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Source: [Duke University](#)
Date: May 11, 2007

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Drylands Are Not The Same As Badlands

Science Daily — Drylands, where 38 percent of the world's population lives, can be protected from the irreversible damage of desertification if local residents and managers at all levels would follow basic sustainability principles, according to a panel of experts writing in the May 11 issue of the journal *Science*.

The study makes a point of introducing hope rather than the usual gloom, said James Reynolds of Duke University, who is the first author. "(Given) recent advances in dryland development, concerns about land degradation, poverty, safeguarding biodiversity and protecting the culture of 2.5 billion people can be confronted with renewed optimism," the report said.

Covering about 41 percent of the globe's land surfaces, drylands are arid and semiarid areas with scarce and unpredictable precipitation where about 2.5 billion people live off the land by raising livestock and growing certain drought-tolerant crops.

Between 10 percent and 20 percent of drylands are undergoing some degree of severe land degradation that is likely to expand in the face of climate change and population growth.

"These are serious problems, no doubt," Reynolds said. "And they could be exacerbated by climate change. But it doesn't always have to lead to negative outcomes. We are trying to take a more positive perspective, saying that adhering to some common-sense principles can really make a difference in understanding and managing these lands.

"The culture surrounding topics of desertification has always been embedded in this negativity and pessimism that 'woe is us,'" added Reynolds, a professor of environmental science and biology at Duke's Nicholas School of the Environment and Earth Sciences.

The report calls on managers to recognize that maintaining vulnerable and delicately balanced dryland systems involves a changeable mix of ecological factors and human ones.

For example, economic losses may force a marginal cattle raiser to increase his herd to make up the deficit, Reynolds said. And that decision may overtax the grass supply to the danger point, especially if a cycle of drought sets in.

It cautions that human and environmental changes in drylands evolve slowly, confounding efforts to manage for quick results. "What managers need to do is be more patient and not try to understand a system based on short-term dynamics," Reynolds said.

It argues that some slowly changing but key variables -- such as soil fertility -- have thresholds that, when crossed, can push systems into "a new state or condition," the report said.

Crossing thresholds don't necessarily mean a turn toward disaster. For example, the report cited the positive social and environmental effects of introducing piped water or solar-heated cookers in a remote village.

The report also encourages tapping the knowledge and memory of people who live on drylands. And it urges local and outside people and groups with vested interests to work together on maintenance issues.

"There have been a lot of misconceptions that people who live there are destroying the land, are ignorant about it and are using it in an incorrect fashion," Reynolds said. "That's really a problem of outside managers having little feel for what is going on.

"There's tremendous local knowledge among the native people who live there that needs to be taken advantage of," Reynolds said. "Then, mixed with some good solid science, there are many opportunities to improve these lands so they won't be degraded in the future."



A Bolivian woman and her children harvest quinoa, a dryland crop that is attracting attention in developed countries. (Credit: James Reynolds)

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For example, study co-author D. Mark Stafford Smith of the Commonwealth Scientific and Industrial Research Organization, in Canberra, Australia, has begun a program called Desert Knowledge that is tapping native Aborigines' millennia of experience on how to manage livelihoods in arid environments.

Reynolds directs a National Science Foundation-funded program called ARIDnet, through which he and his colleagues are testing their sustainability principles in case studies throughout Latin America.

Most recently, they have been working with farmers who raise a cereal called quinoa in Southern Bolivia. There they are assessing how the introduction of tractors is affecting traditional means of tillage, as well as the effects of the developed world's growing demand for the trendy grain.

The study was supported by the National Science Foundation; the Australian Government Cooperative Research Centers Program; the Commonwealth Scientific and Industrial Research Organization; and the Humboldt Foundation of Bonn, Germany.

Note: This story has been adapted from a news release issued by Duke University.

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