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For more information, or to join
Wild Ones Natural Landscapers,
here's how to reach us:

Phone
(920) 730-3986

Mail
2285 Butte des Morts Beach Rd.
Neenah, WI 54956

E-Mail
info@wildones.org

WebSite
www.wildones.org

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The Grapevine

By Maryann Whitman

When frogs are afraid to go into the water, should we be worried, too?

After **Sally Pick**, a Wild Ones Partner-at-Large (MA), called me in response to a note about malformed frogs in the January "Grapevine," I felt compelled to hit the stacks.

It seems that the modern-day maladies of frogs take many forms: extra and malformed limbs; missing body parts; frogs that resemble males on the outside and females on the inside; altered DNA; tadpoles that fail to mature into adults; deadly infections; meningitis; inability to hold up head; frogs with signs of poisoning in distended, yellow livers. Remember always that frogs are, for humans, a form of "canary-in-the-mine-shaft." Whatever befalls them, we may also be heir to.

While frogs in Minnesota may indeed be multi-limbed and infected with parasites, frogs in Vermont are malformed but don't have multiple limbs, and show no sign of parasites. A researcher in Oregon is collecting evidence that UV radiation is deforming Pacific tree frogs. A Canadian researcher who has evaluated more than 30,000 frogs over years of studying a 150-mile stretch of the St. Lawrence River has found too many forms of infirmity to list. He reports that the incidence of limb malformation averages 20 percent in areas subject to pesticides and other chemicals, and 1.5 per cent in non-agricultural areas. That's a significant difference to any statistician.

One piece of research out of UC Berkeley further implicates agricultural pesticides. The scientists replicated what frogs might realistically encounter in the environment. They exposed tadpoles to a mix of pesticides at extremely low concentrations (0.1 part per billion) like those widely found around farms. When the tadpoles were exposed to any one of the pesticides singly, 4 percent died before they had matured to adults. But when the herbicide Atrazine and eight other pesticides and fungicides were mixed to match what might be found in a corn or soybean field, 35 percent of the tadpoles died before maturing. It appears that the chemicals worked differently when combined.



Researchers from Yale working in Vermont are convinced that chemicals in the environment combined with multiple other stress factors are responsible for the malformations, diseases, and infections by parasites. The researchers reason that frogs have dealt with parasites, diseases and drought for a long time before we added chemicals to their water, and disrupted their ecosystems in untold ways. Atrazine and a number of other herbicides and pesticides disrupt hormones, both plant and animal – hormones regulate bodily functions,

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including reproduction, immune functions and general body development. The disruption of the immune system, along with other, as yet undefined environmental factors, results in increased vulnerability to age-old parasites and disease vectors.

One of the experiments performed by the pair of Yale researchers exposed tadpoles to levels of Atrazine that were well within EPA limits in drinking water; some of these animals developed into hermaphroditic frogs; none of the frogs raised in clean water did. (Nothing subtle about those results.) The upshot is that there are no simple answers – everything is attached to everything else. Multiple factors are at work in our environment, producing ecological effects, some of them blatantly obvious, many of them harmful to living things in subtle and unexpected ways – and man is responsible for most of them.

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Maryann is Editor of the Wild Ones Journal, and comes to the position with an extensive background in environmental matters of all kinds.