



Thad Box

Carrying Capacity, Trade-Offs, and a Land Ethic

In the late 1970s I saw the movie, *The Ballad of Mt Narayama*, at an art film festival in Perth, Western Australia. It was a truly remarkable statement about how tradition and values relate to carrying capacity. It was set in a small village in a mountainous area of Japan during the early 1800s. The isolated village could produce, gather, or hunt just enough food for the existing population. Strict cultural rules kept the number of people within carrying capacity. A wife could be recruited from outside only if death provided a vacancy. Babies born in hard times were often placed in a snowbank to die. Penalty for stealing food was death.

The eldest son carried his parents, if either reached age 70, high onto Mt Narayama and left them to die. The story is about how one man and one woman reacted to the cultural law of dealing with the aged. The woman, a respected leader in the village, welcomed the event as her sacrifice for the common good. She broke out her teeth to hasten the decision. The man, acting only in self-interest, had to be tied and dragged kicking and screaming to his fate.

The film, in Japanese with English subtitles, is a sobering movie. The photography, directing, and acting is superb. The story is powerful and thought provoking, and speaks directly to the role of community in a sustainable system. I looked forward to using it in a class I was teaching. For some 30 yr I was not able to find it in the United States. Apparently that was because of explicit sex scenes, where human mating was shown, to make the point that all creatures, including humans, are part of nature. In each sexual encounter, the camera panned from humans to bees pollinating flowers, copulating insects, or snakes writhing in passion, then backed away to show the landscape in all its beauty and interrelationships.

In a class I taught on carrying capacity, I wrestled with ways to get students to think about Aldo Leopold's land ethic statement: "In short, a land ethic changes the role of *Homo sapiens* from conqueror of the land-community to plain member and citizen of it. It implies respect for his fellow-members, and also respect for the community as such." I wanted them to think about how the concept of carrying capacity, a concept central to managing deer, cattle, and rangelands, also applied to us who occupy Earth. One of the tools I used was a simple little four-cell chart that Dr Chip Salunke, a food scientist at Utah State University, had developed.

In 1972 the American diet was about 3,000 calories per day and the diet in other countries averaged about 2,000. With existing arable land and the actual food production at that time the world could support about 3.2 billion people with American eating habits. The world could support 4.8 billion if everyone ate the world diet. The total population at the time was around 4 billion.

We then estimated how many people could be supported on each diet if we applied the latest agricultural, aquaculture, and food handling technology to all arable land, oceans, and

easily converted forests and grasslands. We decided that if we applied fertilizer, irrigation, and other technology to all potentially arable lands, the earth could grow enough food for about 16.1 billion people eating like Americans or 24.2 billion eating a 2,000-calorie diet.

We never claimed the predictions were accurate. Its back-of-napkin calculations were full of holes, assumptions, and outright guesses. We also left out the adverse environmental effects of applying technology. But it provided some general relationships between people and the land, and generated discussion about trade-offs and the relationships between lifestyle and land use.

At the time population was approaching 4 billion people. Had we decided then that the whole world should live like Americans, we would have had to eliminate every fourth person. What criteria should be used to determine which person should be removed? Who would decide?

Or if we decided to live a simpler lifestyle, what lifestyle? If we decided to grow, how would growth be balanced with the land? How would basic productivity be protected from environmental degradation? What trade-offs would threaten sustainability?

Obviously, those questions were not answered 40 yr ago. The human population grew. We blundered ahead, applying technology and advocating growth based primarily on increasing use of cheap energy. As I write this, the world population is approaching 6.8 billion. Projections indicate there will be 9.6 billion people by 2050. Monitoring temperatures show the earth is warming. Other monitoring shows an increase in carbon dioxide. Most scientists believe the current climate change was triggered by human use of fossil fuels.

Our land care professions are only about 100 yr old. The first half-century of our existence we spent trying to correct specific land abuse from a given set of human uses: overgrazed ranges, eroded farmland, denuded forests, overhunted deer herds. We developed monitoring tools to document our effects on specific parts of the land system. Ecologists and philosophers began to develop principles that helped explain the causes and effects of change.

But for the first 50 yr or so, professionals stood apart from the land, husbanding it, adapting it to their liking, and monitoring it to see if it improved for their use. They emphasized land ownership. Even the softer term “steward” indicated a general acceptance that land belonged to people, not that people belonged to the land.

Then a forester, Aldo Leopold, began thinking about rangelands, recreation, wilderness, water rights, and land ownership in a new way. He authored many papers and the major text on wildlife management. But his 1948 essay on the land ethic was to become his most significant contribution. He introduced a concept that we were not standing outside the land, but were part of it.

Leopold wrote,

An ethic, ecologically, is a limitation on freedom of action in the struggle for existence. An ethic, philosophically is a

differentiation of social from anti-social conduct.... All ethics so far evolved rest upon a single premise: that the individual is a member of a community of interdependent parts. His instincts prompt him to compete for his place in that community, but his ethics prompt him also to cooperate (perhaps in order that there may be a place to compete for).... The land ethic simply enlarges the boundaries of the community to include soils, waters, plants, and animals, or collectively: the land.

Leopold redefined our role: “In short, a land ethic changes the role of *Homo sapiens* from conqueror of the land-community to plain member and citizen of it. It implies respect for his fellow-members, and also respect for the community as such.”

Sixty years after those words were written, we land care professionals are still trying to assimilate them. The world has changed. Or has it? We now have almost 7 billion people going on 9 billion. New technology has pushed the number of people we can feed to greater numbers. Or has it? There are data that suggest our use of technology may have reduced the basic biological productivity of our planet. There are some who think our planet is going through a transition to a lower stable state not unlike the change of desert grasslands to creosote bush.

This is not a time for land care professionals to panic, and behave like Wall Street bankers, asking taxpayers to buy up our bad debt. Instead, we accept our role as part of the land and base our actions on the cultural rules Leopold calls ethics:

No important change in ethics was ever accomplished without an internal change in our intellectual emphasis, loyalties, affections, and convictions.... Examine each question in terms of what is ethically and esthetically right, as well as what is economically expedient. A thing is right when it tends to preserve the integrity, stability, and beauty of the biotic community. It is wrong when it tends otherwise.

The film I saw in Perth, now called *The Ballad of Narayama*, is available on DVD. I watched it recently. It is as beautiful and powerful as I remembered it. I challenge anyone who cares about our earth to watch this film. Immediately afterward, I reread Leopold’s essay on the land ethic in its entirety. Then think about your own land ethic. Think about the things we should watch closely—monitor, if you like—and why.

For those who say this a waste of time, please ponder Leopold: “The mechanism of operation is the same for any ethic: social approbation for right actions: social disapproval for wrong actions.” And remember, land does not belong to us, we belong to the land.

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