Nuts, Bolts, and Endangered Species

(For Lesley...)

A rancher and a biologist were walking down the road one day. The biologist was explaining to the rancher why they needed his help for an endangered species. The rancher was explaining why he did not think endangered species were important. As they walked the rancher bent down and picked up a bolt from the ground, looked it over, brushed it off, and put it in his pocket. The biologist asked him why he had done that for just another old, stray bolt. The rancher explained that even though he did not have a use for the bolt at the moment, someday it might be just the right size to fix something he needed. Exactly, said the biologist. Someday we may need one of these endangered species to fix something the world needs even though we don't know what that may be just now.

Everything that lives, or ever has – every individual amoeba, rhinoceros, mosquito, or cottonwood tree - came into this world with Grandma's Cookbook full of genetic recipes inside them. In those recipes are the solutions to problems they will need to survive, passed down from every ancestor that solved them successfully. What they can eat, and not eat; how to get food, water, mates; what temperatures or chemicals or antibiotics they can tolerate – or not; what diseases they are immune to; and the millions of other details of their lives that make them themselves and not another. Which feather, fin, scale, or petal will be what color, shape, size or texture? Put together the cookbooks of all the members of that species and there is a vast, intricate, amazing array of life-critical information on survival some of which will be utterly unique to that species. Lose that species and an entire library of information that took millions of years to produce is gone. Permanently. Like the Codices of Montezuma or the great books of Alexandria. Every time a species dies out, part of the greatest library of problem-solving information and elegant beauty possessed by the earth has been burned. These are the nuts and bolts we may need to fix something one day. After all, as Paul Ehrlich said, "The first rule of intelligent tinkering is to save all the parts." The species with the cure for HIV or the common cold may have gone extinct 20 minutes ago, or may be gone tomorrow. With climate change upon us, ancient species, like sandhill cranes and paddle fish which have survived such episodes in the past, may well have locked in their genes the information on how to do so again and could lead us to helping others survive.

The Endangered Species Act states endangered and threatened species of wildlife and plants have value, have information, have nuts and bolts of many types. It states that they "are of esthetic, ecological, educational, historical, recreational and scientific value to the Nation and its people." Not every species meets every criteria, of course, nor do we know enough about many of these species to even know what criteria they may fit into, but there are more than enough examples of each to make me uncomfortable over losing any. So what has an endangered species done for you lately?

Esthetic reasons to save endangered species? Do you know there are more paintings by Rembrandt than Siberian tigers still in existence? We can copy a great painter with flawless skill (ask forgers!), or even have a new Da Vinci born. We can neither copy nor create Siberian tigers or even a blade of grass. Do you know the largest selling portion of the annual calendar market is the ones with animals and plants on them? If you look at the remarkable book *Witness - Endangered Species of North America*, by Susan Middleton and David Liittschwager you will see esthetic reasons that are profoundly powerful. Have you never felt your own heart soar a little when you see the bald eagles fly over Topock Gorge?

The ecological value of wild species, including endangered ones, is so complex, pervasive, and staggering as to be invisible to most people. Collectively these actions are called "ecosystem services", which they perform for free, and they are worth many billions (with a "B") of dollars to the economy. For agriculture

there is pollination, pest control, and soil building. No bees = no apples, no coffee, no CHOCOLATE, or dozens of other crops. Over 35% of the food on your dinner table tonight depends on pollinators - and all but one of those species is wild. Nearly all those pollinator species' numbers are declining; some are endangered. Anyone want to stop eating? The freetail bats that live under the Congress Avenue Bridge in Austin eat 10,000 to 20,000 POUNDS of insects, especially mosquitoes and agricultural pests, notably cotton boll weevils and corn earworm moths. I wonder how many pounds of mosquitos the Yuma myotis under the London Bridge eat each night? For further services, it was wild birds of prey whose populations declined to endangered that warned us of DDT. The return of the wolves to Yellowstone has made major changes to the ecosystem that has done more in 20 years to restore that Park to functional integrity and balanced biodiversity than all of our attempts to manage it in the last 100 years. They also dramatically increased revenue from visitors. What must the mountains, and Aldo Leopold, be feeling to hear the harmonics of wolves again! What can other declining species now tell us and what could they do?

The educational value of endangered species is also immense. They teach us how our activities and actions can benefit or harm species that may live in the refuge down the road or on the other side of the world; we do not live in a vacuum or a plastic bubble. Food, air, water, and shelter - all these connect us to the rest of the biosphere. Learning that lesson can only ultimately benefit everyone. Children, scientists, yoga instructors, politicians, artists, outdoor recreationists, cooks, teachers, clergy, retirees, business owners - endangered species can help teach everyone a sense of wonder, respect, and the interdependence - the real reality - of the natural world.

Then there are the species with cultural and historical claims on our hearts. What would America look like today if it were not for the fur trade? Buffalo? Bald eagles? American chestnuts? Carolina parakeets? Some endangered species have strong cultural values to different ethnic groups although, sadly, this may be a reason the species is endangered in the first place. Other groups with a high value for a particular species have put themselves at the forefront of that species' restoration and recovery. Eagles may be needed to carry their prayers. Members of some religions believe letting a species go extinct is an affront to the creator they believe made them and said that they were good. After all, Noah's Ark was an endangered species project. American cultural identity is deeply rooted in natural resources and the wildlands where native species and resources were once and can, sometimes, still be found. Under U.S. law, wildlife is a public trust, not private property. That was one of reasons we rebelled against England.

Recreational values of wild species, including endangered ones, have strong economic and cultural foundations. The latest estimate is $730 billion dollars a year are generated by hunting, fishing, wildlife watching, hiking, camping, and other "human powered recreation" on public lands. These activities are all contingent on healthy wildlife and wildlands. Birdwatching enthusiasts alone spend $85 billion dollars per year with much of that focused on rare species. Some folks come from all over the world in spring to kayak the Bill Williams River delta at dawn and hear the clatter of Ridgway's rails. Zoos remain a huge attraction and educational opportunity for people, especially those in urban environments, to see wildlife other than on TV. Again, endangered species are among their biggest draws.

The scientific value of what we have, and still can, learn from endangered species is enormous. Florida manatees, Houston toads, rosy periwinkle, bison, chimpanzees, and dozens of rare plant and insect species all are playing critical roles in medical, agricultural, and scientific research. We learned how to make better crash helmets from woodpeckers. Teosinte is the endangered ancestor of corn. It not only has very high resistance to disease, it is perennial. What do you think it would be worth to the world's corn crop if those genes could be brought in and only have to plant it once? Any idea how much diesel that would save? How about tomatoes that could grow if irrigated with salt water? There is a rare species

of wild tomato that can do that. In light of increasing irrigated agricultural soil salinities and rising sea levels I hope that species does not go extinct. I love tomatoes! Overall, nearly all our food is dependent on fewer than 20 plant species, all of which have vastly lower genetic diversity than their now rare wild ancestors. Those ancestral genomic libraries may be all that stands between starvation and most of *our* species. The consequences of any species' extinction may be far worse down the line than we think it is worth today.

Species have been going extinct since they first appeared on the planet. As individuals die, so do species eventually. Still, the death rate can differ over time. A human population that is living under normal conditions has a very different mortality rate than one that is in a war zone, an earthquake, or in the path of a tsunami. What we are seeing in the death rate of species over the last hundred years or so is not the "normal" rate of loss. Indeed it is a biological earthquake, or more like a war zone. The only time in earth's history there has been this rate of species loss and biodiversity collapse was when the planet was hit by asteroids millions of years ago. However, this time, we are the asteroid, our species is the tsunami, and we can choose which species survive. Of 500 or so species and subspecies lost since 1492 only 2 are known for sure to have no human finger in the pie. When Krakatau volcano blew up east of Java in 1883 the world lost 1 species of bat, 1 rodent, and probably some plants. As volcanos and earthquakes remain beyond human influence, at least so far, we are not responsible for those 2 species, but as for the other 498? Probably, one way or another, we were there.

So, what can you do? You can take the 2 actions that set humans apart from all other species; 2 recipes in our species cookbook that are uniquely expressed in us. 1) You can learn. The human species can do that like no other the world has ever known. Learn about the species that share this space with you whether endangered or not, and upon which you depend for all the reasons listed above. Large or small, common or rare, annoying or fascinating. Learn about them; know what benefits them and what does harm. Know the real cost of a redwood deck or drugs or cheap hamburgers. 2) You can care. Humans have a unique capacity for empathy, foresight, and making decisions based on future desired conditions, not just immediate profit or convenience, not that we always do so, of course. Our species has the ability to take what it learns and project the consequences of current actions and weigh the risk of damage to the future. For our species it is not just a question of asteroids or volcanoes, it is a matter of nuts and bolts and will. Oh, and, yes, if you were wondering? The rancher agreed to help the biologist with his black-footed ferrets and prairie dogs.

> *What is man without the beasts? If all the beasts were gone, man would die from a great loneliness of spirit, for whatever happens to the beasts happens to man. All things are connected.*
> - Chief Seattle

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