

## PAPER

# Sustainability ethics: tales of two cultures

John Cairns, Jr.\*

Department of Biology, Virginia Polytechnic Institute and State University, Blacksburg, Virginia 24061, USA

**ABSTRACT:** Two small, isolated Pacific islands colonized by Polynesians experienced quite different fates—Easter Island suffered a major ecological collapse, while Tikopia appears to have attained sustainability. Both events occurred before European contact and provide valuable evidence in the discussion of sustainability ethics.

**KEY WORDS:** Sustainability · Sustainable development · Carrying capacity · Human conscience · Sustainability ethics · Cultural norms · Individualism

—Resale or republication not permitted without written consent of the publisher—

*We appear to be a species out of control, setting in motion processes that we do not understand with consequences we cannot foresee.*

Lester R. Brown

*To couple the concept of freedom to breed with the belief that everyone born has an equal right to the commons is to lock the world into a tragic course of action.*

Garrett Hardin

## CARRYING CAPACITY

Elevators, bridges, automobiles, ships, airplanes, lifeboats, and Earth have a finite carrying capacity for humans. *Carrying capacity* refers to the maximum, equilibrium number of organisms of a particular species that can be supported indefinitely in a given environment. A good illustration of experiencing carrying capacity can be related in the tale of two small, remote islands in the Pacific Ocean on which the human population encountered carrying capacity limits and responded in quite different ways. Much can be learned from their two case histories. The time period is after colonization by Polynesians and before European contact (Kirch 2000). Both islands had no land-mass nearby that might furnish resources, nor could the people depend on outside help. The size of the islands allowed a physically fit person to view personally the terrestrial resources available as well as the nearby ocean.

Globalization has made humankind aware of how interconnected and interdependent society has become.

Astronomy and space travel have shown that Earth is a small blue dot in a galaxy that appears lifeless, although life may exist elsewhere in the universe. Even if other parts of the universe could help with carrying capacity problems, it would be foolish to expect assistance, at present, from outside Earth's solar system.

Humankind may have already passed the planet's long-term carrying capacity for humans since natural capital is being used more rapidly than it is being replaced. Even if this limit has not been reached, continued exponential growth of both population and rate of resource consumption ensures that humankind will soon reach or exceed it. Although the scale for Earth is much larger than in the two islands, the basic issues are quite similar.

## EASTER ISLAND

The lesson from Easter Island has been discussed in detail in a variety of both popular and academic publications as well as on television (e.g. Flenly et al. 2003).

\*Email: jcairns@vt.edu

Diamond (1994) has presented a concise discussion of the ecological collapse of ancient civilizations, including Easter Island.

Basically, the inhabitants of Easter Island exceeded their carrying capacity by over-harvesting trees that covered the island when it was colonized about 400 AD. Forests were cleared for agriculture, construction of canoes, and for the transport and leverage of the huge statues for which the island is renowned. The statues were moved several miles from the quarry to the coastal area, even though they weighed as much as 80 tons and were up to 37 feet tall. Clearly, the civilization of Easter Island was well organized in order to achieve the remarkable feat of erecting these statues.

Easter Island's peak population appears to have been reached in 1500 AD at 7,000 individuals or approximately 150 per square mile. By this time, about 1,000 statues had been carved and 324 erected. Deforestation resulted in the inability to make large canoes, thus effectively cutting off access to any marine fishery in deep water. Additionally, erosion resulted from the loss of forests that held soil in place and eventually depleted the terrestrial food resources, which led to resource wars and a population collapse. The inhabitants continued unsustainable practices despite evidence they were not sound. Alternatively, they may have realized the drawbacks of living unsustainably after it was too late to make a mid-course correction. An eventual population reduction to an estimated one-third of its peak level illustrates that the cost of exceeding carrying capacity is not trivial.

These events are even more poignant because the inhabitants no longer had the means to build the large canoes they needed for escape. Similarly, if Earth is regarded as an island in the galaxy, humankind currently does not have the means to escape, even if a refuge in the universe were available. In addition, transporting billions of people would pose a logistical nightmare.

### TIKOPIA

The inhabitants of Tikopia Island also exceeded their carrying capacity (Firth 1983, Kirsch 2000), but took effective measures between 1000 and 1800 AD to stabilize their population at approximately 1,281 to 1,323 people. They accomplished their goal by infanticide, abortion, and decreeing that only first-born sons could have children. In addition, the inhabitants shifted to sustainable agriculture from 'slash and burn' practices. Finally, they eliminated pigs, despite the value Polynesians placed on them, because they damaged gardens and ate food the Tikopians could consume.

The precise processes that produced the dramatically different results for the two islands are not entirely clear. However, it is evident that the Tikopians better understood the concept of carrying capacity and that they possessed the leadership and will to achieve both a relatively stable population and sustainable practices. Firth (1983) has listed some important factors relative to Tikopia that impact this present discussion of sustainability ethics.

1. Until about a century ago, the population of Tikopia was usually in a dynamic equilibrium with its food supply.

2. The relationship of population size to resource availability was expressed in terms of family equilibrium, rather than purely individual terms.

3. More radical methods of population stabilization included suicidal sea voyages and wars.

4. As a result of European contact and influence, the Tikopian limits to population expansion do not work to the same extent that they once did.

5. The consequence is that the carrying capacity of the lands of many families had been exceeded.

6. Technology, new foodstuffs, intensive cultivation, etc. resulted in a temporary expansion of resources that later ceased.

7. Migration does not appear to be a viable long-term solution to exceeding carrying capacity.

8. Sex education, plus contraceptives, would reduce the problem but, at present, is not practicable for economic and religious reasons.

9. Adequacy of the food supply is a very real fear among the chiefs and thoughtful natives.

10. Were it not for outside interference, the old checks and balances would still be working satisfactorily.

11. It may be necessary to eliminate life in the short term to preserve life in the long term.

12. Kinship relations are very strong, giving a real sense of community and the individual's responsibility to it.

13. Tikopians were living sustainably until outsiders converted them, in part, to new value systems, many of which have proved unsustainable. It is a pity that one of the best case histories for living sustainably has been altered, even if done with good intentions.

### ISLAND EARTH

Of course, some significant differences exist between these two island case histories and ecological island Earth.

1. The spatial and temporal spans are much larger for Island Earth, and distance weakens resolve.

2. Communication on small islands is facilitated with only one language and an essentially homogeneous culture.

3. Religious diversity is far greater on Island Earth.

4. The inhabitants of Easter and Tikopia Islands were intimately associated with their resource base, while globalization of human society on Earth has increasingly dissociated people from their resource base.

5. Easter and Tikopia Islands can easily be seen as finite, while it is more difficult to visualize Earth as finite (despite pictures from space).

6. A persistent new belief for Island Earth is that modern technology can solve all problems.

7. One touching, but unjustified, belief for Island Earth is that economic growth will relieve most of the ills of humankind.

8. A vast advertising organization, often aided by governments, urges people on Island Earth to buy an increasing amount of material things.

9. A rapidly increasing, vast gap in resource use and acquisition is developing on Island Earth between wealthy and poor individuals. This difference was not as marked when humans were a small group species.

On the other hand, some important factors are now available on Island Earth to aid the quest for sustainable use of the planet.

1. Computers facilitate the gathering, storing, and communication of vast quantities of information.

2. Technology can be used to preserve and protect natural capital.

3. Literature and case histories are becoming available on sustainable use of the planet.

4. Restoration of damaged ecosystems is now possible, which will result in increased natural capital and ecosystem services.

5. More humane methods are available for population stabilization than infanticide (e.g. birth control). Regrettably, many persons in developing countries lack both necessary knowledge and funds to purchase contraceptives. Some nation-states and non-governmental organizations even effectively block both information dissemination and financial aid to assist people who wish to plan family size.

6. Nation-states, communities, eco-regions, etc. that encourage sustainable living have a better survival potential than those that favor unsustainable practices. However, these entities are likely to be increasingly vulnerable to groups that prefer the use of force and terrorism to a change in lifestyle to preserve resources.

7. Social systems are the result of numerous human decisions that can sometimes result in major paradigm shifts in a relatively short period of time.

### HARDIN'S OSTRICH FACTOR

Hardin (1999) was an outspoken critic of those who ignore the dangers of overpopulation and irreversible

environmental damage. He argued that rampant growth will inevitably force humankind to face many issues that are unpalatable—even discussion of them, at present, is often taboo. Hardin recalled that, in the first century AD, Pliny the Elder remarked that the stupid ostrich thrusts its head and neck into a bush, imagining 'that the whole of the body is concealed' (Bierens de Haan 1943, p. 11). In the 14th century, 'sand' was substituted for 'bush,' the form in which the myth still persists.

In short, if humankind avoids seeing something, it does not mean that the 'something' ceases to exist. This avoidance alone could explain the different results on Easter and Tikopia Islands: one culture turned a blind eye to the concept of carrying capacity; the other did not.

In contrast, Seidel (1998) believes that overpopulation, global warming, and other damage to natural systems are the results of individually sensible but uncoordinated efforts to better oneself. Seidel believes that failure to react to the threats to Earth's ecological integrity is not ignorance of what is wrong or not knowing what to do about it, but rather lies in humankind's failure to take this knowledge seriously enough to act on it.

Gazzaniga (1985) remarks that humans alter their beliefs to suit their needs or aspirations. Anyone who watches television in the United States is well aware that approximately one-third of the broadcast time is devoted to advertisements, which shape both individual 'needs' and aspirations. Given the enormous amount of time that both adults and children watch television, this shaping of individual wants and desires is indeed a powerful force. Consequently, the United States has an ecological footprint (Wackernagel & Rees 1996) that dwarfs most of the rest of the world.

### THE FOLLY OF DEPENDING ON CONSCIENCE

Hardin (1968) agreed with Darwin's grandson that breeding of humankind, in the long run, cannot be controlled by an appeal to conscience. Even though some people will respond to a plea to reduce family size, those who fail to do so will have more children than those who do not. Feelings of guilt will restrain exploitation of the commons by a few, while those who feel no guilt will continue this exploitation. Ultimately, nature's harsh penalties will reduce the population size, as they did on Easter Island. Intelligent choice, as on Tikopia Island, does blatantly restrict human 'rights,' but is beneficial to those making intelligent choices, as well as to posterity.

Crowe (1969) argues that the social myths are eroding at such a swift rate that the myths cannot be

revitalized in time to prevent one or more environmental catastrophes. Three of these three myths follow: (1) a criterion of judgment can be developed that will render the incommensurables commensurable (i.e. having the same measure), (2) coercion can be mutually agreed upon, and (3) an administrative system can protect the commons from further desecration. In short, what proved effective for the Tikopians may not be successful for humans living in gigantic groups in an increasingly impersonal world. Ehrlich (2000) is optimistic about humankind's capability of learning to deal sensibly with both nature and human's nature, but he is pessimistic about whether humankind will use this capability. Clearly, the time to make a major paradigm shift is very short.

### SUSTAINABILITY ETHICS AND CULTURAL NORMS

Estimates indicate that Earth has taken more than 4,550 million years to evolve from lifeless materials into the great diversity of life forms existing today. Life has probably existed on Earth for approximately 3,800 million years. Geological and paleontologic records show that these years have been dynamic, including such events as continental drift and ice ages. Earth may have another 15,000 million years remaining. Humans have existed only for a relatively short period of time (part of the Cenozoic era), but they are having a major influence on the sixth mass extinction now in progress. Most species ultimately become extinct, although the concept of sustainable use of the planet is based on the assumption that *Homo sapiens* will persist indefinitely.

If humankind intends to persist for 15,000 million years, cultural norms must change dramatically and must include a commitment to eco-ethics and sustainability ethics.<sup>1</sup> In fact, it will be a challenge for the human species to persist for merely 5 million years. As Boulding (1977, p. 292) remarked, 'It may be, therefore, that evolutionary sustainability is a different matter from the sustainability of any particular system (and one might add species) within the process, for though all particular systems may become extinct, the evolutionary process may go on.'

Until very recently, Earth had a large number of relatively isolated social systems. When one system failed, it became extinct or disappeared as an entity. Other social systems with more viable social norms

have persisted, at least for a time. Globalization is changing Earth into a single social system in which the commitment of individuals to the system is weak or non-existent. The entire biospheric life support system is now threatened by human behavior, and no sense of community exists at a global level to protect and cherish its life support system. Professional organizations with international membership provide a means for reaching a consensus on global social norms that could make sustainable use of the planet possible.

### INDIVIDUALISM AND SUSTAINABILITY

Renewable resources are those that have a self-regenerating capability and, if used properly, can function indefinitely. Carrying capacity of a particular eco-region, or even the planet, is defined as 'the maximum number of a species that can be supported indefinitely by a particular habitat, allowing for seasonal and random changes, without degradation of the environment and without diminishing carrying capacity in the future' (Hardin 1977, p. 113).

If Earth is regarded as a single ecosystem, major ecological damage in any area affects the entire system. Given the dangers of exponential growth on a finite planet, catastrophes are highly probable and possibly irretrievable. Without a sense of community, sustainability will not be achieved. Somehow the ability of individuals to view themselves as a part of a global community that is dependent upon a global biospheric life support system must be achieved. This is the sine qua non of sustainable use of the planet.

### CONCLUSIONS

I believe that humankind can continue to persist on Earth for thousands of years, perhaps even longer. It seems improbable that the human species can persist indefinitely. At the very least, humankind should accept the responsibility of leaving a habitable planet for posterity. Behavior that is conducive to sustainability can be learned and passed to future generations. May it be so!

Tikopians were living sustainably until Europeans successfully changed parts of the Tikopian culture that resulted in replacing sustainable practices with unsustainable ones. Humankind should be learning to live sustainably from those who have some aptitude in this area. Some of the Tikopian methods are repugnant, but so is what unsustainable practices will do to posterity. The Easter Island tale shows that living sustainably is not inevitable.

<sup>1</sup>See Cairns J Jr (2003) Eco-ethics and sustainability ethics. Part 1. ESEP Book 2. PDF format (656kb) available for download at [www.int-res.com/journals/esep/eb2cairns.html](http://www.int-res.com/journals/esep/eb2cairns.html)

## LITERATURE CITED

- Bierens de Haan JA (1943) The history of a legend. *Ardea* 32:11–24
- Boulding KE (1977) Commons and community: the idea of a public. In: Hardin G, Baden J (eds) *Managing the commons*. WH Freeman, San Francisco, CA, pp 280–294
- Crowe BL (1969) The tragedy of the commons revisited. *Science* 166:1103–1107
- Diamond J (1994) Ecological collapses of ancient civilizations: the golden age that never was. *Bull Am Acad Arts Sci* XLVII(5):37–59
- Ehrlich PR (2000) *Human natures*. Island Press, Washington, DC
- Firth R (1983) *We, the Tikopia*. Stanford University Press, Palo Alto, CA
- Flenley J, Bahn P, Bahn PG (2003) *The enigmas of Easter Island: island on the edge*. Oxford University Press, UK
- Gazzaniga MS (1985) *The social brain*. Basic Books, NY
- Hardin G (1968) The tragedy of the commons. *Science* 162:1243–1248
- Hardin G (1977) Ethical implications of carrying capacity. In: Hardin G, Baden J (eds) *Managing the commons*, WH Freeman, San Francisco, CA, pp 112–125
- Hardin G (1999) *The ostrich factor*. Oxford University Press, Oxford, England
- Kirsch P (2000) *On the road of the winds: an archeological history of the Pacific Islands before European contact*. University of California Press, Berkeley, CA
- Seidel P (1998) *Invisible walls*. Prometheus Books, Amherst, NY
- Wackernagel M, Rees W (1996) *Our ecological footprint: reducing human impact on the Earth*. The New Catalyst Press, New Society Publishers, Gabriola Island, British Columbia

*Editorial responsibility: David R. Orvos, PhD (Editor)  
Sweet Briar, VA, USA*

*Submitted: March 22, 2004; Accepted: May 13, 2004  
Proofs received from author(s): May 19, 2004  
Published on the web: May 24, 2004*