

## The Post Keynesian/Ecological Economics of Kenneth Boulding<sup>1</sup>

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Anyone who believes exponential growth can go on forever in a finite world is either a madman or an economist (Boulding, 1966, p. 3).

### Introduction

On March 8, 1966 at the sixth Resources for the Future Forum on Environmental Quality in a Growing Economy, Kenneth Boulding (1966) presented his now famous paper “The Economics of the Coming Spaceship Earth.” This paper, arguably, marks the beginning of modern ecological economics. In it, Boulding castigates neoclassical economists for ignoring the environment in their models. As Kula (1998, p. 4) accurately states, Boulding’s paper “must be one of the most thought-provoking pieces written on the environment this century.” Heilbroner (1975, p. 77) called it a “classic.” Its importance is mostly due to the fact that until this time mainstream economists were largely silent about how the economy impacts the environment (as well as how the environment impacts the economy). Boulding’s article made it clear that the environment is important, and that economists can no longer ignore it in their analyses.

In the 1970s, due to growing national interest in environmental issues (resulting in the first Earth Day and creation of the Environmental Protection Agency), mainstream neoclassical economists developed two subfields to study the environment: (a) environmental economics, and (b) natural resource economics. Today most mainstream economists use the term environmental economics to encompass both subfields.

Environmental economics studies the effects (or inclusions) of economic activity on the environment—water pollution, air pollution, toxic waste leakage. All these effects are harmful, but some to a larger degree than others. Natural resource economics studies the economic affects of resources (or elements) taken out of the environment for economic uses, such as mining, logging, and commercial fishing. Both subfields weigh the costs of environmental degradation against the economic benefits of greater economic growth and resource use. But because it is unlikely someone can accurately assess future environmental costs in the present (environmental effects are often immeasurable until many years, or decades, later), environmental economists often discount the true economic impact of environmental degradation, which makes the economic benefits seem larger than they actually are (Spash, 1999).

Both environmental economics and natural resource economics adhere to several mainstream principles. First, they believe technology will develop quickly enough to solve any environmental problems that may arise. Second, they support the idea that the free market will solve all environmental problems (a green invisible hand); therefore, they promote small government with limited (or no) regulations. Third, they think economic growth equates to economic development and is thus always desirable.

Mainstream economists view the environment as a mere extension of the economy. Their models generally ignore the long-term environmental impact of economic activities (e.g., water pollution) and instead include the environment as an afterthought to growth constraints. Their anthropocentric perspective separates humans from the ecological system; therefore, the economy, as a social construction, is also removed from the environment.

Boulding (1966; 1978) criticizes this anthropocentrism and argues that any discussion of the economy must presuppose environmental importance (and environmental dominance). This belief has important implications for how economists should view economic growth. Mainstream economists encourage economic growth at almost any cost. They see growth as the primary solution to social/economic problems (poverty, inequality, and crime). But Boulding believed economic growth is unlikely to solve many of the problems (economic, social, and environmental) caused by a capitalist system. Instead, he argued for a more fair and equitable social construction revolving around enhancing people's living standards.

Mainstream economists also conflate economic growth and economic development. Their growth models (e.g., the Solow growth model) classify the environment as an open system of endless bounty, and thus disregard its value when making economic decisions. These models are constrained by population growth and technological improvement in the long-run, but they ignore the environmental resources needed to sustain this growth, and waste-producing outputs due to growth. For Boulding (1966; 1978), economic growth is a quantitative measure of increased production while economic development is a qualitative measure of living standards—much in the way

John Kenneth Galbraith (1996; 1998) and Amartya Sen (1984; 1985) view growth. Thus, an increase in economic growth does not imply (nor necessarily lead to) better living standards—in fact, rapid uncontrolled economic growth will likely lead to large income and wealth inequalities and environmental problems (such as we are now seeing in China). The costs of such growth far outweigh the benefits, which makes this type of growth unsustainable (Daly, 1999). Ecological economics was born from these principle disagreements with mainstream economics, and the potential negative long-term effects of decisions made using mainstream ideology.

Post Keynesians have written little on environmental issues. However, a few Post Keynesians have been drawn into discussions concerning the environment. Holt (2006) argues that Post Keynesians need to start studying the environment, but he never applies Post Keynesian theory to specific environmental problems. Andrew Mearman (2007) argues that Post Keynesians share many theoretical (and ideological) views with green economics (an offshoot of ecological economics); but his work falls short of making suggestions as to how the two views can be meshed to create new policies. His research, therefore, is largely limited to explaining why Post Keynesians should start studying the environment. But Boulding's ecological research has what Post Keynesians' work so far lacks, which is the conviction that economists must look at the environment differently today and pay careful attention to how the economy influences the environment. Specifically, Boulding acknowledges the earth as a closed system (and thus limited); he, therefore, promotes environmental sustainability for the long-run good of both the environment and the economy. For example, he believes we must address problems associated with our growing population, and that energy consumption is the root of many

of our environmental problems. Boulding also provides suggestions for addressing these problems (and others).

This paper presents a summary of Boulding's contributions to the development of modern ecological economics. The next section identifies the similarities between Post Keynesian economics and the ecological economics as developed by Boulding. Then, several Post Keynesian ecological economic public policy solutions are discussed that encourage environmental sustainability and protection while minimizing harmful consequences of economic growth. The principle findings of this paper are summarized in the concluding section.

#### Boulding's ecological economics

##### Cowboys, spacemen, and rational economic man

Boulding was one of the founders of the International Society for Ecological Economics (ISEE) formed in 1988. ISEE was created "to advance understanding of the relationships among ecological, social, and economic systems for the mutual well-being of nature and people" ([www.ecoeco.org](http://www.ecoeco.org)). It publishes the journal *Ecological Economics*. The ISEE also confers biennially the Kenneth Boulding Memorial Award. The work of the award recipient is supposed to represent the objectives of the ISEE in the spirit of Boulding's transdisciplinary scholarship.

Boulding first started writing about ecological economic issues in 1958 when he started conceptualizing society as an ecological system. He observed that firms were interconnected with one another. There was more cooperation than competition among them in the system. So, instead of viewing each firm as separate, he started seeing them

as part of a larger whole, where each was dependent on all others for survival. He then broadened this view to explain how our economy is likewise interconnected with the environment, and that the two must cooperate to achieve a level of sustainability that allows for long-run economic growth without ruining the environment.

However, it was his “Spaceship” article that cemented his commitment to bringing the environment into economic analysis. In this article, Boulding castigates the mainstream for their failure to consider the environment’s importance in studying the economy. Boulding goes on to present many reasons why the environment should be important to economists. He believes that economics represents, in large part, an attempt to understand the interdependence between the economy and the environment. Moreover, Boulding views the environment as encompassing the economy. The economy, therefore, is not the entire system, but rather a subsystem that is beholden to the larger ecosystem. This perspective is contrary to the neoclassical belief that the economy is the principal system within which all others fit.

Boulding’s “Spaceship” article was a clarion call for all economists to begin considering the limitations of planet earth, and to start incorporating the effects that economic decisions have on the environment. He argued that earth had finally reached an exhaustive point where there were no new lands to inhabit. No longer could people think of their world as illimitable (open). Boulding states that earth is a closed system, which he compares to a spaceship. In Boulding’s spaceship regular attention must be paid to population growth, energy use, and use and disposal of all other resources. If spacemen pay no mind to how best to use their inputs and account for outputs, then the environment becomes unstable, potentially leading to their extinction (or crisis at minimum). To

mainstream economists, however, the environment is considered an open system of unlimited resources. This anachronistic view is a holdover from times when economic models were oversimplified to account for our inability to accurately model a macro-dynamic system (Boulding, 1978).

According to Boulding (1966, p. 4), “Economists...have failed to come to grips with the ultimate consequences of the transition from the open to the closed earth.” An open system is one where “the outputs of all parts of the system are linked to the inputs of other parts” (1966, p. 4). In a closed system, no inputs come from outside and no outputs go outside the system (outside does not exist). Boulding claims that mainstream economists’ open system perspective can be analogized to that of a “cowboy economy.” This analogy generates images of frontier plains (abundant unexplored free territories) and “is associated with reckless, exploitative, romantic, and violent behavior, which is characteristic of open societies” (Boulding, 1966). For Boulding this romantic view of undiscovered plains is naïve today because there are no more undiscovered plains on earth. As such, Boulding’s closed system economy that he calls a “spaceship” is the earth.

In the cowboy economy, growth via consumption and production is desirable. The more an economy consumes, the more is produced, the higher is its GDP, and the better off everyone becomes (Boulding, 1966; 1978). No consideration is given to pollution or degradation of resources (or other long-run effects) in the cowboy economy. Conversely, in the spaceship economy, it is desirable to minimize throughputs. The success of this economy is not measured by maximizing consumption and production; rather, success is measured by increasing “the nature, extent, quality, and complexity of the total stock of

capital, including in this the state of the human bodies and minds included in the system” (Boulding, 1966). The spaceship economy is consequently better off with lower levels of production and consumption. And technology is valuable when it lessens harmful outputs by using fewer (or the same amount of) inputs without destabilizing the system—socially, economically, or environmentally.

All living things are open systems because they take inputs to live (air, food, water) and give off outputs in the form of carbon dioxide and waste. Open and closed systems rely on three classes of inputs and outputs: matter, energy, and information. He states the economy is open with regard to all three classes. And all three are dependent on each other; or, more generally “everything depends on everything else” (Boulding, 1978, p. 224). However, not all are accounted for by economists; therefore, Boulding (1971a, p. 385) states:

Thus we see the econosphere as a material process involving the discovery and mining of fossil fuels, ores, etc., and at the other end a process by which the effluents of the system are passed out into noneconomic reservoirs—for instance, the atmosphere and the oceans—which are not appropriated and do not enter into the exchange system.

Energy is either renewable (sunlight, heat, water) or nonrenewable (fossil fuels), and both types are used “to move matter from the noneconomic set into the economic set or even out of it again” (Boulding, 1966, p. 5). Advanced economies use significant amounts of nonrenewable resources to increase the amount of energy throughput far above the amount of renewable energy stock available. This results in an increase in economic production (and throughput). But this boost is temporary because energy in this system adheres to the Second Law of Thermodynamics: in a closed system, energy disperses over time, and work (production) is only possible at the point of entropy where

less concentrated energy is useful. Entropy represents a steady-state where pure energy has dissipated enough to become useable. In order to have a sustainable energy stock, it is necessary to learn how to effectively use renewable energies. This is necessary because eventually nonrenewable energies (fossil fuels) will be extinguished. Using more renewable resources now will also reduce (perhaps eliminate entirely) the end amount of damage caused by pollution from outputs produced by using fossil fuels and nuclear fission (Boulding 1978, pp. 293-295; 1985; Georgescu-Roegen, 1971).

According to Boulding (1966), of the three classes of inputs and outputs, information (knowledge) is the most important to humans. He argues that matter is only significant when it becomes a part of “human knowledge.” The production of knowledge is necessary for human development, and the more knowledge a society possesses the greater is its economic progress. Knowledge, therefore, evolves in the ecosystem where it lets people organize energy and materials for effective use (Boulding, 1978, p. 225). But, Boulding argues, there may be an eventual limit to this evolution, which implies that technology will, contrary to neoclassical beliefs, fail to solve important social, environmental, and other problems (Boulding, 1966; 1978). At what point technology will fail to provide solutions is impossible to predict, but the world is currently creating environmental problems at rates faster than existing science can solve (Daly, 1999).

For example, Boulding believed the effects of population growth deserved significant attention because it is growing at an unsustainable rate (he does argue we do not know *a priori* what should be the steady-state population level—but we have to pay much more attention to population growth and start measuring its impact on living standards) (Boulding, 1964; 1971b, pp. 137-142; 1978, pp. 298-9). He provides three

theorems to explain the result of population growth. First is “The Dismal Theorem” that states if human misery is the only measure of population growth then the world will expand until it is so miserable that it will eventually reduce its population. Second is “The Utterly Dismal Theorem,” which asserts that any technical advancement will only relieve misery for a short while. Ultimately it only serves to increase the number of people—and period of—suffering until maximum misery is achieved and population is reduced to a non-miserable level. Last is “The Moderately Cheerful Form of the Dismal Theorem” that encourages finding a way other than misery to check population growth. It is necessary to measure earth’s capacity for population sustainability so maximum misery is avoided. Boulding was possibly the first person to consider tradable reproductive rights as a practical method for controlling population (a concept today being applied to the trading of pollution emission credits in the private sector) (Boulding, 1964; 1950; 1978; McFarling, 2002). Herman Daly (1996, p. 119) elaborates Boulding’s point by stating:

The eventual necessity of a steady-state population has been evident to many for a long time. What holds for the population of human bodies must also hold for the populations of cars, buildings, livestock, and each and every other form of physical wealth that humans accumulate.

Daly, like Boulding, argues that an increasing population harms the lower classes because it raises the unskilled labor supply thus keeping wages low (or pushing them lower).

They both see population as having a principal influence on people’s well-being.

However, little research has been done in this area, even as the population expands to new record highs worldwide.

Post Keynesian Linkages of Boulding’s Ecological Economics

Boulding worked under Joseph Schumpeter (who was also Hyman Minsky's professor and mentor) at Harvard, and Frank Knight at Chicago. His first journal article was accepted by John Maynard Keynes for publication in the *Economic Journal* in 1931; so, early in Boulding's intellectual development were influences furthering his detachment from mainstream economics toward a (what we may now label) Post Keynesian (pluralistic, transdisciplinary) view of the world. While Boulding's work has received positive reviews from Post Keynesians (e.g. McFarling, 2002; Wray 1994; 1997), his ecological economics research has thus far gone unnoticed by them. This section begins to rectify this oversight.

Boulding and Post Keynesians vehemently dispute the core principles of mainstream economics. Three principle theoretical concepts that Post Keynesians and Boulding share include: (1) the role of uncertainty in decision making; (2) acknowledging that the economy exists in historical time (rather than logical time); (3) recognizing the environmental (social and psychological) impact of economic growth—specifically that growth does not necessarily lead to higher living standards; and (4) open systems analysis.

First, they both believe that uncertainty plays a critical role in decision making. Boulding adopted his definition of uncertainty from Knight, as did the Post Keynesians (c.f., Davidson, 1982/3; 1991). According to Knight (1921), it is important to differentiate between risk that is mathematically calculable and uncertainty which is incalculable. Keynes (1973, pp. 113-4) makes his view of uncertainty clear when he wrote:

By “uncertain” knowledge, let me explain, I do not mean merely to distinguish what is known for certain from what is only probable. The game of roulette is not

subject, in this case, to uncertainty. Even the weather is only moderately uncertain. The sense in which I am using the term is that in which the prospect of a European war is uncertain, or the price of copper and the rate of interest twenty years hence [...] About these matters there is no scientific basis on which to form any calculable probability whatever. We simply do not know.

Boulding (1971b, p. 160) echoes Knight and Keynes when he states that “under imperfect markets [...] there is a double uncertainty—we are not only uncertain as to the future, but we are uncertain even as to the present parameter of the market functions.” For Post Keynesians and Boulding, because the future is unknowable we must carefully weigh our decisions, but we will never know *a priori* the probability of any decision’s result(s). This is especially disconcerting with issues relating to the environment—we have only one, for in spaceship earth there is nowhere else to go. Because humans rely on a stable natural environment to survive, it is essential to take measures to ensure environmental protection (if for no other reason than out of our own self interest).

Mainstream economists are largely interested in prediction and establishing economic laws based on risk (i.e., mere chance propositions) (Spash, 1999). However, for Boulding, uncertainty surrounds all decisions that influence the environment (and therefore the economy too). Most mainstream modeling techniques (i.e., cost-benefit analysis) collapse under uncertainty, which is especially the case when making economic decisions that directly (or indirectly) influence the environment because it is indispensable and not substitutable.

According to Post Keynesians, the real world is a dynamic, largely unpredictable system that is non-ergodic (Boulding, 1978, p. 225; 1985; Davidson, 1982/3; 1991; 1994). Post Keynesians use the term non-ergodic to explain our inability to use past experiences to accurately predict future outcomes—it is thus impossible to calculate risk

probabilistically—including problems related to the environment. This means that cost-benefit analysis, which is popular among mainstream environmental economists for decision making, is irrelevant to Post Keynesians because it is impossible to price the future value of something today with any degree of certainty. Decisions based on cost-benefit results are made with limited (or no) knowledge of future (end) results. Decisions that affect the environment (directly or indirectly) may, therefore, have long-term unintended consequences; so, careful planning and oversight are necessary to maintain environmental sustainability.

Second, Post Keynesians (and ecological economists) are interested in studying the real world in historical time (Lavoie, 2005). In historical time, decisions made today are not easily undone in the future (if they can be reversed at all). For Boulding this is important because economic decisions not only affect the economy, but also the larger environment that supports it.

Mainstream economists analyze the economy in logical time. This allows them to perform static mathematical modeling (e.g., general equilibrium analysis) that assumes away many environmental problems that could arise. This approach is rejected by Post Keynesians and Boulding because (a) there is no reason to assume that one optimum equilibrium exists or that we will know what the optimum equilibrium is—even if we by chance reach it, (b) decisions made in logical time can be undone easily without consequences (which is not the case in the real world), and (c) inputs and outputs in mainstream models produce no waste (externalities with unknown future costs)—effects such as pollution are unaccounted for. Boulding (1966) asserts that this open-earth (cowboy economy) perspective is no longer the case. Because of population increases

and technological advances people are spread throughout the world, resulting in no untouched regions to discover or exploit (or escape to). We must now find ways to use inputs efficiently (e.g. renewable energy) so as to minimize harmful outputs and forget about modeling the economy/environment in logical (cowboy) time.

Post Keynesians have long stressed that because the real world exists in historical time that economic analysis, to be of any real value, must adhere to the characteristics of historical time. Historical time is irrevocable—moving constantly from an unchangeable past to an unknown future. Therefore, no equilibrium can exist in a system moving through historical time, which makes clean, static mainstream models irrelevant. Decisions made in historical time are more lasting (perhaps permanent). In studying the environment, Boulding (1966) adopts an historical time perspective; specifically he observed that “even if we concede that posterity is relevant to our present problems, we still face the question of time-discounting and the closely related question of uncertainty-discounting” (pp. 12-13). He further argues that this is “perhaps the reason why conservationist policies almost have to be sold under some other excuse which seems more urgent, and why, indeed, necessities which are visualized as urgent, such as defense, always seem to hold priority over those which involve the future” (p. 13). According to Boulding, therefore, environmental problems are largely the result of people’s inability to comprehend problems in historical time.

Third, Boulding has a well developed view of growth. For him “the objective of economic policy should not be to maximize consumption or production, but rather to minimize it” (Boulding, 1971b, p. 267). Boulding’s focus on thermodynamics emphasizes his viewpoint that economic growth must be scrutinized given constraints on

what we know about the environmental impact of production resulting from the necessary inputs (resources, labor, etc.) and resulting outputs (waste and products). Besides, rapid growth, even if it were sustainable, does not directly result in better living standards.

Post Keynesians also believe it is wrong to promote economic growth at any cost because it will not lead to a better environment or a better economy. Galbraith (1996, p. 83) accurately states that “environmental problems emerge from the impact of...production and consumption on the contemporary health, comfort, and well-being of the larger community.” He also argues that growth fueled by a free market system is in direct conflict with the goal of environmental protection. Furthermore, “A sacrifice of freedom of decision and profit in order to protect the larger community or its unborn children is held to be an abridgment of the very freedom that produced economic success” (Galbraith, 1996, p. 85).

Fourth, using open systems analysis, Post Keynesians accept that the economy is complex, and that we cannot understand all the variables associated with its many operations. According to Boulding (1971b, p. 384), “all human societies [are] open systems.” He believes, therefore, that the environment is complex too, which due to the interconnections between the economy and the environment, results in an even more complex system. Therefore, static models such as cost-benefit analysis are too limited, and cannot adequately measure the present (or future) influence of economic activity on the environment. Rosser (2001, p. 23) correctly states that “various complex dynamics [are present] in ecologic-economic systems.... Chaotic and catastrophic dynamic patterns are shown to be possible, along with other complex dynamics arising from non-linearity in such combined systems.” Therefore, public policies in a complex system must set

reasonable thresholds to avoid catastrophic system failure. These policies must also be flexible so they can adjust to new information and institutional changes. Environmental stability is too important to risk making long-term policy mistakes—thus it is better to error by setting system thresholds too strict rather than too loose.

### Policy prescriptions

The three principle beliefs of Boulding and Post Keynesians discussed above lead to alternative environmental economic policy solutions that contrast sharply with those proposed by the mainstream. Most economic policy research that deals with the environment is conducted by conservative think tanks in the United States: the Heritage Foundation, the Competitive Enterprise Institute, and the Independent Institute. These think tanks have become powerful policy-generating agencies (Beder, 2001).

To the displeasure of ecological economists they endorse neoliberal (libertarian) agendas that promote free markets and deregulation. Many of these organizations deny that there exists an ecological threat. They believe technology will solve all environmental problems and that present environmental dilemmas are simply a necessary outcome of much needed economic growth (for example Bailey, 1995; 1999; Higgs & Close, 2005; Lomborg, 2001). In contrast, Boulding and Post Keynesians recognize the importance of social investment and government regulations in protecting the environment, which they believe is constantly under threat from free market forces. Dunn and Pressman (2005, p. 162), writing about Galbraith, note that he believed “that increasingly outmoded economic ideas misinform social policy in a way that supports the corporate power structure, to the detriment of wider society,” and these ideas could

“make it easier for large firms to resist government regulation and shield firms pursuing practices that may be environmentally unsound.”

Boulding and Post Keynesians both recognize the importance of social (or government) investment. Social investment should be used to promote a better environment. For example, green buildings use recycled waste water, solar energy, and green roofs to diminish operating costs and enhance work environments (more ambient light and cleaner air). Investment in green buildings is unlikely to occur in a major way until it is more strongly encouraged by government funding (e.g., significant tax breaks for green practices). Adopting environmentally-friendly production techniques is expensive. It is usually cheaper for businesses to use the institutionally standardized environmentally-unfriendly inputs; but this maximizes harmful waste outputs, which become externalities for society. According to Keynes (1964, p. 317), “Government is not to do things which individuals are doing already, and to do them a little better or a little worse; but to do those things which at present are not done at all” (quoted by Pressman, 1987, p. 17).

Post Keynesians see regulations as the central policy tool for solving problems in a capitalist system—and keeping new ones from occurring. Environmental regulation in the US is largely upheld by the Environmental Protection Agency (EPA). The EPA is an organization designed for the benefit of everyone. In contrast, the free market model supported by mainstream economists sector has thus far failed to ensure environmental protection. The free market is incapable of making the necessary “regime switches” necessary to minimize environmental problems (Rosser, 2001). Only governments have

the overarching authority, and capability, to “adjust the system toward sustainable, eco-friendly, growth” (Rosser, 2001, p. 57).

Between 2004 and 2008 George W. Bush’s budgets have reduced the EPA’s research budget over 25 percent. And the EPA’s overall budget has decreased at an annual rate of 3-6 percent. Bush’s 2008 budget further cuts the EPA’s budget by over 6 percent (roughly \$500 million): \$35 million reduction in air quality management, \$31.3 million reduction in scientific investigation and research, and over a \$20 million reduction in research and prevention of climate change. Bush’s 2006 EPA budget reduced the EPA’s library system funding by almost half (a \$2 million cut) resulting in the closing of over half of the EPA’s 27 libraries located across the country (EPA, 2006). This loss greatly reduces researchers’ ability to investigate environmental issues. At a time when environmental research and regulations should be at a record high (and given government priority), the EPA is facing severe financial constraints (Environmental and Energy Study Institute, 2007). Galbraith (1996) writes about the conflict between the free market and environmental protection that “There is no escape from the role of government; it is for the larger community interest and its future protection that government and governmental regulation exist.” This sentiment is strongly shared by Boulding and Post Keynesians.

Post Keynesians’ job creation strategies can benefit the environment. For example, Mathew Forstater (2003) proposes establishing an environmentally-friendly Public Service Employment program to raise effective demand. However, instead of employing people to work production jobs that create more pollution (or hiring someone to dig a hole and another to fill it in) they will create jobs that endorse environmentally-friendly goals. For example, collecting trash, promoting recycling programs, beautifying

areas (painting, rebuilding, landscaping), educating people about environmentally friendly practices, and so forth. These are jobs the private sector is unlikely to create because they have little profit potential, but though they will likely result in positive social effects. This program could eventually result in attracting new businesses to once dilapidated areas by making them safe and clean.

For Boulding and Post Keynesians, unchecked economic growth cannot solve our economic problems. Rampant economic growth often creates more problems than it solves. Rethinking this issue includes addressing the environmental consequences of unregulated population growth—an issue of contentious debate. Boulding (and ecological economists generally) believe population must be managed (Daly, 1996). Conversely, mainstream economists argue in favor of the “demographic transition hypothesis” that states population will diminish as an economy grows (develops) (Daly, 1999, pp. 20-21; 46; Lomborg, 2001). This supports mainstream economists’ belief that economic growth is the solution to almost everything. Ecological economists argue, however, that even if economic growth does show signs of slowing population growth it does not work fast enough. Boulding believed tradable reproductive rights would lend flexibility to this sensitive subject. In his plan, people who want more children than the mandated limit can either buy (or be given) additional rights for more children. Herman Daly (1999, p. 113) suggests that more active family planning education and assistance will give people power to better control reproduction rates. There are, however, religious and cultural issues that obfuscate Boulding’s plan. Both Daly’s and Boulding’s plan could garner Post Keynesian support; but this issue requires further research before a clear solution can emerge.

## Conclusion

Kenneth Boulding developed the foundation of modern ecological economics. His “Spaceship” article emphasizes the dependent relationship that exists between the economy and the environment. He believes mainstream economists incorrectly view the world as an open (cowboy) system, which subsequently ignores harmful outputs resulting from economic activities. Boulding, like Post Keynesians, is critical of mainstream economists’ anthropocentric methodology, and argues that ecological economists must study the real world.

A future Post Keynesian/ecological economics should embrace Boulding’s transdisciplinary approach and start developing public policy strategies that account for the complexities and uncertainties inherent in the economy. Boulding and Post Keynesians both think that a capitalist system is more likely to cause environmental problems than solve them. It is necessary, therefore, to promote social investment in environmentally sustainable programs and reinforce institutions designed to protect the environment (e.g. EPA).

## Notes

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## References

- Bailey, R. (ed.) (1995), *The True State of the Planet*, New York, NY: Free Press.
- Bailey, R. (ed.) (1999), *Earth Report 2000: Revisiting the True State of the Planet*, New York, NY: McGraw-Hill.

- Beder, S. (2001), 'Neoliberal think tanks and free market environmentalism', *Environmental Politics*, 10 (2), 128-133.
- Boulding, Kenneth E. (1950), *A Reconstruction of Economics*, New York, NY: Science Editions, Inc.
- Boulding, Kenneth E. (1964), *The Meaning of the Twentieth Century: The Great Transition*, New York, NY: Harper & Row.
- Boulding, Kenneth E. (1966), *The Economics of the Coming Spaceship Earth*, in Henry Jarrett (ed.) (1966), *Environmental Quality in a Growing Economy*, Baltimore, MA: Johns Hopkins Press, pp. 3-15.
- Boulding, Kenneth E. (1971a), *Income or Welfare*, reprinted in F.E. Glahe (ed.) (1971), *Kenneth E. Boulding: Collected Papers vol. I*. Boulder, CO: Colorado Associated Press. pp. 263-274.
- Boulding, Kenneth E. (1971b), *Foreward to T. R. Malthus, Population the First Essay*, reprinted in F.E. Glahe (ed.) (1971), *Kenneth E. Boulding: Collected Papers vol. II*. Boulder, CO: Colorado Associated Press. pp. 137-142.
- Boulding, Kenneth E. (1978), *Ecodynamics: A New Theory of Society Evolution*, Beverly Hills, CA: Sage Publications.
- Boulding, Kenneth E. (1985), *The World as a Total System*, Beverly Hills, CA: Sage Publications.
- Daly, Herman (1996), *Beyond Growth: The Economics of Sustainable Development*, Boston, MA: Beacon Press.
- Daly, Herman (1999), *Ecological Economics and the Ecology of Economics: Essays in Criticism*, Cheltenham, UK: Edward Elgar.
- Davidson, Paul (1982/3), 'Rational expectations: A fallacious foundation for studying crucial decision-making processes', *Journal of Post Keynesian Economics* 5 (2), 182-197
- Davidson, Paul (1991), 'Is probability theory relevant for uncertainty? A Post Keynesian perspective', *Journal of Post Keynesian Economics*, 13 (1), 129-143.
- Davidson, Paul (1994), *Post Keynesian Macroeconomic Theory*, Aldershot, UK: Edward Elgar.
- Dunn, Stephen and Steven Pressman (2005), 'The economic contributions of John Kenneth Galbraith', *Review of Political Economy* 17 (2), 161-209.

- Environmental Protection Agency (2006) 'EPA fy 2007 library plan: National framework for the headquarters and regional libraries', [www.epa.gov/natlibra/Library\\_Plan\\_National\\_Framework081506final.pdf](http://www.epa.gov/natlibra/Library_Plan_National_Framework081506final.pdf), 15 August.
- Forstater, Mathew (2003), 'Public employment and economic sustainability,' *Journal of Post Keynesian Economics*, 25 (3), 385-406.
- Galbraith, John K. (1998), *The Affluent Society*, New York, NY: Mariner Books.
- Galbraith, John K. (1996), *The Good Society: The Humane Agenda*, New York, NY: Mariner Books.
- Georgescu-Roegen N. (1971), *The Entropy Law and the Economic Progress*, Cambridge, MA: Harvard University Press.
- Heilbroner, Robert (1975), 'Kenneth Boulding, collected papers: A review essay', *Journal of Economics Issues*, 9 (1), 73-79.
- Higgs, R. and C. Close (eds) (2005), *Re-Thinking Green: Alternatives to Environmental Bureaucracy*. Oakland, CA: Independent Institute.
- Holt, Richard P. F. (2006), 'Post-Keynesian economics and sustainable development', *International Journal of Environment, Workplace and Employment*, 1 (2), 174-186.
- Keynes, John M. [1936] 1964. *The General Theory of Employment, Interest, and Money*, New York, NY: Harcourt Brace.
- Keynes, John M. (1963), 'The end of laissez-faire', in Keynes, John M. (ed.), *Essays in Persuasion*, New York, NY: Norton, pp. 312-22.
- Keynes, John M. (1973), 'The general theory and after: Defense and Development', in Vol. XVI of *The Collected Writings of John Maynard Keynes*, London: Macmillan.
- Khalil, Elias (1996), 'Kenneth Boulding: Ecodynamist or evolutionary economist', *Journal of Post Keynesian Economics*, 19 (1), 83-91.
- Knight, Frank H. (1921), *Risk, Uncertainty and Profit*, Boston, MA: Hart, Schaffner & Marx.
- Kula, E. (1998), *History of Environmental Economic Thought*, New York, NY: Routledge.
- Lavoie, Marc (2005), 'Post-Keynesian Consumer Choice Theory for the Economics of Sustainable Forest Management', in Kant, S., and A. R. Berry (eds) *Economics, Sustainability, and Natural Resources: Economics of Sustainable Forest Management*, Dordrecht, Netherlands: Springer, pp. 67-90.

Lomborg, Bjorn (2001), *The Skeptical Environmentalist: Measuring the Real State of the World*, Cambridge, UK: Cambridge University Press.

McFarling, R. (2002), 'A Post Keynesian appreciation of "A Reconstruction of Economics"', *Journal of Post Keynesian Economics*, 24 (4), 643-656.

Mearman, Andrew (2007), 'Post Keynesian economics and the environment: Wake up and smell the burning coffee', *International Journal of Green Economics*, 1 (3/4), 374-380.

Pressman, Steven (1987), 'The policy relevance of *The General Theory*', *Journal of Economic Studies*, 14 (4), 13-24.

Rosser, J. B. (2001), 'Uncertainty and expectations', in Holt, Richard and Steven Pressman, *A New Guide to Post Keynesian Economics*, New York, NY: Routledge, 52-64.

Sen, A. K. (1984), *Resources, Values and Development*, Cambridge, MA: Harvard University Press.

Sen, A. K. (1985), *Commodities and Capabilities*, Amsterdam: North Holland.

Spash, Clive (1999), 'The development of environmental thinking in economics', *Environmental Values*, 8 (4), 413-435.

Spash, Clive (2007), 'Deliberative monetary valuation (DMV): Issues in combining economic and political processes to value environmental change', *Ecological Economics*, 63 (4), 690-699.

Wray, L. R. (1994), 'Kenneth Boulding's Grants Economics', *Journal of Economic Issues*, 28 (4), 1205-1225.

Wray, L. R. (1997), 'Kenneth Boulding's reconstruction of macroeconomics', *Review of Social Economy*, 55 (4), 445-463.