

***“Thomas and Robert: A Tale of Two Malthuses”***

**By**

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Exactly a hundred and fifty years ago a reverend gentleman called Malthus wrote a pamphlet pointing out that the population of the world was growing, that the physical capacities were limited, and that a stage would soon be reached where there was not sufficient food to feed the people of the world. It was therefore wrong, he suggested, to bring in measures of social amelioration, for preventing the death of infants and for keeping people healthy, because if that were done more people would survive and the problem would become worse...Even as an account of the earliest views of Malthus this statement is a tendentious distortion.” (Flew, 1970)

Yet it is a distortion which continues to thrive more than two centuries after the ‘reverend gentleman’ published his pamphlet. My colleague Steve Horwitz has recently pointed out in a his review of Stephen Medema’s *Hesitant Hand*:

Where Medema is at his best in this book is suggesting that what we think of as Smithian laissez-faire, Pigovian welfare economics, and Coasean analysis do not have nearly as much to do with what Smith, Pigou, and Coase actually said as the adjectives might suggest. (Steve Horwitz: [http://eh.net/book\\_reviews/hesitant-hand-taming-self-interest-history-economic-ideas](http://eh.net/book_reviews/hesitant-hand-taming-self-interest-history-economic-ideas))

We have a similar problem with Malthus where the adjective, “Malthusian”, bears only rudimentary resemblance to the noun, “Malthus”. And furthermore it has been recognized as such repeatedly over the same time period, yet distortions of Malthus seem to be incorrigible.

James Bonar, who wrote probably the first scholarly study of Malthus commented on the same problem, and suggested that distortion is a function of illiteracy.

The ‘opinion’ so imagined by Senior [before he actually read Malthus] and the multitude is still the current [1885] Malthusianism. A Malthusian is supposed to forbid marriage. Mr. Malthus was supposed to have believed that ‘the desire of marriage, which tends to increase population, is a stronger principle than the desire of bettering our condition, which tends to increase subsistence.’ [quoting Nassau Senior’s *Two Lectures on Population*] The old adage was wrong then: Providence does not send meat where he sends mouths; on the contrary, He sends mouths wherever He sends meat, so that the poor can never cease out of the land, for, however abundant the food, marriage will soon make the people equally abundant. It is a matter of simple division. A fortune that is wealth for one will

not give comfort to ten, or bare life to twenty. The moral is, for all about to marry, ‘Don’t,’ and for all statesmen, ‘Don’t encourage them.’ (Bonar, 1924, 4)

This, as Bonar immediately points out, is a “caricature”, but with “enough truth in it to save it from instant detection.”

Senior, himself, admitted to Malthus that he had misunderstood the population doctrine.

As the subject is of the utmost importance, I will venture to state, for your correction, my present impression as to your doctrine. I conceive you to hold, that an increase of population in a greater ratio than that of subsistence, is a probable event *only under peculiar circumstances*. (Senior, *Two Lectures*, Appendix, p. 57; emphasis added)

In a similar vein Bonar notes that the message of the second edition of the *Essay* is that

It tells us that on the whole the *power of civilization* is greater than the power of population; the pressure of the people on food is therefore less in modern than it was in ancient times or the middle ages; there are now less disorder, more knowledge, and more temperance. The merely physical checks are falling into a subordinate position. (Bonar, 51-52, emphasis added)

And J.S. Mill’s *Principles* contain the following assessment:

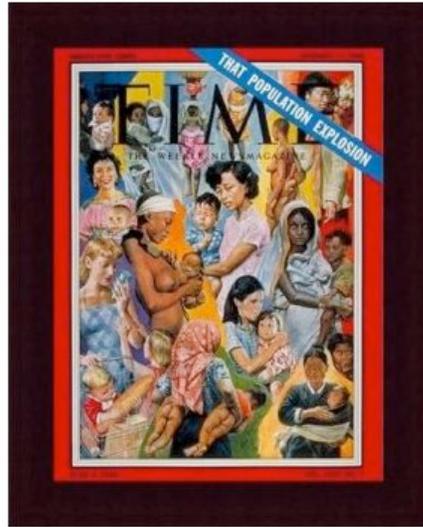
The publication of Mr. Malthus’ *Essay* is the era from which *better views* of this subject [the relation of people to food] must be dated; and notwithstanding the acknowledged errors of his first edition, few writers have done more than himself, in the subsequent editions, to promote these *juster and more hopeful* anticipations. (1987 [1848], p. 747, emphasis added)

And yet today, Malthus’s name continues to be associated with gloom and doom: a population “explosion”, famine, resource scarcity, environmental destruction, and technological pessimism.

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Population Explosion / TIME Cover: January 11, 1960, Framed Art Print by TIME Magazine



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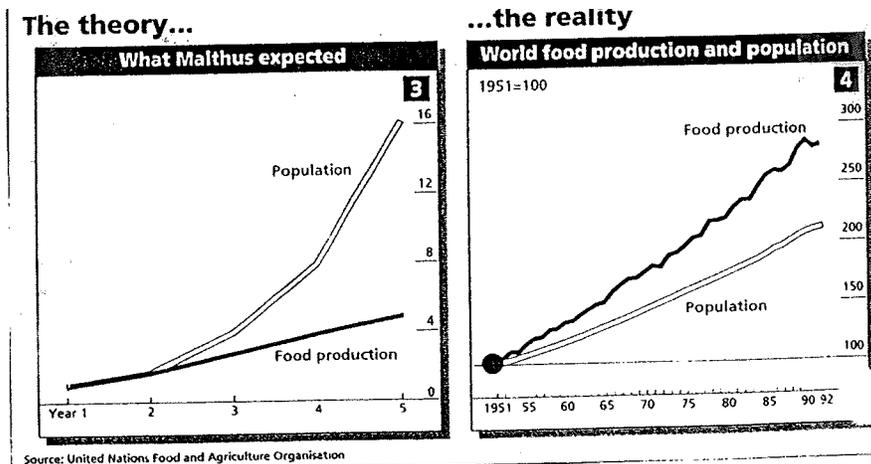
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The diagram below is taken from *The Economist*, September 3, 1994.



THOMAS MALTHUS first published his “Essay on the Principle of Population”, in which he forecast that population growth would outstrip the world’s food supply, in 1798. His timing was unfortunate, for something started happening around then which made nonsense of his ideas. As industrialisation swept through what is now the developed world, fertility fell sharply, first in France, then in Britain, then throughout Europe and America. When people got richer, families got smaller; and as families got smaller, people got richer. (*The Economist*, October 29, 2009)

The same notion can be expanded to the relation between population and natural resources generally:

The scarcity and growth debate began in earnest with Thomas Malthus’s observations on the fecundity of human nature and the relative stinginess of Mother Nature...Malthus could not have foreseen the rapid technological progress and the decline in fertility rates that would allow large portions of the world to avoid the Malthusian population trap. (Jeffrey Krautkraemer, “Economics of Scarcity; The State of the Debate,” in *Scarcity and Growth Revisited*, R. David Simpson, Michael A. Tomand, and Robert U. Ayres, eds., 2005, pp. 55-56.)

From a leading American textbook we have a growth model which

Formalizes the ideas of Thomas Malthus...This Malthusian model has the property that any improvement in the technology for producing goods leads to increased population growth, so that in the long run there is no improvement in the standard of living. (Stephen D. Williamson, *Macroeconomics*, fourth edition, 2011, p. 191)

Similarly another text asserts that

It was the mistaken forecast of Thomas Malthus in the early nineteenth century concerning future prospects for economic growth that earned the discipline its most recognized epithet, the ‘dismal science’.” (Charles I. Jones, *Introduction to Economic Growth*, 2<sup>nd</sup> Ed. New York: W. W. Norton and Company, 2002.)

The forecast in question here is, of course, that attributed to Malthus in *The Economist’s* diagrams. That being the case I count no less than 4 historical inaccuracies in this one sentence, and the vast majority of contemporary economists are so ignorant of the history of the discipline, that they would not catch them. Robert Malthus, who wrote a short essay in the late *eighteenth* century, made *no* such prediction, despite popular opinion over two centuries. And as Levy and Peart have persuasively argued this non-prediction is *not* the source of the “dismal science” epithet.

This view of Malthus is, however, pervasive in the modern world (as it has been despite repeated attempts to set the record straight over two hundred years), so it must be rooted in some genuine historical artifact. The belief that Malthus made a dismal forecast about population and resources rests on the belief that Malthus deployed a particular model of population and food, which following Waterman, I will designate the “ecological model”, as a contribution to the positive science of economic growth, and hence the geometric ratio overwhelming the arithmetic ratio is viewed as a scientific prediction. However, as Senior, Mill, and Bonar testify, there is much more than this going on in Malthus (especially, of course, in the second and subsequent editions of the *Essay*, but also, I will argue, in the first), and that “something” seems to have more to do with “civilization” than it does with technology.

However, before delving into the substance of the argument to be developed here, why quibble over the name? So what if we call him “Thomas” instead of “Robert”?

Because of the importance of true biography in genuine intellectual history it may not be irrelevant to observe that Malthus, like Maynard Keynes, used only his second christian name. He signed himself “T. Rob<sup>t</sup>. Malthus,” was known to his family as “Robert” and to his parents as “Bob.” The growing practice of referring to a “Thomas R. Malthus” or simply a “Thomas Malthus”...is a sign of that cultural imperialism which seeks to impose the categories of late-twentieth century America upon the rest of time and space; and affords a useful rule-of-thumb for distinguishing textbook accounts of “Malthus” which do not intend to treat him seriously from those which do. (Waterman, A. M., “Reappraisal of ‘Malthus the Economist, 1933-97,” *History of Political Economy*, 30(2), Summer, 1998, 301-302.)

Not wanting to be an unserious interpreter of Malthus, I refrain from “Thomas”, despite being American. (From casual observation, however, I have noticed among my undergraduate students in recent years a growing number of men and women using their second name in preference to their first.). However, as my selection of quotes suggests there is more going on in serious Malthus interpretation than exalting or condemning him for making the prediction that population would outrun food supply, marriage (fertility) must be discouraged as a matter of public policy, and that technological change would only make things worse. One way of dealing with this diversity is to suggest that there

are really more than one Malthuses, and it is certainly not new to suggest that there are at least two Malthuses, especially given the profound difference between the first and second editions of the *Essay*.

In what follows, I will take the “two Malthuses” approach, although I will not treat the development from the first to the second essay as the key that distinguishes the two, since that implies that what Bonar has called a “caricature” is in some sense a valid interpretation of the *First Essay*, and that Malthus did make such predictions as modern economists attribute to him in that edition. This in turn implies that the “juster and more hopeful anticipations”, the role of “circumstances” and “civilization” came later. While it is true that with the introduction of the moral check in the second edition, these themes received greater attention in Malthus’s developing views; they are by no means absent from the first edition.

My approach rests on the fact that when we extract a model from the first essay, i.e. engage in a rational reconstruction, the model we get is exactly the same as that proposed by H. Scott Gordon 156 years later to explain the economics of the fishery, which was in turn popularized by Garrett Hardin as “The Tragedy of the Commons.”<sup>1</sup> (Gordon, H. Scott, “The Economic Theory of a Common-Property Resource: The Fishery,” *Journal of Political Economy*, 62, April 1954, 124-142; Hardin, Garrett, “The Tragedy of the Commons,” reprinted in Garrett Hardin and John Baden, eds., *Managing the Commons*, 1977, 16-30) Both used the idea to highlight institutional failure:

The following section [which presents the model] attempts to apply that theory to the fishing industry and to demonstrate that the “overfishing problem” has its roots in the economic organization of the industry. (Gordon, 128)

The class of “no technical solution problems” has members. My thesis is that the “population problem”, as conventionally conceived, is a member of this class. (Hardin, 17)

I shall have more to say about Hardin’s approach to the problem, below, where I will argue that the conventional conception of the problem, growth in a finite environment, is a misapplication of the model. Nonetheless, he along with Gordon is correct that common property resource problems are at bottom institutional failures, which must first be addressed before the successful application of technology.

The realization that Malthus’s is the same model sheds important light on both Malthus’s original intent in the first essay, and on contemporary debates over population, resources, and limits to growth. As we shall see the model has two equilibria: an open access, competitive equilibrium and the socially optimal equilibrium that would prevail under appropriate institutions of property rights, informal rules of governance, and/or formal government regulations. The open access competitive equilibrium of Gordon’s model corresponds to the pessimistic predictions of Malthus’s ratios, while the social optimum corresponds to the equilibrium of the classical growth model. Both of these equilibria can be found in the *Essay*, and the difference between the two is the presence

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<sup>1</sup>Originally published in *Science* in 1968, neither Hardin nor his audience, to my knowledge, was aware of Gordon’s work. (Hardin, *Science*, 162, 1243-1248.)

or absence of the institutions, which Malthus believed characterized civilization: private property, competitive markets, and marriage. The two Malthuses, then, are the Malthus without institutions and the Malthus with them. The former, however, is a mere caricature of the latter, and so in deference to Waterman I refer to the caricature as “Thomas” and the reality as “Robert”.<sup>2</sup> Robert proposed a model of population without institutions for a particular, well known, political purpose. Robert eventually found his way to a model of economic growth in which prudent, foresighted, even rational behavior, could result in continual improvement in the standard of living in the face of natural resource scarcity. Robert recognized this throughout all editions of the *Essay*.

In the context of modern scarcity and growth debates, Neomalthusians incorrectly use Robert’s institution-less model to analyze a world that is not institution-less. Treating the institution-less world as the real world and attributing it someone called Malthus is the approach I associate with “Thomas”, the Malthus caricature. Population growing into a finite, but institution-less environment is not an appropriate way to model population, resources, and the environment in the modern world, except perhaps in peculiar circumstances, such as those which led to the demise of civilization on Easter Island. Modern perspectives in economics have more in common with Robert than with Thomas.

Consider first the ecological model. A number of rational reconstructions of Malthus’s implicit model are extant in the literature. (Kenneth Boulding, “The Malthusian model as a general system,” *Social and Economic Studies* 4(3), 1955, 195-204; Anthony M. C. Waterman, *Revolution, Economics and Religion*, Cambridge: Cambridge University Press, 1991; “Adam Smith and Malthus on high wages”, A. M. C. Waterman, *European Journal of the History of Economic Thought*, 19:3, June 2012, 409-429; Walter Eltis, *The Classical Theory of Economic Growth*, Second Edition, 2000, Hampshire and New York: Palgrave.) Boulding’s view of Malthus’s model as a general system is instructive, however, I prefer Waterman’s model as it is explicitly rooted in Malthus’s ratios. Moreover, its designation as an ecological model highlights its biological orientation. To reflect the complexity of having two Malthuses to contend with Waterman has produced two versions of his macro dynamic model, the “ecological model” and the “sophisticated model”.

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<sup>2</sup> Some might object that I am illicitly assuming that there is a “true” interpretation of Malthus, and that I, have access to him. This is not what I am claiming in making the distinction. I am claiming, along with Anthony Waterman and other noted Malthus scholars going back to the 19<sup>th</sup> century, that Malthus’s text does not support the common view. It is well known that Malthus “softened” his stance in the second edition of the *Essay*. However, it is all there in the first, which is the text I rely in here.

I reproduce his diagram as Figure 1.

*Figure 1*  
*The 'Ecological' Model*

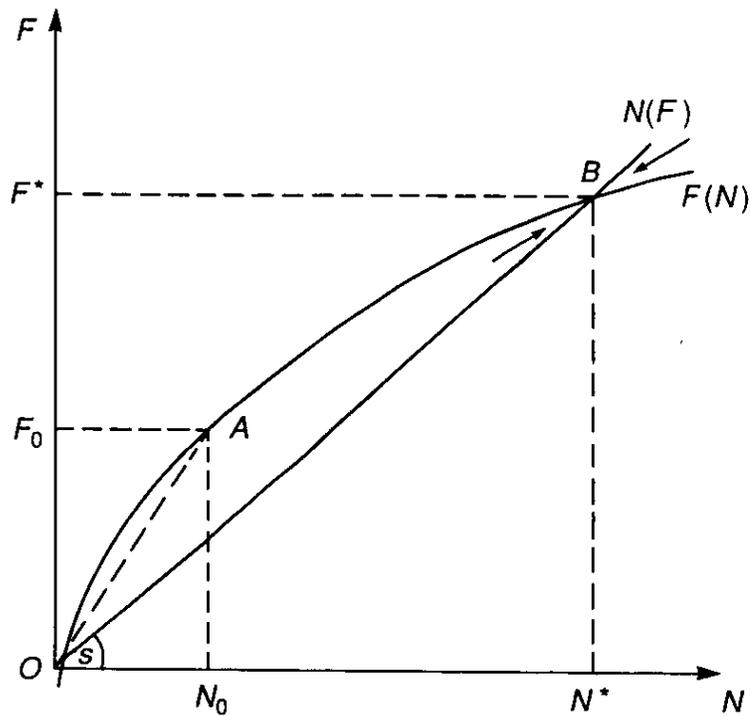


Fig. 6. The Malthusian 'ratios' and the equilibrium of population.

Source: Anthony Waterman, p. 266.

The function  $F$  is given by

$$F = L \log N,$$

and the function  $N(F)$  is given by

$$N = F/s.$$

Where  $N$  is population,  $F$  is food output,  $s$  represents biologically determined subsistence, and  $L$  represents the factors, such as technical know-how, which determine labor

productivity. The logarithmic form of  $F$  is derived from the ratios, which Malthus explains thus:

Population, when unchecked, increases in a geometric ratio. Subsistence increases only in an arithmetic ratio. A slight acquaintance with numbers will shew the immensity of the first power in comparison of the second...Taking the population of the world at any number...the human species would increase in the ratio of—1, 2, 4, 8, 16, 32, 64, 128, 256, 512, &c, and subsistence as—1, 2, 3, 4, 5, 6, 7, 8, 9, 10, &c...No limits whatever are placed on the produce of the earth; they may increase for ever and be greater than any assignable quantity; yet still the power of population being a power of a superior order, the increase of the human species can only be kept commensurate to the increase of the means of subsistence by the constant operation of the strong law of necessity acting as a check upon the greater power. (Pp. 13, 17-18; all references to the first edition come from the Oxford World Classic's edition, T. R. Malthus, *An Essay on the Principle of Population*, edited by Geoffrey Gilbert, Oxford: Oxford University Press, 2004.)

As Waterman has very recently reiterated, “It turns out that this is the only mathematical reconstruction [logarithmic form] that satisfies all three hermeneutical requirements imposed by Malthus’s text.” (2012, p. 421) As far as it being a predictive model, Waterman emphasizes that, “Malthus postulated that *if* population (and labour inputs therefore) actually grew geometrically, *then* food supplies could grow only arithmetically *at best*, although ‘certainly far beyond the truth’ [quoting Malthus first essay]”. (421)

Assuming a given state of knowledge and capital and assuming population and labor input are the same, the ratios imply a logarithmic relation between the two. Note that unlike modern textbook formulations of diminishing returns, the function,  $F$ , never experiences negative returns (one of the three requirements imposed by the text on the form of  $F$ ). Average and marginal products ( $L \log N/N$  and  $L/N$ , respectively, asymptotically approach zero. The function,  $N$ , has a slope given by subsistence,  $s$ , such that as subsistence expands so does population. The function is linear, and it tells us that for a given  $F$  and  $s$ , the corresponding  $N$  on the horizontal axis is the equilibrium population.

The function  $N$  reflects the notion, common in 18<sup>th</sup> century literature, that the availability of subsistence regulates population growth. Adam Smith, for example, probably with Cantillon in mind, states that, “As men, like all other animals, naturally multiply in proportion to the means of their subsistence, food is always, more or less, in demand. (WN I. xi.b.1)

In the ecological version of the model we interpret  $s$  as a biological minimum. If the availability of subsistence falls below  $s$  then mortality will rise as the positive checks take hold. If subsistence rises above  $s$ , mortality falls. We thus have two interdependent equations and their simultaneous solution at  $N^*$  determines the equilibrium population.

A moment’s reflection will show that it is a stable one. If population is below  $N^*$  it will rise as food per capita given by  $F$  will be above subsistence,  $s$ . Given a constant

birth rate, deaths will fall below births and  $N$  will rise toward  $N^*$ . If population is above  $N^*$ , food per capita is below subsistence,  $s$ , mortality rises above the constant birth rate and population dies back to equilibrium. In fact, given the nature of the adjustment dynamics in this model, population will initially rise above  $N^*$  and then collapse back toward equilibrium. The model exhibits an overshoot and collapse mode. Malthus himself actually thought in terms of an oscillation around equilibrium.

Any improvement in the state of knowledge will rotate  $F$  counterclockwise, and food per capita at  $N^*$  will now be above subsistence and the population rises to a new equilibrium. Boulding has aptly called these results the “Dismal Theorem” and the “Utterly Dismal Theorem”, respectively (p. 197. It is certainly “dismal” even if that is not why economics became the “dismal science”.) At  $N^*$ , everyone is miserable, since population is held in check only by the positive checks of misery and vice (disease, war, famine, vicious sexual practices). The fruits of technical improvement are realized in a larger population living at the same miserable level, hence the “Utterly Dismal Theorem” as “improvement” merely serves to increase the sum of human misery.

Such is the ecological model. Human agency is severely restricted in its scope of operation, if not entirely lacking. Regarding human action in the model, Malthus states his familiar “postulata”:

First, That food is necessary to the existence of man.

Secondly, that the passion between the sexes is necessary, and will remain nearly in its present state. (12)

These, says Malthus, “appear to have been fixed laws of our nature.” What about reason? Isn’t the ability to reason also a ‘fixed law of our nature’?

Impelled to the increase of his species by an equally powerful instinct, reason interrupts his career, and asks him whether he may not bring beings into the world, for whom he cannot provide the means of subsistence. In a state of equality, this would be the simple question. In the present state of society, other considerations occur. (18)

These other considerations have a cultural component, as one might fear loss of status, as well as self-interested considerations of having to work harder, or compassionate concerns for the sorrow of seeing one’s own children in misery. Malthus continues noting that

These considerations are calculated to prevent, and certainly do prevent, a very great number in all civilized nations from pursuing the dictate of nature in an early attachment to one woman. And this restraint almost necessarily, though not absolutely so, produces vice. (*Ibid.*)

This conclusion, as is well known, was softened in the second edition when Malthus admitted that moral restraint was possible. However, my concern here is not so much with the moral status of the sexual practices that may or may not be associated with such restraint, as with the positive proposition that human reason is capable of

intervening into a supposedly “fixed law”. Malthus views human nature in terms of a tension between reason and passion, where reason entails the virtue of prudence. However, it is clear that the operation of reason occurs within a particular institutional and cultural context, which Malthus sometimes refers to as the “present state of society” and others as “civilization”. It is a bit of a simplification, but I believe it is reasonable to view the ecological model, the Dismal and Utterly Dismal Theorems, as portraying population dynamics in a world without institutions. In the above Malthus calls such a world a “state of equality”. As such the operation of reason in fertility decisions is minimal, if not absent.

It is a model without institutions as Malthus used it as a thought experiment to “demolish Godwin’s utopia”. (Waterman, p. 265)

The great error under which Mr Godwin labours throughout his whole work is attributing all the vices and misery that are seen in civil society to human institutions...[which can be changed by reason] But the truth is, that though human institutions appear to be the obvious and obtrusive causes of much mischief to mankind, yet in reality they are light and superficial, they are mere feathers that float on the surface, in comparison with those deeper-seated causes of impurity that corrupt the springs and render turbid the whole stream of human life.” P. 75

And yet, the whole thrust of his critique is that if you remove the institutions everyone will be miserable, not just the lower classes. The heart of Malthus’s polemic against Godwin is found in chapter X.

But let us imagine for a moment Mr Godwin’s beautiful system of equality realized in its utmost purity, and see how soon this difficulty might be expected to press under so perfect a form of society...Let us suppose all the causes of misery and vice in this island removed...All men are equal. The labours of luxury are at end. And the necessary labour of agriculture are shared amicably among all...The spirit of benevolence guided by impartial justice, will divide this produce among the members of society according to their wants...Let us suppose the commerce of the sexes established upon principles of the most perfect freedom...It would be of little consequence, according to Mr Godwin, how many children a woman had or to whom they belonged. (77)

Once again Waterman has it right. This is a thought experiment (“let us imagine...”) in which marriage, inequality (and hence luxury), greed, self-interest, and injustice have been eliminated from society. What is the result? “I cannot conceive a form of society so favourable upon the whole to population.” (78)

With these extraordinary *encouragements* to population, and every cause of depopulation, as we have supposed, removed, the numbers would necessarily increase *faster than in any society that has ever yet been known*. (78; emphasis added)

It is not that human agency disappears, but that there is no incentive to exercise rational control over fertility; they are “encouraged” to reproduce under these conditions. If this generates a rate of growth greater than anything ever observed we may infer that the doubling time would be less than the 25 years Malthus assumed in constructing the ratios. The abolition of marriage and the expansion of agricultural output constitute “encouragements to population,” a phrase which suggests that from an individual’s perspective there is no need to exercise control over hormones. The Dismal Theorem takes hold, and within a mere 50 years the whole thing falls apart.

This beautiful fabric of imagination vanishes at the severe touch of truth. The spirit of benevolence, cherished and invigorated by plenty, is repressed by the chilling breath of want. The hateful passions that had vanished, reappear... till at length self-love resumes his wonted empire and lords it triumphant over the world. (78)

Benevolence had established her reign in all hearts; and yet in so short a period as within fifty years, violence, oppression falsehood, misery, every hateful vice, and every form of distress, which degrade and sadden the present state of society, seem to have been generated by the most imperious circumstances, by laws inherent in the nature of man, and absolutely independent of all human regulations...yet all this time we are supposing the produce of the earth absolutely unlimited, and the yearly increase greater than the boldest speculator can imagine. (80, 81)

Human institutions we now learn from bitter experience serve to mitigate misery; they are surely not its source.

Is it not a degree of misery, the necessary and inevitable result of the laws of nature, which human institutions, so far from aggravating, have tended considerably to mitigate, though they never can remove? (81)

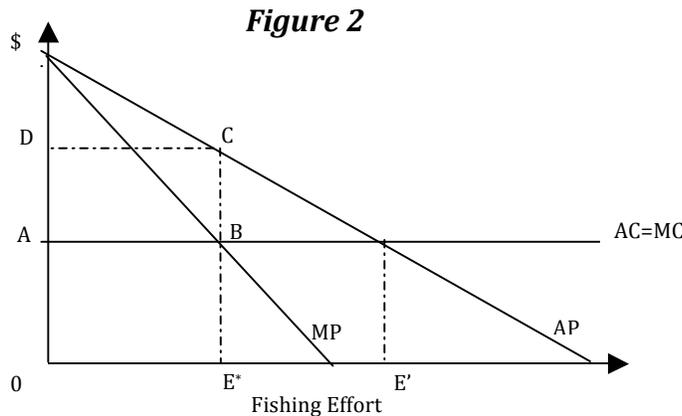
Before we return to Malthus’s story, let’s jump ahead 156 years to Scott Gordon’s theory of the fishery. H. Scott Gordon’s 1954 model of an open access common property resource is the canonical institution-less model in contemporary economics. As we now know, it is the open access feature, not its common ownership, which is decisive for the results Gordon (and later Hardin predicted for the common property resource.<sup>3</sup> (See Elinor Ostrom, *Governing the Commons*, Cambridge: Cambridge University Press,

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<sup>3</sup> “Open access” operates in two dimensions. The resource may be commonly owned by a well-defined group with members of other groups effectively excluded. In this case “open access” would involve members of the group being able to increase their individual appropriation or use of the resource without fear of sanction. Alternatively, there may not even be a well-defined group, in which case the resource is open to anyone to appropriate as much as they can. “Open access” then means the number of appropriators as well as each individual’s level of appropriation is open.

1990.) Thus, the institution-less feature of the model implies, not only the absence of formal, government sanctioned property rights, but also informal conventions and community level organizations, which govern the use of a commonly held resource. Gordon formalized this in his analysis of the fishery as a common property resource. (Gordon 1954) He showed that in the absence of any way of excluding potential fishermen from a fishery, economic rent would be dissipated and the fishery would be managed inefficiently. He concluded that "...the 'over fishing problem' has its roots in the economic organization of the industry." (128)<sup>4</sup>

The argument is by now quite familiar among economists. Figure 2 depicts the situation of an open access fishery where the composite labor and capital invested in people, boats, and equipment is treated as homogeneous 'fishing effort'. Gordon argued that this input would be subject to diminishing returns because increasing effort would reduce the fish population (Gordon 1954: 129), but the same result obtains for any fixed resource, such as land or water. For simplicity the marginal and average opportunity costs of the resources devoted to fishing effort are assumed to be constant.



The social net product is maximized with fishing effort  $E^*$ , and it would be appropriated as economic rent (ABCD), if there was someone to claim it. However, in the open access case the opportunity to earn rent draws increasing numbers of fishermen into the area and exploitation continues until all returns are

<sup>4</sup> Looking at the very same problem, overfishing, the original *Limits to Growth* (LTG) authors argued that the fundamental problem was growth in a finite environment and the inability of technological change to do anything but exacerbate the problem (see Utterly Dismal Theorem):

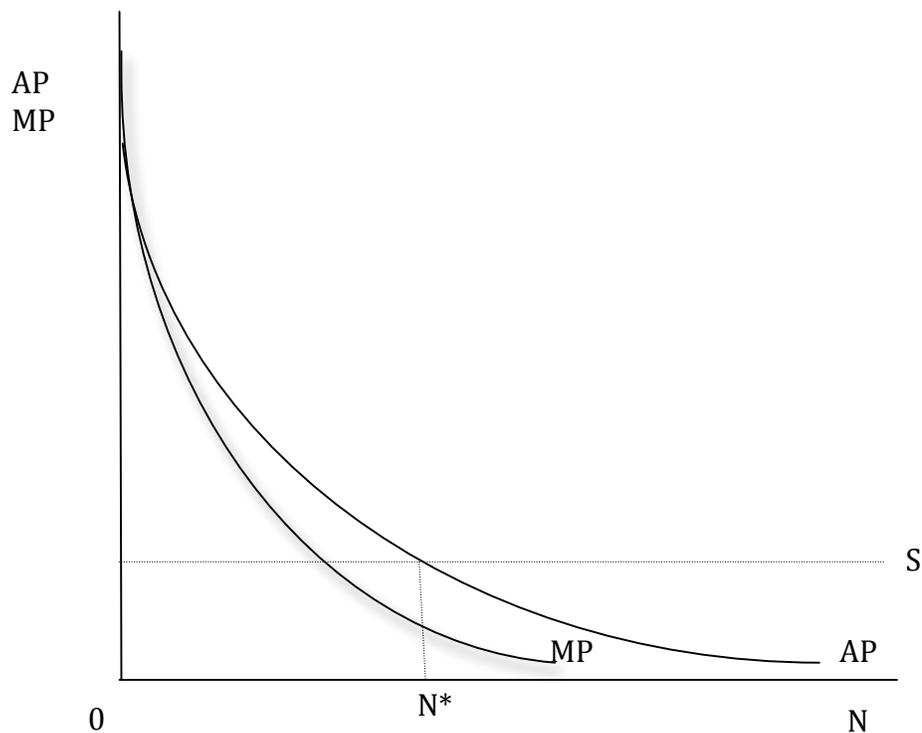
The basic choice facing the whaling industry is the same one that faces any society trying to overcome a natural limit with a new technology. *Is it better to try to live within that limit by accepting a self-imposed restriction on growth? Or is it preferable to go on growing until some other natural limit arises, in the hope that at that time another technological leap will allow growth to continue still longer?* (Donella H. Meadows, et al, *The Limits to Growth*, 1972, p. 151, 153; emphasis in original.)

equal to opportunity costs,  $E'$ . The economic rent is dissipated and all factors earn only their opportunity return. The competitive equilibrium, then, is shown to be socially inefficient. Cheung further refined the analysis to show that  $E'$  is reached in the limit as the number of fishermen expands toward infinity. (Cheung, S. 1974[1970] 'The Structure of a Contract and the Theory of a Non-Exclusive Resource', in Furubotyn and Pejovich (eds) *The Economics of Property Rights*, Cambridge, MA: Ballinger.) Clearly, if the first boats on the scene could exclude the latecomers from the fishery, they would be able to prevent rent dissipation.

That this is the same model as the ecological model we have been examining in Malthus is evident, first, if we interpret "fishing effort" as the population of fishermen, and, second, if we view the cost of fishing effort, i.e. the opportunity cost of the labor and capital devoted to fishing, as a subsistence below which the population decreases, and, third, if we rewrite the ecological model in terms of average and marginal products instead of total product.

Figure 3 shows the ecological model in these terms.

**Figure 3**  
***The Ecological Model in terms of Average and Marginal Products***



Given Malthus's proposed logarithmic function for total product, the average and marginal product curves will both asymptotically approach the horizontal axis,

with the average always being above the marginal. Note that the ecological equilibrium,  $N^*$ , occurs where the average product of labor equals the subsistence standard of living, and here is no surplus as total food output ( $N^*s$ ) is just sufficient to provide a subsistence basket to each member of the population. As in Gordon's model with no restriction on population increase other than the subsistence constraint, the population pushes beyond the social optimum, and equilibrium obtains where AP, not MP equals  $s$ . The population equilibrium of the ecological model is the open access competitive equilibrium of the population of fishing effort, fishermen for short.

Something very much like this is evident in Malthus's treatment of Godwin's utopia. In both cases population is expanding into an environment unconstrained by institutions. The role of human agency in these respective cases functions a bit differently, though. Gordon needs only to assume individual rationality, while Malthus is dealing with the interaction of the rational and the passionate, or between the virtue of prudence and sexual desire. In his case the absence of constraint means that there is no reason to exert prudential restraint over sexual desire which effectively means that humans behave like any other biological species, and population expands to the ecological equilibrium. Moreover, in both cases there is no surplus; the rent dissipation result of Gordon's model is also a feature of Malthus's model, although the two used very different discourses to say it. Gordon's is the discourse of modern economic theory, while Malthus's is that of late Enlightenment political theory. Malthus is thinking in terms of broad institutional regimes—a state of equality (or state of nature of the social contract theorists) vs. the civilized state. Like social contract theorists before him, he views the foundational institutions of existing society as a response to the inconveniences of the state of nature. So Malthus's version of the rent dissipation theorem is that in a state of equality there would be no social surplus, everyone will be living at a subsistence level. It would be an equality of poverty, just as Adam Smith recognized in the Introduction to the *Wealth of Nations* (WN.Intro.4; p. 10, Glasgow Edition)

Returning to Malthus's narrative, having shown the implications of returning to the state of equality, he argues that people would never let things get so bad as the state of subsistence equilibrium before taking some kind of action. First, "Some kind of convention would then be called, and the dangerous situation of the country stated in the strongest terms." (82) What would be agreed at this convention?

It seems highly probable, therefore, that an administration of property not very different from that which prevails in civilized States at present would be established as the best, though inadequate, remedy for the evils which were pressing on the society. The next subject that would come under discussion, intimately connected with the preceding, is the commerce between the sexes... that the most natural and obvious check seemed to be to make every man provide for his own children...as it might be expected that no man would bring beings into the world for whom he could not find the means of support...The institution of

marriage, or at least of some express or implied obligation on every man to support his own children, seems to be the natural result of these reasonings in a community under the difficulties that we have supposed. (83)

Unfortunately, “When these two fundamental laws of society, the security of property and the institution of marriage, were once established, inequality of conditions must necessarily follow.” (85) Once again, the institutions of society ameliorate misery, they do not end it.

Under the institutions of civilized states, Malthus’s model undergoes an important transformation into what, following Waterman again, we will call the Sophisticated Model. The “superficiality” of institutions notwithstanding, they play an integral role in Malthus’s thinking. Indeed, he predicted that the institutions of “civilized” society: property rights, markets, and marriage would be reintroduced before the utopian experiment could collapse into total misery at  $N^*$ . The same model with these institutions introduced gives us Waterman’s “Sophisticated Model”.

*The ‘sophisticated’ model*

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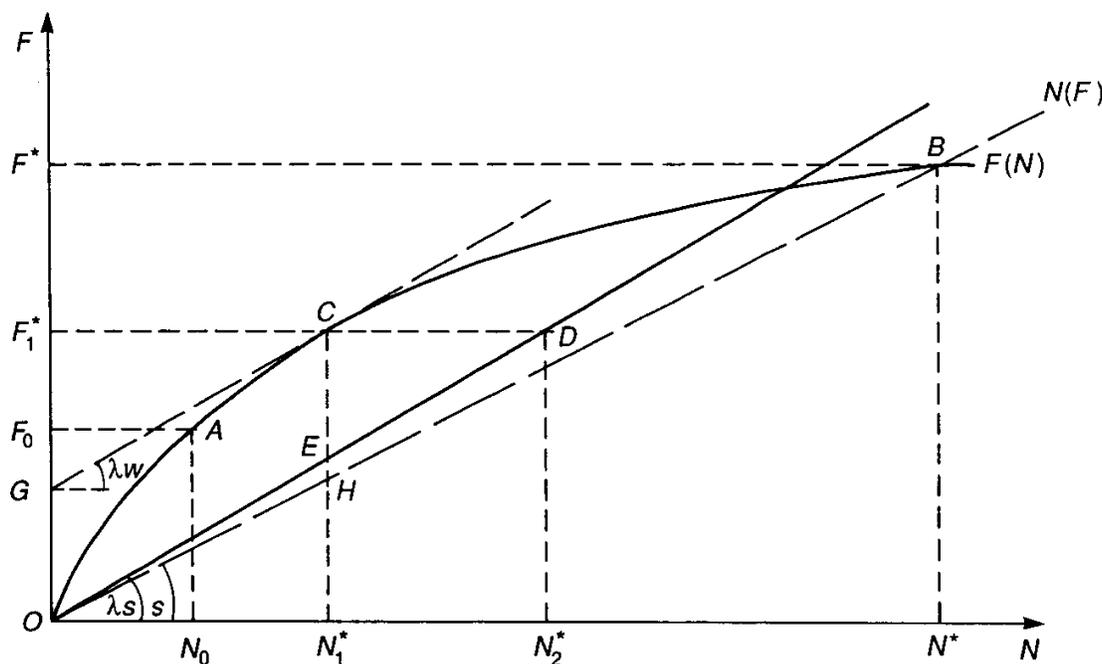


Fig 7. Population equilibrium with private property and competitive wages.

Here the institutions of modern society have been re-introduced. Agricultural land has now been privately appropriated, capital investments and improvements have been made, and labor services are bought and sold in a market. As is common with simple rational reconstructions of the classical growth model,  $N$ , population, now also represents a composite dose of labor/capital, which is employed where its composite marginal product equals its marginal cost (given by  $\lambda s$ , the subsistence wage,  $s$ , with a minimum rate of return to capital added on). Equilibrium now occurs at  $N_1^*$ .  $EC$  is the rent accruing to the landowners. It is a surplus, which does not exist in the ecological model.

Again, note that Gordon's model is the same. Assuming a private owner of the resource, or some institutional structure that allows for the appropriation of rent, equilibrium is  $E^*$  in Figure 2, the surplus is maximized and it accrues as rent, the same as the sophisticated model.<sup>5</sup>

In Waterman's formulation landowners use the surplus to employ unproductive personal servants. If they are also paid the subsistence wage,  $s$  per worker, also including a dose of capital, then  $CD$  is the population of unproductive workers, and  $N_2^*$  is the total population. We continue to assume that positive checks only operate. Thus, in this version of the model the subsistence,  $s$ , prevails as the equilibrium real wage per worker. The positive checks operate via the supply of labor. The property owning class is assumed to practice preventive checks, however, it is considered negligible relative to the rest, so  $N_2^*$  is the total population, clearly less than the ecological maximum. However,  $N^*$  is relative to the state of knowledge and capital accumulation, both of which would entail a higher value for  $L$  in the advanced state compared to the pure ecological, institution-less model. Thus,  $N_2^*$  in the advanced state could exceed  $N^*$  in the ecological state.

The steady accumulation of capital and knowledge suggest that in the advanced state the  $F$  function will be continually rotating counterclockwise, which as we know simply raises the equilibrium population without affecting the equilibrium real wage (the Utterly Dismal Theorem) unless preventive checks are introduced into the reproductive behavior of the working population. Given appropriate incentives and proper education, Malthus did believe that they would be able to foresee the consequences of early marriage, and, thus, by prudentially delaying marriage until the male was able to support the wife and children, fertility would come under some rational control. The further practice of restraint within marriage would strengthen the effect.

For if  $s$  can become endogenous, as Malthus himself had recognized, a prolonged episode of economic growth with above-ZPG wages could be quite as effective in raising  $s$  as all the sermons and pamphlets of middle-class clergymen and their female coadjutors such as Jane Marcet and Harriet Martineau. (Waterman, 2012, p. 420)

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<sup>5</sup> It is beyond the scope of this paper, but there is another important similarity here between Malthus's model and the modern discourse on common property resources. The potential to appropriate rent from a scarce resource is the basis for modern theories of the origin and development of property rights, as it is in Malthus. This is an important strand in what is now new institutional economics. This literature is now quite large, and I have surveyed some of the major contributions elsewhere in relation to Adam Smith's theory of the origin of property rights. ("Adam Smith and New Institutional Theories of Property Rights," *Adam Smith Review*, 2, 2006, 48-68.) The theory of the self-governing commons, associated especially with Elinor Ostrom, represents another branch of new institutional thought, which has much in common with Robert Malthus's analysis. Ostrom has numerous articles, but her 1990 book, *Governing the Commons*, (Cambridge: Cambridge University Press) gives the basics with several important case studies of successful governance.

Malthus and the classical economists generally understood that subsistence,  $s$ , had a large culturally determined component to it. It was not determined by mere survival in the wild. Thus, during periods of rising real wages following an upward rotation in  $F$  workers might acquire a taste for the luxury goods they were now able to afford, which could induce them to reduce their fertility in order to continue to afford such goods. Malthus began to speak of the “standard of wretchedness” rather than subsistence. Such a standard would serve the same analytical function in that population would tend to fall when real wages fell below the standard. However, since this standard now is largely subjective, the mechanism works as a rational choice one rather than as the result of biological necessity. Hence the sophisticated model allows for an upward rotation of  $N$  as well as of  $F$ :

*The ‘sophisticated’ model*

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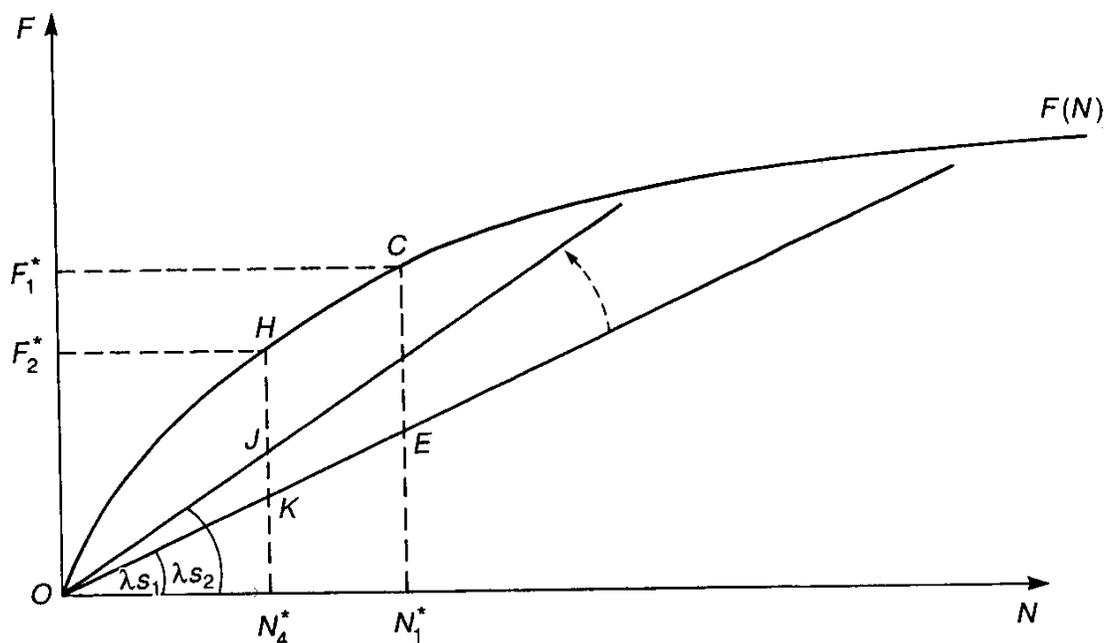


Fig. 8. The operation of the ‘preventive check’.

(Waterman, p. 271)

*Ceteris paribus* a rising “standard of wretchedness” reduces the equilibrium population and raises the real wage.

As Boulding has shown the Malthusian model is a general one, which is capable of a wide variety of behaviors, not all of them pessimistic. With continuous improvement in agriculture and with a continuously increasing taste for luxuries driving fertility rates down, a continuously rising population is compatible with rising real wages, thus completely defeating the dismal theorems. Waterman’s latest reconstruction of Malthus on high wages reaches similar conclusions. (2012) Malthus certainly recognized and hoped for this possibility. Indeed, later classical economists, such as Nassau Senior, considered it the normal tendency in a modern commercial society. (1828, *Two Lectures*)

Malthus was not as sanguine as some of his contemporaries that the preventive check would spread throughout the working classes without the aid of state sponsored education, and he continued to believe, despite the growing evidence to the contrary, that the power of population was always and everywhere stronger than the power of production of subsistence. Population growth could overwhelm the latter at any time.

However, Malthus did recognize that this was much less likely in a society of personal responsibility, which to him entailed the institutions of private property in land and capital, marriage, and abolition of the contemporary English welfare system. Given these, he recognized that a gradual progress toward higher material welfare was occurring and was sustainable in principle. This cautiously optimistic scenario is not normally what we think of as “Malthusian”. Thus the sophisticated model as a general system may or may not yield “Malthusian” results. To the extent that Malthus believed in the power of prudential forethought and of responsibility for one’s own offspring to check fertility, Malthus was not very “Malthusian” if we take the “Dismal” and “Utterly Dismal” theorems to in some sense capture the essence of Malthusianism.

Population growth under conditions of land scarcity and open access results in an equilibrium of human misery. This is Thomas’s ecological model. The sophisticated model is a general model of a commercial society with traditional Judeo/Christian marriage. This is Robert’s sophisticated model. Malthusian results of population pressing on food yielding subsistence living necessarily follows from the assumptions of Thomas, while Robert yields such results only in the early and rude state or in a commercial society if diminishing returns overbalances technical change and capital accumulation or if a taste for luxury or the ability to think ahead to future consequences fails to emerge in a sufficient percent of the population. In short, the path of population, resources, and standard of living is an empirical matter.

Robert did make use of Thomas’s model, but as a thought experiment against Godwin and Condorcet, and he used it against the English Poor Laws, but he did not believe it was an adequate representation of population and resources in an advanced state. While Robert backed off of the outrageous polemics of the first *Essay* by allowing that not all preventive checks were immoral, the contrast between the two equilibria of the model (state of equality vs. civilized state) is present in the first edition.

The model’s affinity with the modern theory of open access common property resources highlights the foundational role of institutions in Malthusian population dynamics. For both Robert Malthus and new institutional economists, the misery of a population expanding into an institutionally unconstrained physical environment provides the background for a theory of property rights, of self-governing systems of social control, and, especially for Robert a theory of fertility under the constraint of marriage. The dismal theorems depict a state of nature without institutions, a nuance unfamiliar to Thomas.

In contemporary thought historically illiterate economists have dismissed Thomas, or relegated him to the special case of the Malthusian trap.<sup>6</sup> At the same time

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<sup>6</sup> Perhaps I should insert a clarifying remark here. In drawing the contrast between Thomas’s institution-less model and Robert’s “new institutional” model I do not want to imply that the misery of over-population Robert postulated as the consequence of returning to the state of nature (or, in modern terms, the misery of the tragedy of the

theories of the demographic transition, the economic theory of fertility, and the macro dynamics of growth and resource scarcity have developed along lines that would be congenial to Robert. And he certainly would have had no problem grasping the “tragedy of the commons” and the new institutional approach to common pool resource problems.

However, the ecological model, which is usually associated with the historical Malthus seems to be alive and well among modern ecologists and environmentalism understood as an intellectual system of thought, not the political movement itself. The following quotes and concluding remarks suggest the direction in which I am developing the “two Malthuses” theme into a critique of modern neo-Malthusianism, which seems to me to be the dominant worldview of the environmental movement.

Slopes were stripped and planted to corn which, like *syphilis*, has been one of the most potent contributions of the New World to civilization. It is probable that corn, under modern methods of cultivation, has caused more *misery* than the venereal disease. (1948 William Vogt, *The Road to Survival*, 33; emphasis added; note the utterly dismal theorem)

The battle to feed humanity is over. In the 1970s the world will undergo famines—hundreds of millions of people are going to starve to death in spite of any crash program embarked upon now...We must have population control at home, hopefully through a system of incentives and penalties, but by compulsion if voluntary methods fail. (1968 Paul Ehrlich, *The Population Bomb*, p. 11)

The increase in consumption and human population coupled with increasing misuse of natural resources has led to serious degradation of the environment and threatens natural ecosystems and human societies which depend upon them. (2010 *SLU Catalogue*, ENV5 description, P. 110)

Blind to the need of co-operating with nature, man is destroying the sources of his life. Another century like the last and civilization will be facing its final crisis. (1950 Fairfield Osborn, *Our Plundered Planet*, 37)

In the early 1970s, the leading edge of the age of scarcity arrived...a period of environmental and social decay has begun. (1974 Paul Ehrlich, *The End of Affluence*, p. 7)

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commons) means that all actual human societies when faced with the problem will *necessarily* be able to develop appropriate institutional responses to it. Easter Island, for example, stands as the “poster child” for institutional failure leading to population and resource collapse. Nor do I want to imply that establishing the institutions of civilized society means that the preventive check will *automatically* be practiced and the positive checks of the ecological model will *automatically* disappear. Malthus didn’t think so, and neither does anyone else. Hence the idea of the Malthusian trap, of a population stuck in a subsistence equilibrium as in the ecological model.

The rate of increase is now approximately 1 per cent per year. If this rate were to be continued, it would mean a doubling of the present world population in about seventy years. Obviously changing conditions in many countries will affect the rates of increase within the next few decades, yet students of population point out that by the end of this century there may be still another half-billion people on the earth and that the world population in a hundred years may considerably exceed the three billion mark. (Osborn, 40)

The modern medical profession, still framing its ethics on the dubious statements of an ignorant man who lived more than two thousand years ago-ignorant, that is, in terms of the modern world-continues to believe it has a duty to keep alive as many people as possible. In many parts of the world doctors apply their intelligence to one aspect of man's welfare-survival -and deny their moral right to apply it to the problem as a whole. Through medical care and improved sanitation they are responsible for more millions living more years in increasing misery. (Vogt, 48)

There are too many people in the world for its limited resources to provide a high standard of living. By use of the machine, by exploitation of the world's resources on a purely extractive basis, we have postponed the meeting at the ecological judgment seat. The handwriting on the wall of five continents now tells us that the Day of Judgment is at hand. (*ibid.*, 78)

The straightforward way of striking the balance is nature's method of creating an excess and then killing it off by plague or starvation. Malthus himself, and other more recent writers also, have attempted to propose solutions which should allow us to escape from this threat, but nobody has found one which is at all convincing. It follows that in the very long run of a million years the general course of future history is most likely to be what it has been for most of past time, a continual pressure of population on its means of subsistence, with a margin of the population unable to survive. (1952 Charles Galton Darwin, *The Next Million Years.*)

I conclude with two observations. First, the ecological model is alive and well in the modern environmental movement and widely taught in environmental studies programs (this is a hunch, not as yet documented). Second, these passages are not thought experiments, they are clearly meant to be statements about the world as it is. The thought experiments come in the form of "if current trends continue", which has been legitimized in the minds of the educated public as *Limits to Growth*. These "thought experiments" are not scientific. They do not contain refutable hypotheses, since it is always impossible to check the "next 100 years" or "next 1 million years" against the data. No conceivable event is incompatible with any "prediction" about the *next x* number of years. They are, therefore, incorrigible with respect to any fact, such as the original LTG predictions about resource availability having already proven false. It does not matter what years are put on the horizontal axis.