

The Complexity of the Governance of Climate Change

The influence of human activities on the global atmosphere is “clear and growing” and is anticipated to change local climates across the world with “severe, pervasive and irreversible impacts for people and ecosystems.” (Paucheri and Meyer 2014, v) Under the United Nations Framework Convention on Climate Change (UNFCCC) countries have accepted “common but differentiated responsibilities and respective capabilities and their social and economic conditions” (UNFCCC 1992) to collectively “holding the increase in the global average temperature to well below 2°C above pre-industrial levels.” (UNFCCC 2016) Because the climate system is complex and, despite extensive and long-term research, the exact nature of these impacts is uncertain, governance of the social response is necessarily complex.

Due to its ubiquity, climate change suggests a global multi-level response. However, national governments and IR scholars continue to focus primarily on an intergovernmental response. The most recent large-scale move in the intergovernmental politics of climate change, the Paris Agreement, is by some accounts “a political success in climate negotiations and traditional state diplomacy” because the arguments during the negotiations were sufficiently persuasive on the economic benefits to induce cognitive change (Dimitrov 2016). It also offers a “new hope” for climate governance because it institutes a “bottom-up” approach (Bodansky 2016).

There is little evidence that the political success in Paris will prevent dangerous warming. For most developed countries this would require greenhouse gas (GHG) emissions reductions of up to 80% below 2005 levels. Achievement of such national targets volunteered as a result of the Paris Agreement depends on how firms, municipalities, and individuals are persuaded to accept short-term economic costs for a possible long-term benefit. While there is dispute over the changes that are required, for governments to enforce the necessary behavioral changes on organizations and individuals would appear to require massive intervention in the economy and society as technological innovation alone, even assuming effective diffusion of innovations, will not suffice (Harrison and Mikler 2014). Avoiding dangerous climate change will require complete decarbonization of electricity production with rapid expansion of electric energy production, costly decarbonization or eradication of liquid fuels, and substantial changes in land use (IPCC 2014). Such changes may cause estimated losses of between 3 and 11 percent of global GDP per

capita. In addition, estimates of the cost and effectiveness of mitigative policies are highly uncertain, preventing design of effective long-term policy trajectories.

Depending on nation-states is at best a partial strategy. Conventionally, states choose their actions in the context of international norms and domestic political and economic conditions and implement them from the top-down. This assumes that they will be willing and able to implement effective policies and to maintain them over time. The weakness of this position was blatantly demonstrated by the actions of President Trump who removed the United States, the world's second largest emitter of GHGs, from the Agreement. In Paris the Obama Administration had proposed a 26-28% reduction in GHG emissions below 2005 levels by 2025. According to President Trump, this was too costly and the science was unproven so withdrawal was necessary "to fulfill my solemn duty to protect America and its citizens."¹ In contrast, China enthused that the Paris Agreement "is fair and just, comprehensive and balanced, highly ambitious, enduring and effective, and with legally binding force."² Although it has made major environmental strides it still faces major implementation problems. Achieving its voluntary national emissions reductions goals depends on implementation by relatively autonomous regional governments and is fragmented, driven by local social, economic, and environmental conditions.³ Some regions are in a "race to the bottom," implementing only the minimal changes permitted by Beijing (or less), while some cities (e.g. Shanghai) and regions are in a "race to the top."

The "new hope" in the Paris Agreement's is its rejection of enforceable national targets and timetables in favor of a process that allows states to voluntarily set GHG emissions reduction goals and their progress toward those goals. This process still leaves the responsibility for meeting emissions goals at the state level and many states will choose to use authority in a top-down manner to elicit behaviors by organizations and individuals that will be effective in reaching the chosen emission goals. As discussed below, a complexity perspective suggests that a distributed approach at all levels of social aggregation would be more effective at both meeting mitigation targets and protecting human society.

For a system to be a complex *adaptive* system it must have an environment to which it must adapt. Defining the system to be studied defines its environment and vice versa. The environment within which the complex conflicts of the Middle East develop includes the

¹ Comments on June 1, 2017 accessed at <https://www.whitehouse.gov/briefings-statements/statement-president-trump-paris-climate-accord/> on April 1, 2018.

² China's Closing Statement at COP21, December 12, 2015, quoted by Dimitrov, *Op Cit.*

³ Personal conversation with Professor Wei Shen, Lancaster University.

international political and security systems but also the historical, religious, cultural, geographical, and resource differences between the players. The true success of the UNFCCC process has been construction of an ideational environment within which complex local social systems may choose their adaptive behaviors.

All significant social systems from local to global are complex but differently from the natural systems that are often used as exemplars. While governments exercise some authority that may simplify decision-making, they may be unable to reduce complexity in the social system being administered. This is because humans have a reflective social complexity that enables [us](#) [them](#) to switch between multiple identities as they adapt to changes in context and sometimes to changes in the rules of the system that order their interactions. This level of complexity is amplified at the global level not only by the larger physical and biological interactions, but by the enormous diversity of human organizational forms and competing interpretations, understandings and norms on almost any issue. Thus, from a complexity perspective, the true benefit of the Paris Agreement is not seen just in the decisions of nation-states—the “political success”—but in the number of US states and cities that individually and collectively affirmed the Paris goals after President Trump repudiated that agreement. Twelve states representing 30 percent of the US population, 210 cities, and “[m]ore than 1,000 U.S. governors, mayors, investors, universities, and companies joined the “We Are Still In” campaign, pledging to meet the goals of the Paris agreement.” (Nuccitelli 2017) These entities chose actions contrary to national preferences because of the ideational environment structured by the UNFCCC process.

Because both social and natural systems evolve, global governance is exceptionally complex and a political success in inter-governmental negotiations is entirely inadequate. The problem is to manage the co-evolution of a global social system and the climate so as to avoid dangerous changes in global and local climates. Simply put, while we are changing the climate so we must adapt our lives to reduce those changes and at the same time adapt to them as they occur. Effective mitigation to achieve global goals set at Paris is most likely to emerge partly from national responses but perhaps more from local choices within the ideational environment that it represents. However, adaptation to climatic changes must emerge locally in response to local conditions and resource constraints.

Adaptations by complex social systems may or may not be effective. A social system that is successfully able “to adapt or even transform into new development pathways in the face of dynamic change” is said to be “resilient.” (Folke 2016) Resilient social systems adapt to climate change by reducing their net GHG emissions to mitigate global warming and by conserving

essential physical, social, and cultural infrastructure in the face of climatic changes as they occur. Social system actions may also be maladaptive, reducing resilience, leading to system collapse despite the significant expenditure of energy and resources (Tainter 1988). The difficulty of designing effective policies increases with the size and complexity of the social system and, because both social systems and the climate are complex and dynamic, it is not possible to assure in advance that any adaptive effort by a social system will be effective. Uncertainty, experimentation and feedback loops are all part of the process.

Complexity has clear linkages to elements of pragmatist philosophy (Ansell and Geyer 2016) and the debates on governance and policy (Duit and Galaz 2008). Both complexity thinking and pragmatism stress the importance of “evolutionary learning” and “democratic experimentalism” (Ansell 2011, 5) and the need for caution and avoiding hubris when attempting to govern complex systems. Complexity and governance (or multi-level governance) share the idea that for most issues there is no central controlling government. Instead, governance takes place, “through processes and institutions operating at, and between, varieties of geographical and organizational scales involving a range of actors with different forms of authority.” (Duit and Galaz 2008, 318) In considering how to intervene in complex collectivities—to modify norms, rules, institutions, or practices—governance actions must recognize that the past does not foretell the future, that unintended consequences may be significant, and that, therefore, the system cannot be firmly, or hardly, “managed” to a desired future state.

An example of one of the tools of pragmatic complex governance would be the use of “catalytic probes”—small scale, low risk experiments intended to elicit information about system response—in order to find small interventions that may cause large scale, positive changes in system. Each probe into a local social system is a socio-political intervention that tests its behavioral response and the consequent emissions reductions in search of an effective contribution to the Paris goals. Spurred by [the](#) ideational environment constructed by [the](#) UNFCCC and IPCC reports many regional, state, or local mitigation and adaptation processes have emerged across the US (Lutsey and Sperling 2008) and around the world (Bulkeley and Castan Broto 2014). By their nature the probability that such localized probes would unintentionally cause large negative changes in social or natural systems is minimal. In contrast, the risks of geo-engineering the complex global climate are, from a complexity perspective, orders of magnitude greater.

Adaptation to changing climatic conditions inevitably occurs locally, subject to changes in local climates, and may be behavioral or physical (UNFCCC 2017). For example, New York and

New Orleans may need physical protection from sea level rise and hurricanes. Because farming states in the US Midwest are threatened by prolonged droughts punctuated by serious flooding, behavioral change in farming practices is slowly emerging that reduces emissions and protects productivity (Tabuchi 2017). Elsewhere small-island states, for example, face an existential threat from sea-level rise and have few resources since developed states have not fully funded their inadequate promises through the UNFCCC financial mechanism (Pickering, Jotzo, and Wood 2015).

Climate change is a potentially catastrophic, non-linear evolution of a complex natural system caused by human activity. The mitigation of this human activity is complicated by an international system that lacks a central government and where state compliance with international rules and norms is now voluntary. States are themselves more complex than usually accepted. Thus, if a complex system comprised of multiple complex sub-systems can be expected to mitigate changes in a complex natural system, governance processes that emerge across all scales of collectivities need to be coordinated – a form of pragmatic complex multi-level governance. Complexity highlights the need for co-evolution of states and [between](#) their sub-systems in terms of technical knowledge, and physical and financial resources.

From a complexity perspective, effective co-evolution of global society with a non-dangerous climate requires more than voluntary agreements among states. Indeed, some states appear to be a major impediment. While this may not be true for all issues, effective global climate governance and more resilient social systems can emerge through action at lower levels of social aggregation than nation states. However, for this to occur resources will need to flow to the most promising local catalytic probes. Thus, states are part of the problem as well as [of](#) the solution and IR theory and thinking must adapt accordingly. Nothing in complexity guarantees that Humanity will be able to create a sustainable response to this potentially cataclysmic change, but progress to that end requires probing the workings of an approach better suited to the challenge of global governance through global sharing of effective local strategies and the distribution of resources across all sizes and types of social systems.