

## Editor's note: Linkages between desertification and climate change, revisited

As the articles in this issue of the *Arid Lands Newsletter* make clear, the connections between desertification and climate change are increasingly on people's minds—not only in terms of ecological linkages, but also in terms of the benefits of linking policies and programs aimed at mitigating and adapting to both of these phenomena.

Both “mitigation” and “adaptation” have been more explicitly developed in terms of climate change, with “mitigation” generally meaning steps taken to reduce the amounts of greenhouse gases being produced by human societies over the long term (usually through international policy), and “adaptation” meaning steps that communities and societies can take right now to help them cope with any adverse effects of climate change. But the terms apply to desertification as well and, practically speaking, actions taken to address either phenomenon can have positive outcomes regarding both. Representatives of the Observatory of the Sahara and Sahel and the Community of Sahelian-Saharan States, for example, have pointed out that adaptation strategies are fundamentally no different than the actions already developed in National Action Plans for combating desertification in the same regions.<sup>1</sup>

Interest in creating more synergy between international conventions, especially the UN Convention to Combat Desertification (UNCCD) and the UN Framework Convention on Climate Change (UNFCCC), is also increasing. At the 8<sup>th</sup> Conference of the Parties (COP-8) to the UNCCD in December 2007, for example, the UN Environmental Programme (UNEP) delegate specifically “highlighted the importance of understanding, mitigating and adapting to climate change in relation to combating desertification” (Conliffe et al. 2007a, 1); the executive secretary of the UNFCCC further flagged “reforestation and land management; adaptation; education, awareness raising and science; and mitigation” as “four areas of potential synergy between the UNFCCC and the UNCCD” (Conliffe et al. 2007b, 1).

In ecological terms, climate change can drive desertification in several ways. First, current understanding of complex systems (in this case, ecological systems like deserts and desert grasslands) shows that if certain thresholds are crossed, the system may change irreversibly. Rising temperatures caused by climate change may trigger such ecological “tipping points”, leading to sweeping ecosystem changes, land degradation and biodiversity loss. One example of this dynamic and how it could work is the incursion of exotic buffelgrass (*Pennisetum ciliare*) into the Sonoran Desert. In our first article, Dr. Shirley Kurc of the University of Arizona discusses the nature of desertification and ecological tipping points, invasive plants as potential agents of desertification, and why rising temperatures might help buffelgrass to increasingly dominate the Sonoran Desert and thus devastate one of the most richly biodiverse deserts in the world.

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<sup>1</sup>original comments made at the Joint International Conference on Desertification and International Policy Imperative, 17-19 December 2006, as reported (in French) on p. 287 in *Session 6: Interlinkages between desertification, climate change and other environmental issues*; online at [http://www.inweh.unu.edu/inweh/drylands/IYDD\\_Proceedings/Part7\\_Session6.pdf](http://www.inweh.unu.edu/inweh/drylands/IYDD_Proceedings/Part7_Session6.pdf).

Rising temperatures are predicted to lead to changes in precipitation and snowmelt patterns, as well, with potentially devastating effects: reduced water availability from major river systems, lower agricultural production, increased salinization, water security problems (IPCC 2007). And, perhaps of more immediate concern, rising global temperatures predictably lead to more extreme weather events of all kinds, from droughts to floods and heat waves to cold snaps. This is basic physics: as the earth's atmosphere heats up, it stores more energy. Regional temperature differences cause highs and lows (fair weather and storms) and direct the flow patterns of the jet streams. More energy in the system means higher temperature differentials and more violent storms or more extreme changes in wind flow patterns. The implications for human societies are serious. As one writer has put it starkly: "The time has come to reframe global environmental change first and foremost as an issue of human security. ... The debate should not be about whether or not this [or that] is evidence of climate change, but about whether human society has the capacity to respond to these types of shocks." (O'Brien 2006)

The world's drylands, particularly where local populations have historically relied on rainfed subsistence agriculture or pastoral nomadism as their main livelihood strategies, may be particularly vulnerable to such shocks. And this brings us back to the notion of tipping points, in this case social tipping points. In terms of desertification, social tipping points would be changes that force local populations from their traditional/chosen livelihood systems, whether they want to change or not. A UN University analysis (2007) states baldly that desertification, exacerbated by climate change, represents the greatest environmental challenge of our times, one that must be addressed if mass migrations of people driven from their degraded homelands are to be avoided within even a single generation.

But as Dave Mouat of the Drylands Research Institute writes in his article, societies themselves can help avert such disasters by developing new and more diverse livelihood strategies in the face of environmental change. This can in effect create positive tipping points; he cites regions of Senegal that avoided desertification despite relatively heavy populations and increasing land use demands, probably due to such resiliency. A major point is that this kind of resiliency requires the direct involvement of the local populations themselves, and that it needs to be in place before disaster strikes, in order to be effective. One good tool that can help people develop this sort of resilience is a bottom-up, participatory visioning and planning technique called "alternative futures analysis," that "provides information, illustrates the consequences of human responses, and assists people to develop options and alternatives for maintaining dryland sustainability."

The UNCCD, alone among the major international ecological conventions, emphasizes the need for such bottom-up actions, empowerment of local populations, and local buy-in to make anti-desertification activities successful. One activity often advocated as a strategy for diversifying livelihoods in a sustainable way is ecotourism, usually as represented by projects undertaken by community-based organizations and/or indigenous communities, often in industrializing nations. But, as the article by Aspen Edge of Semilla Besada, Spain, shows, ecotourism initiatives are also undertaken in industrialized nations within the context of sustainable development, sometimes even, as in this case, by individuals. No matter what the context, designing truly sustainable ecotourism projects is not easy, but the payoffs in terms of restoring the land and increasing local resilience may be substantial.

Finally, any strategies for adapting to or mitigating either climate change or desertification will be greatly strengthened by better understanding how these complex processes work and how to monitor them. Ultimately, this will allow us to determine optimal mixes of mitigation and adaptation strategies and how to mainstream these strategies effectively. Such research undertakings require massive amounts of data and coordination and collaboration among different entities, and current efforts are

more highly developed for climate change than they are for desertification. This is in part because desertification until now has been seen largely as a local and regional phenomenon, and international coordination (such as that needed to set up early warning networks for desertification) still needs to be more fully developed.

But efforts that already have been made in the climate change arena may also produce tools that can be adapted to desertification. Our final article, by Theresa Crimmins and Mike Crimmins of the University of Arizona, touches on one such effort, the National Phenology Network in the United States and its use of volunteer "citizen scientists" to gather data in the massive quantities required to develop such tools. This is a different kind of bottom-up participation and involvement that provides researchers with extremely useful data at the same time that it gives individuals a way to better understand environmental issues and to be involved in the research in a way that is directly meaningful to them.

The fact is, all of these efforts, at every level, are needed: the meticulous scientific research undertaken to understand individual plant species and complex systems alike, the community-level development of strategic plans for the future, the individual efforts to live a more sustainable life, the broad public participation in data collection. One of the most essential linkages of all to keep in mind, one that has been stressed time and time again but still bears repeating, is that we are all in the same boat together. Each one of us has some contribution to make towards addressing desertification, climate change, and other environmental challenges, and we can each start doing it right now.

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