

## **A Stitch in Time Saves Nine (American Proverb)**

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### **Kenneth E. Boulding's Dismal Theorems (Boulding 1971)**

#### First Theorem: The Dismal Theorem

*If the only ultimate check on the growth of population is misery, then the population will grow until it is miserable enough to stop its growth.*

#### Second Theorem: The Utterly Dismal Theorem

*Any technical improvement can only relieve for a while, for so long as misery is the only check on population, the improvement will enable population to grow, and will soon enable more people to live in misery than before. The final result of improvements, therefore, is to increase the equilibrium population which is to increase the total sum of human misery.*

#### Third Theorem: The moderately cheerful form of the Dismal Theorem

*Fortunately, it is not too difficult to restate the Dismal Theorem in a moderately cheerful form: if something else, other than misery and starvation, can be found which will keep a prosperous population in check, the population does not have to grow until it is miserable and starves, and it can be stably prosperous.*

*An object at rest will remain at rest unless acted on by an unbalanced force. An object in motion continues in motion with the same speed and in the same direction unless acted upon by an unbalanced force.*  
Sir Isaac Newton's Law of Inertia

This chapter focuses on the global crisis of exponential human population growth. The fate of all humankind, if exponential growth continues, can be summarized by using Haiti as an example:

*Haiti can never be self-sustaining without a huge reduction in population. I have been there and seen 9.2 million people jammed into an area half-mountainous, . . . (9,926 square miles) and the worst erosion I have ever seen . . . Haiti's population keeps growing, and is projected to be nearly 70% larger by 2050" (Youngquist 2010).*

Achieving sustainability for Haiti is a formidable problem with no simple, palatable solution.

The Haitian problem and the planet wide problem can be stated simply. (1) The human population cannot grow exponentially on a finite planet. (2) The human population cannot grow beyond a nation's or Earth's carrying capacity. (3) Is humankind's goal to see how many humans the planet can support in misery or in a quality of life? (4) Most people would opt for a quality life, but that means stabilizing the human population within Earth's carrying capacity for them. (5) Climate change, loss of topsoil, turning the oceans acidic, and scarcity of freshwater are reducing food production and thus lowering Earth's carrying capacity for humans. (6) Discussion of population has been taboo for a variety of reasons but a discussion is essential in order to reach a compassionate, informed policy decision.

During the Great Depression in the United States, "a stitch in time saves nine" was frequently quoted and sometimes followed — the idea of taking action when needed saved making major actions later. Human society would have been spared much misery and mortality had the proverb been heeded, even as late as the beginning of the 21<sup>st</sup> century. Had a large-scale transition to non-carbon energy sources begun, then most of the glaciers might have been saved, hurricanes would have been less threatening, the severity of droughts and

floods would have been diminished, and agricultural productivity would have been less threatened by climate changes.

Arguably, a major factor in the continuing damage of natural systems is the low level of scientific literacy globally and particularly in countries (e.g., the United States) with a very high per capita consumption of resources. The oceans, which comprise about 70% of the planet's surface area, have been changed from mildly alkaline to mildly acidic. These changes profoundly and adversely affect marine ecosystems. Markedly reducing carbon dioxide emissions from fossil fuel emissions just a decade or two ago would have avoided this catastrophe.

Since a large number of species have become extinct, restoration of damaged ecosystems is problematic since species are the basic operational units of the biosphere. Ecosystems are self maintaining as long as biodiversity (i.e., replacement species) remains high and as long as change (e.g., global warming) remains within the normal range of variability. However, humankind is causing so many changes that the present era has been termed the Anthropocene. The climate changes that have already occurred make ecological restoration even more difficult. Of course, in evolutionary time (probably millions of years), biodiversity will doubtless be restored as it was following the five great extinctions that have already happened; however, this possibility is not comforting to most humans now alive. This situation markedly lowers carrying capacity has negative effects upon the economy due to a decrease in natural resources.

Failure to provide regular maintenance for societal infrastructures has markedly increased the risks for both human society and ecosystems. Ecosystems have been self maintaining for billions of years. They are dynamic (e.g., species successional processes), but they do maintain both structure and function unless placed in disequilibrium by some catastrophic event (e.g., the massive British Petroleum oil leak in the Gulf of Mexico in 2010)

Much of the infrastructure in the United States (e.g., bridges, roads, water delivery and sewage disposal systems, dams, buildings) is unsafe and badly needs repair or replacement. These factors are critical in determining carrying capacity. Surely *Homo sapiens* is capable of facing these problems head on. Common sense dictates that all human artifacts require continual maintenance to remain functional. Deterioration is usually so rapid that responsibility cannot be passed on to future generations as debt responsibilities are (e.g., the national debt).

“ . . . political forces that resist attempts to regulate greenhouse gas emissions” lead to technological inertia that exacerbates the threat of climate change (Freedman 2010). Scientists have estimated “an 85% chance of population grinding to a halt by 2100, and a 60% chance that it will not exceed 10 billion” (Connor 2010). These estimates are not comforting since about 1 billion people go to bed hungry at present.

Some actions give reasons for hope. China has tried to limit couples to one child with some success. “Philippino President Benigno Aquino announced . . . [in October 2010] that his government will provide birth control to poor couples to help curb the country's high birth rate” (Reader Posted 2010). However, population growth will probably continue to be exponential and is only one of eight interactive global crises (Cairns 2010). The 21<sup>st</sup> century will be a rough era for humans because natural resources are declining and the population continues to grow.

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## LITERATURE CITED

- Boulding, K. 1971. *Collected Papers [by] Kenneth E. Boulding, Vol. 2.* Colorado Associated University Press, Boulder, CO, p. 137.
- Cairns, J., Jr. 2010. Threats to the biosphere: eight interactive global crises. *Journal of Cosmology* 8:1906-1915.
- Connor, S. 2010. World population forecast to peak before 2100. *The Independent* 2Aug  
<http://www.independent.co.uk/news/science/world-population-forecast-to-peak-before-2100-664281.html>.
- Freedman, A. 2010. Tomorrow's infrastructure poses greater climate threat than today's, study finds. *Climate Central* 10Sept  
[http://climatecentral.org/breaking/news/tomorrows\\_infrastructure\\_poses\\_greater\\_climate\\_threat\\_than\\_todays\\_study\\_finds](http://climatecentral.org/breaking/news/tomorrows_infrastructure_poses_greater_climate_threat_than_todays_study_finds).
- Reader Posted. 2010. The politics of birth control. 28Sept RH Reality Check  
<http://www.rhrealitycheck.org/reader-diaries/2010/09/28/politics-birth-control>.