fisheries and Wildlife. His research interests include international environmental law and politic, democratic institutions and the environment, natural resources and environmental governance and environmental justice.

**Stephen Gasteyer** is an Associate Professor in the Dept. of Sociology. His research focuses on community development, environmental justice, and the political ecology of landscape change, with specific attention food, energy, water, and public health.

**Anthony Kendall** is a member of the MSU Hydrogeology Lab. His research has focused on regional-scale landscape hydrology, examining the terrestrial hydrologic cycle and its relationship to climate, vegetation and biogeochemical cycles.

**Yadu Pokhrel** is an Assistant Professor in the Dept. of Civil & Environmental Engineering. His research interests mainly focus on improving the understanding of the changes in the global/regional terrestrial water cycle in response to the combined effects of human activities and climate change.

**Amber Pearson** is a health geographer in the Dept. of Geography, Environment & Spatial Sciences with a focus on social justice and understanding the unexpected tenacity, adaptability and resilience of the underprivileged. Specifically, her research relates to aspects of the built, physical and social environment that bolster health in the face of adversity.

Other MSU faculty that attended the January 24, 2019 meeting or who have explicitly have expressed interest in being part of a greater interdisciplinary initiative are Andrea Allen, Jeff Andresen, Rob Glew, David Hyndman, Sean Lawrie, Wei Liao, Lifeng Luo, Brendan Mullan, Stephanie Nawyn, Pouyan Nejadhashemi, Michael Rip, and Joan Rose. If funded, we anticipate that many of the aforementioned will play a role in the greater interdisciplinary initiative on conflict and climate change at MSU.

**Expected Goals & Outcomes**

This initiative received funding from the Interdisciplinary Team Building Initiative (ITBI) program funded through the Environmental Science and Policy Program (ESPP) and the AgBioResearch office. The key deliverables from the proposed ITBI will be a series of white papers that will serve as the foundation for a high caliber interdisciplinary research initiative at MSU on conflict and climate change. At the conclusion of the program, the immediate next steps would depend on the feedback given by potential funders. If the reception received by the program officers were overwhelmingly positive, then the next step would be proposal submissions. In addition, the workgroup would continue to recruit other MSU faculty into the initiative, as it grows, as well as discuss what some long term aspects of a conflict and climate change initiative at MSU could look like.