Learning to Live With Climate Change Will Not Be Enough

Contributed by David W. Orr
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The awareness that humans could alter the climate of Earth has dawned slowly on our consciousness. In 1896, Swedish chemist Svante Arrhenius deflected his anguish over a failed marriage into remarkably tedious and, as it turned out, accurate calculations about the effect of CO2 emissions on climate.
It was an oddly therapeutic thing to do, but it had no more effect on public attention than the smallest cloud on a distant horizon.

Another 69 years would pass before scientists warned a U.S. president of the potential for serious climate disruption, and still another 30 years before the first report from the Intergovernmental Panel on Climate Change.

Now, facing climate destabilization, our choices for action are said to be adapting to a warmer world or mitigating the severity of climate change by sharply reducing greenhouse gas emissions. Of course, neither adaptation nor mitigation alone will be sufficient, and sometimes they may overlap. But in a world of limited resources, money, and time we will be forced often to choose between the two. In making such choices, the major issues in dispute have to do with estimates of the pace, scale, and duration of climatic disruption. And here the scientific evidence tilts the balance strongly toward mitigation.

The argument for adaptation to the effects of climate change rests on a chain of logic that goes something like this: Climate change is real, but will be slow and moderate enough to permit orderly adaptation to changes that we can foresee and comprehend. Those changes will, in a few decades, plateau around a new, manageable stable state, leaving the gains of the modern world mostly intact - albeit powered by wind, solar, and as-yet-undreamed advanced technologies.

In other words, the developed world can adapt to climatic changes without sacrificing much. The targets for adaptation include developing heat- and drought-tolerant crops for agriculture, changing architectural standards to withstand greater heat and larger storms, and modifying infrastructure to accommodate larger storm events and rising sea levels, as well as prolonged heat and drought. These are eminently sensible and obvious measures that we must take.

But at some point there are limits to what can be done and the places in which such measures can be effective. With predicted changes in temperature, rainfall, and sea level rise, it is unlikely that we can "promote ecosystem resiliency" or adapt to such changes with "no regrets," as some have suggested. On the contrary, ecological resilience and biological diversity will almost surely decline as climatic changes now underway accelerate, and going forward we will surely have a great many regrets chiefly of the "why did we not do more to stop it earlier" sort.

Accordingly, more extreme adaptive measures called "geoengineering" are being discussed. These include proposals to fertilize oceans with iron to increase carbon uptake, or injecting sulfur dioxide into the upper atmosphere to increase the reflective albedo and thereby provide temporary cooling. But since the effects of geoengineering are largely unstudied and its risks largely unknown, it is a "true option of last resort" in the words of one analysis. Accordingly, "the best and safest strategy for reversing climate change is to halt the buildup of greenhouse gases," as a recent article in Foreign Affairs suggests.

Proponents of mitigation, on the other hand, give priority to limiting the emission of heat trapping-gases as quickly as possible to reduce the eventual severity of climatic disruption. The essence of the case for mitigation is that:

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Growing scientific evidence indicates that the effects of climate change will be greater and will occur faster than

previously thought.

- The duration of climate effects will last for thousands of years, not decades.

- We are in a very tight race to avoid causing irreversible changes that would seriously damage or destroy civilization.

- The effects of climate destabilization can be contained perhaps only by emergency action to stabilize and then reduce CO2 levels.

Practically, climate mitigation means reversing the addition of carbon to the atmosphere by making a rapid transition to energy efficiency and renewable energy. Arguments for mitigation, in other words, are rather like those for turning the water off in an overflowing tub before mopping. Those advocating mitigation believe that we are in a race to reduce the forcing effects of heat-trapping gases before we cross various thresholds some known, some unknown tipping us into irretrievable disaster beyond the ameliorative effects of any conceivable adaptation.

There are five reasons why focusing on mitigation is a far-better choice than emphasizing adaptation. First, the record shows that climate change is occurring much faster than previously thought, will affect virtually every aspect of life in every corner of Earth, and will last far longer than we'd once believed. The small cloud that Arrhenius saw on the distant horizon in 1896 is growing into a massive storm, dead ahead.

The effects of climatic destabilization, in other words, will be global, pervasive, permanent, and steadily or rapidly worsening. Given the roughly 30-year lag between what comes out of our tail pipes and smokestacks, the climate change-driven weather effects we now see are being caused by emissions that occurred in the late 1970s. What is in store 30 years ahead when the forcing effects of our present 387 parts per million of CO2 are manifest? Or further out when, say, the warming and acidifying effects of 450 parts per million of CO2 or higher on the oceans have significantly diminished their capacities to absorb carbon? No one knows for certain, but trends in predictive climate science suggest that they will be much worse than once thought.

The implications for climate response strategies are striking. For example, it is now obvious that impacts will change as atmospheric concentrations of greenhouse gases rise, meaning adaptation targets will often move faster than we can anticipate as climate disruption becomes manifest in surprising ways. To what climatic conditions do we adapt? What happens when previous adaptive measures become obsolete, as they will?

Similarly, at every level of climate, forcing the changes will be difficult to anticipate, which raises questions of where and when to intervene effectively in complex ecological and social systems. Are there places in which no amount of adaptation will work for long? Given what is now known about the pace of sea-level rise, for example, what adaptive strategies can possibly work in New Orleans or South Florida, or much of the U.S. East Coast, or in those regions that will likely become progressively much hotter and dryer and perhaps one day mostly inhabitable under drastically worsened conditions?

Second, the implications of the choice between adaptation and mitigation do not fall just on those able, perhaps, to temporarily adapt to climatic destabilization, but rather on those who lack the resources to adapt, and to future generations who will have to live with the effects of whatever atmospheric chemistry we leave behind. The choice between mitigation and adaptation, in other words, is one about ethics and justice in the starkest form. A few wealthy communities in the developed world may be able to avoid the worst for a time, but unless the emission of heat-trapping gases is soon reduced everywhere, worsening conditions will hit hardest those least able to adapt. The same can be said far more emphatically about future generations.

There is, third, a "stitch in time saves nine" economic argument for giving priority to mitigation. Stabilizing climate now will be expensive and fraught with difficulties, but it will be much cheaper and easier to do it sooner rather than later under much more economically difficult and ecologically harrowing conditions. Nicholas Stern, for one, estimates "that if we don't act [soon], the overall costs and risks of climate change will be equivalent to losing at least 5 percent of global GDP each year, now and forever."

Fourth, efforts to adapt to climate change will run into institutional barriers, established regulations, building codes, and a human tendency to react to rather than anticipate events. There are, in economist Robert Repetto's words, "many reasons to doubt whether adaptive measures will be timely and efficient, even in the U.S. where the capabilities exist."

In the best of all possible worlds, effective adaptation to the changes to which we are already committed would be complicated and difficult. In the real world of procrastination, denial, politics, and paradox, however, anything like thorough adaptation is unlikely. Rather, it will be piecemeal, partial, sometimes counterproductive, wasteful, temporary, and ultimately largely ineffective. In contrast, measures pressing energy efficiency and renewable energy, as complicated as they are, will be much more straightforward, measurable, and achievable. And they have the advantage of resolving the causes of the problem, which has to do with anthropogenic changes to the carbon cycle.

Finally, beyond some fairly obvious and prudent measures, federal, state, and foundation support for climate adaptation gives the appearance that we are doing something serious about the looming climatic catastrophe. The political and media reality, however, is that efforts toward climatic adaptation will be used by those who wish to do as little as possible to block doing what is necessary to avert catastrophe.

The conclusion is inescapable: Adaptation must be a second priority to effective and rapid mitigation that limits the scale and scope of climatic destabilization. The priority must be given to efforts toward a rapid transition to energy efficiency and deployment of renewable energy. Until we get our priorities right, the emission of greenhouse gases will continue to rise beyond the point at which humans could ever adapt. In ecologist George Woodwell's words, "The only adaptation is mitigation."

We were first warned of global warming over a century ago and have lingered in increasingly dangerous territory in the belief that we can continue to burn massive amounts of fossil fuels without risking serious climate destabilization. That fantasy is rapidly coming to an end. According to NASA's James Hansen, we must move decisively to return CO2 levels to 300 or 350 parts per million. If we wait too long to prevent climate change, we will perhaps sooner than later create conditions beyond the reach of any conceivable adaptive measures. With sea level rise now said to be on the order of one to two meters by 2100, for example, we cannot save many low-lying places and species we would otherwise prefer to save. And sea levels and temperatures will not stabilize until long after the year 2100.

There will be unavoidable and tragic losses in the decades ahead, but far fewer if we act to contain the scope and scale of climate change now. No matter what we do to adapt, we cannot save some coastal cities, we will lose many species, and ecosystems will be dramatically altered by changes in temperature and rainfall. Our best course is to reduce the scale and scope of the problem with a sense of wartime urgency. And we better move quickly and smartly, while the moving's good.

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