POPULATION GROWTH AS A PROBLEM IN THE PUBLIC SPHERE: CURRENT STATE OF PLAY AND FUTURE PROSPECTS

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(ABSTRACT)

Eight contemporary population growth (PG) thinkers serve as a representative sampling of the cross-section of current PG ideas. Using the philosophical models of problems provided by Laudan (1977) and Nickles (1978, 1980a, 1981), these eight PG spokespersons are shown to have different conceptions of what a "problem" is. Such differences are shown to have significant impact in ordering the present PG debate. In particular, these differences are a source of incommensurability and/or disagreement among the thinkers. They are also entail that alternative senses of the "real problems" are being considered. The final chapter recommends a framework which will improve PG discourse as it presently stands. Emphasis is placed on interaction of the spokespersons, integration of other literatures (in particular, ecological economics and feminist scholarship), and delivery of argument.

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Without the support of my family, my professors, my friends, my dog and my experience at Camp Artek, I probably would not have had the necessary initiative and desire to finish many of life's endeavors. I have been fortunate to have been surrounded by loving, caring, and dedicated individuals. This work is but a manifestation of the collective support that I have received over the years. So I am obliged to thank the following people for their insightful comments and guidance: my mother, Barbara A. Major, and my father, David W. Schwartzman, who have always encouraged me; Huong M. Hua, who has been an understanding companion, not to mention a formidable scrabble and pinochle opponent; my grandparents, Helen Major and Max Schwartzman, who have taught me many lessons in tolerance; Sam Junge, who has allowed me to experience brotherhood; Jo-Ann Sherwin, who has provided me invaluable advice; and Kyoto, who kept me sane--some might disagree--for more than a year while in Blacksburg. Special thanks must also go to Steve Fuller who has been a very entertaining and intriguing discussant. I also would like to thank Bruce Wallace for his instructive comments. To all of those I have not explicitly mentioned, you know who you are, I thank you as well. And last, I want to acknowledge that I, Peter Schwartzman, and I only, am responsible for any misstatements, misspellings, or misusages contained in this document.

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Chapter 1
INTRODUCTION

According the United Nations the world population in 1990 was 5.29 billion people. A more important statistic, however, is the distribution of population in terms of development. Less developed countries (LDCs) constitute 4.09 billion (about 77%) of the total while the more developed world (DCs) has 1.21 billion (about 23%). But perhaps the most important figures, at least in terms of its prevalence in population discussions, are the rates of population growth, which the U.N. projects as 2.08% (for the LDCs) and 0.48% (for the DCs) annual growth from 1990-1995 (UNPF 1991, 39).[1] If these rates remain relatively stable for the next seventeen years, and there is fair reason to believe they will, the world in the year 2010 will have 7.50 billion people, of which 6.17 billion will live in the LDCs and 1.33 in the DCs. "So why fret?," someone might interject. To some this might be an appropriate response, but for others it is an entirely misguided one, and one that could spell disaster for many humans, and soon thereafter, all of humankind. In a nutshell, this response and

[1]Although the percentage growth will be over five times greater in the LDCs, there still will be growth in the DCs. And given that people in the DCs have a greater impact on the environment by virtue of their higher energy and material consumption, one should not get the impression that the population growth in the DCs is insignificant.

the vigorous attacks on it constitute what is known as "the population growth (PG) debate."

Discussions about population (at least that which remains on record) date back to classical Greece. At that time, population was a sign of strength both at the familial and the state level. States (e.g., Athens and Sparta) had population policies, similar, in fact, to some found in the world today. For example, Aristotle notes how men were persuaded to have large families, ". . . he who had three children should be excused the night watch, and that he who had four should pay no taxes." (in Hutchinson 1967, 9) However, after the Pelopponesian War (434-404 B.C.), serious questions began to be raised about the desirability of further PG. The reason was that the Greeks were confronted with pressing political and economic concerns;

> the former outlets of trade and migration were closing or already closed by the filling up of the desirable colonial lands, trade rivals had appeared, Asia Minor was increasingly dominated by the Persians, and the western Mediterranean was being blocked off by the expansion of Carthage and Rome. (Hutchinson 1967, 10)

Not surprisingly, a debate ensued and the "population debate" made its appearance into the historical record.

Though population remained an object of interest from classical Greece well into the Middle Ages, only "rudimentary" analyses were conducted prior to the seventeenth century, the early part of which was the "period par excellence of

populationist theory and policy." (Hutchinson 1967, 28) By the year 1800, largely as a result of contributions made in England and France, remarkable strides had been made in establishing the structures for the two competing sides (viz. optimism and pessimism) of the population question, including the relation between population and food, the notion of approaching a limit, the geometric character of PG, and the concept of checks. However, it wasn't until 1798 that the most significant work, as indicated by its numerous citations in contemporary PG-related literature, was published. In that year, Thomas Robert Malthus (1766-1834) anonymously submitted *An Essay on the Principle of Population* for publication. In this work, Malthus contends that population increases more quickly than the means of subsistence. Central to this contention is his conception that while population was capable of growing at an exponential rate, subsistence could only be expanded at an arithmetic rate. This formulation has been helpful to many thinkers, including Charles Darwin, who, upon reading the *Essay* began to "appreciate the constancy of the pressure behind the competition for food and space--a constancy essential to his own theory of species selection in nature." (Winch 1992, xi) According to Winch (1987), Malthus' name has so dominated later PG discussions because he was the first "to present as a universal and perpetual dilemma" the idea that

> the prospects for permanent improvement in the condition of the mass of society in all countries was placed in a precarious balance by an unequal race between the hare of population growth and a tortoise representing the power to expand food production. (1)

As amazing at it may seem, we now have sufficient historical context for engaging in the discussion which follows, as the PG thinkers at the core of this investigation very rarely mention the names of other authors or thinkers who have written on the question of population prior to the 1960s. In fact, the relatively simple Malthusian relationship gets so much attention that one begins to wonder whether contemporary PG thinkers are cognizant of the numerous population tracts published in the last 200 years.

But why be concerned with PG discourse now? The Earth Summit (officially designated the U.N. Conference on Environment and Development (UNCED)) held in Rio de Janeiro in the June 1992 is just one of many recent indications that environmental issues are getting serious attention by the majority of world leaders. Along with this renewed interest, one finds an increased intensity in the debates regarding numerous environmental questions. International discussion is further complicated by the ever expanding nature of environmental considerations--contemporary examples include the hole in the ozone layer and biodiversity. Inextricably related to these environmental matters is the question of

population growth, which is no less complex. According to Nafis Sadik, Executive Director of the U.N. Population Fund, PG issues are central to any discussion of forces impacting the environment (UNPF 1991, 3). And although there is wide disagreement on how continued PG might affect the environment (as will become increasingly clear from the positions presented later), there is general agreement that, outside of an extraordinary (even apocalyptic) development in the near future, increasing the size of the population will inevitably require more sacrifice on the part of the environment. At the 1992 Earth Summit, there was general consensus that the PG issue would need to be addressed, despite the hesitations and the difficulties of doing so (Holloway 1992). With this motivation, I have set to answer "How might the PG discussion proceed more constructively?" This is my ultimate question, and the one I attempt to answer by providing a framework for PG discourse (found in chapter 4).

But before suggesting a framework for PG discourse, I first need to engage the details of the PG debate. Relevant PG sub-questions include: Will the present trends in population expansion continue, which promise to put 10 billion people or more on the earth by the middle of next century? What will be the repercussions of such a development? Need we be concerned? And if the future looks bleak--i.e. wrought with extensive famine and pestilence--what steps can our present civilization

take to insure that our species will continue to survive on this Earth well into the future? Fundamentally, what type of world do we want to live in and what means are available to reach that goal? This is not an easy question--only the ends and means of life--but one that needs to be asked now, if not into perpetuity. PG thinkers are currently in the process of asking many of these and similar questions. This work will focus on the arguments and thoughts of the following PG thinkers: Lester Brown, Barry Commoner, Paul Ehrlich, Bernard Gilland, Garrett Hardin, Herman Kahn, Robert McNamara, and Julian Simon (see Table I and Table II, found in chapter 2, for a brief description of these thinkers and their positions). One major task of this thesis is to outline and analyze the arguments of these eight contemporary thinkers on population growth. Only with a sufficiently broad introduction to these thinkers' claims, assumptions, ideologies and values, communication patterns, and subjects of neglect can one expect to have much to contribute to the discourse.

But why eight thinkers and why the above eight? In selecting which PG thinkers to concentrate on, I made a special effort to assemble a group whose members met the following three criteria: (1) be well-known for their work in matters relevant to PG; (2) they provide coherent, detailed, distinct, and relevant arguments; and, (3) they come from a variety of disciplinary backgrounds. Let me explain the

intention and substance of these criteria. The first criterion selects for prominent spokespersons of PG matters, as indicated by their being cited in recent third person literature (see Paehlke (1989), Mann (1993), Russett and Starr (1985), Repetto (1987), Wagar (1991)).[2] The second criterion selects for thinkers who discuss germane PG topics (from the perspective of policy) but whose views do not overlap too much. Criterion three selects for thinkers who have different senses of what information is relevant to PG, as this is expected to have considerable influence on a person's outlook (worldview). Much third person literature draws on disciplinary distinctions for important findings, although I

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[2]As way of indicating how "popular" these gentleman are both in social science as well as science literature, I now present the results of a brief citation analysis of my eight PG thinkers. Number of citations, excluding self-citations, (in parentheses after the corresponding year(s)): **Social Science Citation Index** (SSCI) (Brown 1976-80 (32), 1981-85 (40), 1990 (28), 1991 (25); Commoner 1976-80 (127), 1981-85 (70), 1990 (10), 1991 (19); Ehrlich 1976-80 (42), 1981-85 (10), 1990 (6), 1991 (17); Gilland 1976-80 (3), 1981-85 (3), 1990 (0), 1991 (1); Hardin 1976-80 (214), 1981-85 (235), 1990 (67), 1991 (82); Kahn 1976-80 (123), 1981-85 (74), 1990 (6), 1991 (7); McNamara 1976-80 (7), 1981-85 (10), 1990 (0), 1991 (0); Simon 1976-80 (17), 1981-85 (105), 1990 (18), 1991 (21)); **Science Citation Index** (SCI) (Brown 1975-79 (7), 1980-84 (7), 1988 (6), 1991 (21); Commoner 1975-79 (52), 1980-84 (21), 1988 (3), 1991 (0); Ehrlich 1975-79 (14), 1980-84 (4), 1988 (1), 1991 (7); Gilland 1975-79 (0), 1980-84 (1), 1988 (0), 1991 (0); Hardin 1975-79 (94), 1980-84 (56), 1988 (9), 1991 (26); Kahn 1975-79 (27), 1980-84 (19), 1988 (0), 1991 (1); McNamara 1975-79 (2), 1980-84 (1), 1988 (0), 1991 (0); Simon 1975-79 (0), 1980-84 (9), 1988 (1), 1991 (6). Clearly not all of the thinkers were chosen because they were "popular." In particular, Gilland and McNamara were chosen primarily because of their unique disciplinary perspective.

think that some of these are unfounded (as I discuss later). In terms of the number, the *eight* thinkers listed above[3] satisfy the above criteria while allowing for a reasonably straight-forward discussion;[4] additional vantage points might have clouded the picture more than necessary. I feel confident that I have set up the playing field for the PG debate because many works (including Bailey (1990b), Boyce (1990), Dunlap (1983), Mann (1993), Paehlke (1989), and Russett and Starr (1985)) tend to draw the boundaries in much the same way.[5] A more expanded version of this thesis, perhaps in the form of a book to follow, would undoubtedly include a more extensive account of PG thinkers from Third World, minority, and underprivileged communities.

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[3]From this point on, PG thinkers, PG spokesperson, PG voices, etc. will refer to only these eight figures.

[4]A few other methodological comments deserve notice. In my attempt to determine who the major spokespersons of PG were I referred to the Infotrac Expanded Academic Index. This index contains literature, published between January 1980 - February 1993, from a wide range of scholarly (e.g., *African Studies Review, American Journal of Physical Anthropology, Ecology, Soviet Geography, American Demographics, Far Eastern Economic Review, UN Chronicle, and the Bulletin of Atomic Scientists*) as well as more popular (*The Atlantic Monthly, Science Digest, The Futurist*) periodicals. Under the heading of "population growth" there were 250 articles mentioned, 24 of which I read fully (as the overwhelming majority of the articles were on peripheral subjects) and 12 of which are included in my reference section.

[5]My account however is much broader in scope and a much more thorough examination of the thinkers' ideologies, assumptions, omissions, and communications.

Despite the fact that all eight spokespersons happen to be men, Caucasian, and from Western traditions, I feel that their views still adequately represent a large spectrum of ideas on PG.[6] There definitely exist areas where their ideas are lacking and these will be described when appropriate. In fact, one of the goals of my research is to identify and draw on those ideas, although prominent or even central in other literatures, that have particularly important implications for PG conceptions, but are lacking within the PG discourse.

A second focus of this thesis will revolve around the PG thinkers' conceptions of "problem." Whether we, as conscientious, dedicated, truth-seeking individuals, perceive a need to protect ourselves (or others) against a so-called "population explosion" depends on how we delineate and delimit the problems at hand. Policy decisions, in the form of referenda, laws, treaties, or embargoes, require discourse on the relevance and cogency of various arguments and positions. The substance of each of these arguments depends on how the problem is posed.

Given the particular importance that I attach to how the problem of PG is posed, and given that the PG thinkers come at

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[6]While a few Third World thinkers of PG do find their way into my thesis, the majority of works used are from Western sources. However, many of my eight thinkers draw on Third World perspectives of PG in their works, in particular Commoner (1992) and Brown et al. (1991).

the issue with a wide variety of background assumptions and disciplinary frameworks, I endeavor to examine the substance of PG thinkers' arguments using existing models of problems as a means of understanding important differences found within PG discourse. Specifically, I introduce ideas from two modern philosophical models of problems--Laudan (1977) and Nickles (1978, 1980b, 1981), in order to draw on a few of their structural elements. Among those concepts which are the most important for our purposes include Laudan's categorizations of conceptual/empirical problems and solved/unsolved/anomalous problems and Nickles' account of constraints on problems. Importing these structural elements into the PG discussion directly is not possible however, because the problems Laudan and Nickles were considering are of a different sort than those generally found in PG matters, in that PG problems are coming *to* science and not *from* science. But importing these structural elements, once qualified, into the PG discussion has great utility. By providing evidence for the following claims: (1) some thinkers take as empirical what others consider conceptual (and vice versa); (2) different views exist as to whether specific problems are solved, unsolved, or anomalous; and (3) the thinkers' constraints are equivocal and sometimes ideological in nature; I substantiate a principal conclusion of this work, i.e., that debates over the effect of population growth on the earth and its inhabitants have been

inconclusive because the parties to these debates operate with alternative conceptions of what a problem is, and hence alternative senses of the "real problems" that need to be addressed. And, consequently, the current state of play prevents any unequivocal evaluation of the arguments made by the various sides.

And as alluded to earlier, my last, and most important, aim is to provide a framework within which PG discourse may become more focused and purposeful. This framework will be based on both a quantitative and a qualitative analysis of the PG thinkers' outlooks. In quantitative terms, I will assign a positive or negative numerical value to measure the strength and direction of the causal relationship that each thinker perceives between PG and other socially relevant environmental factors (e.g., food, ecological stability, etc.). More qualitatively, I will assemble the ideologies, assumptions, and omissions found in the thinkers' accounts with an eye toward offering recommendations meant to improve PG dialogue. These recommendations will focus on three areas of PG discourse--character, content, and domain of argumentation--and are directed not only to the eight spokespersons highlighted in this thesis, but also to other thinkers who may enter the PG discussion now or in the future. With this introduction, let me now outline the structure of the thesis and briefly reiterate the major goals of each section. Chapter

2 consists of an short piece on each of the eight contemporary PG thinkers followed by an analysis section. The analysis section attempts to lay out the central elements in their conceptualizations of PG. Special attention is paid to their critical claims, their underlying assumptions and values, their communication patterns, and the neglected features of their accounts.

Chapter 3 begins with an articulation of Laudan's (1977) and Nickles' (1978, 1980b, 1981) models of problems. These models, although developed in reference to problems found in the natural sciences, provide important conceptual structures for future PG discussion. The second half of chapter 3 is dedicated to showing how the PG thinkers are working with different conceptualizations of problems. Further, these differences are shown to have negative implications for constructive PG debate.

The final chapter, chapter 4, is broken into three sections. Each section serves as part of a recommended framework for future PG discourse. Section one consists of a quantification of the thinkers' views, specifically in terms of the causal relationship of PG and many societal elements (e.g., food, pollution, morality, equality, etc.). Section two draws on the ideology, assumptions and omissions (as articulated in chapters 2 and 3) of the thinkers to show that certain improvements in the character, content, and domain of

their argumentation will further the goals of PG discourse. The last section provides a brief outline of the potential implications of importing the ideas of two often overlooked intellectual traditions--feminist perspectives and ecological economics--into the PG debate. When taken together, the comments of this chapter will hopefully offer serious alternatives to the present structure and content of PG discourse.

Having thus presented an exposition of this work, I shall now try to put the reader in the proper frame of mind by briefly clarifying a few important points. In many ways a reflexive move, these clarifications are meant to give the reader a better idea of the nature of my analysis.

Some have simplified the population debate by describing it as a clash between polar communities--those who are think PG is a major problem facing humanity now and those who regard PG as unproblematic--a dichotomous move which I contend only confuses and obfuscates the central issues. There a few reasons why I feel this way. First, recent economics shows definite signs of support for the limits-to-growth model[7],

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[7]In simple terms, the limits-to-growth model means that the world's economy cannot grow forever because as the world's resources become scarcer, further use of those resources yields diminishing returns. The Club of Rome, a self-appointed group of economists, industrialists, and environmentalists which convened for the first time in 1968, introduced and articulated this model's major features (Russett and Starr 1985, 549). Among its assumptions were: (1) natural and social

suggesting that disciplinary outlooks change over time. Second, the views of the members of a professional group, such as "ecologists," "biologists" or "social scientists" tend to get treated as if they were uniform, which just isn't the case. Furthermore, divisions made along the lines of disciplinary association (e.g., ecologists/economists (see Simon 1987) or cornucopians/environmentalists (see Grant 1983)) or ideological stance (e.g., Cassandras/Pollyannas (see Mann 1993)) tend to underestimate the true continuum of views which exist.[8] In no way am I suggesting that there do not exist institutional biases which predispose a group of individuals to conceptualize the world in a certain way and not another. Nevertheless, recent work in both ecology and economics indicate that a great deal of integration is not only possible but can result in some very enlightening commentaries (see Cobb & Daly 1989, Boulding 1992, Daly 1986, Hamrin 1980). In order to avoid such stereotyping in this

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resources are finite; (2) consumption will continue at current rates; and (3) techno-fixes are unlikely phenomena. Among it conclusions were: (1) resources become more expensive; (2) many of the world's inhabitants cannot afford resources; and (3) massive decline in consumption (see the Club of Rome's *Limits to Growth* 1972).

[8]Mann (1993) actually notes that "the debate has spread between two poles" which are not restricted by disciplinary boundaries. However, he tends to overstate the disciplinary polarization of today's PG discussion.

work, I have refrained from categorizing the PG thinkers when lacking ample reason to do so.[9]

The policy implications of PG discussions, both as described in this thesis as well as more generally, are abundant. The policies that the PG thinkers want to influence range widely beyond PG per se (Tables III and IV in chapter 3 give one a sense of how varied the PG-related elements are and how diverse the relationships drawn can be). Thus, it appears that PG acts as a lightning rod for discussing any of a variety of environmental issues. That is, although the PG thinkers appear to be talking about PG, the way they talk about it (i.e., the multifarious contexts in which they locate PG) suggests that they really mean to focus on other issues. So even though PG itself may not be the chief matter of interest of the thinkers I deal with, all the them consider it sufficiently relevant to their more pressing concerns to dedicate a significant portion of their work discussing it specifically. This observation further supports my view that PG is a unique object of study in that such a large number of environmental considerations are so closely connected to it, allowing for a particularly edifying and revealing subject of study.

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[9]Actually, Chapter 2 is structured in a way that makes it appear that I am grouping the thinkers for purposes of polarizing the debate, while, in fact, no such desire exists. More on this later.

Population is also a subject that provokes strong feelings in organized religion. The promotion of celibacy, the forbidden use of human-made birth control devices, and the entire pro-choice/pro-life imbroglio are evidence of the degree to which population thinking is permeated with religious and spiritual principles. Though I recognize the significance of these values, due primarily to their prevalence in society, they do *not* find their way into our discussion, at least at any substantive level. This is the case, surprisingly, because such spiritual edicts really aren't the basis of support for the relevant arguments presented by the eight thinkers. Undoubtedly, any discussion of population at the individual level would require discussion of them to a much greater extent.

And finally, a further qualification of my account needs to be made. Traditionally, a strong component of population study has concentrated on straightforward demographics, including questions of population size, population density, population growth, population distribution and other vital statistics pertaining to the health of the populace. But our discussion will not emphasize the results of this vast literature. This is because, excepting the casual reference, the PG thinkers rarely make explicit mention of the work of professional demographers, the reasons for which might itself make an interesting research topic.

CHAPTER 2
Population Growth Thinkers: Their Concerns, Assumptions, Relations, and Omissions

Introduction

Recently I had a dream which, somewhat ironically, drove home many points critical to the PG question. In the dream, two young business scholars were standing on a crowded sidewalk somewhere in New York City. They announced to the public that they were going to hold a meeting. On their agenda this day was a discussion about a recently published environmental text. Despite their efforts, the young scholars were only able to persuade two people, a leading advocate of environmental matters and her son, to join them in the discussion. As the meeting began, one scholar asked, in a manner indicating that he knew little about it, "Does anyone have this book?" To the amazement of the scholars, the advocate raised her hand within which she held the text. In a disappointing air, the second scholar said to the first, "How are WE going to discuss this book with this woman who has apparently read the book cover to cover and then some?" At this point, possibly induced by the lack of constructive discourse, I woke up.

Surprisingly perhaps, this dream has much to say as we venture to discuss, in much greater detail, the various viewpoints of population growth. The following ideas should be

kept in mind during the discussion which follows. The advocate, holding the book high in her hand represents those who have knowledge by virtue of purchasing it and securing it; *information need not constitute knowledge*. Few members of the public feel interested or threatened by the topic; *participation need not reflect relevance and import*. Business students and ecological advocates interact; *thinkers on a specific subject may come from different fields and vantage points*. The advocate is considered omniscient in the area of environmental issues because she "knows" one recent work; *a chosen work need not be representative of the larger discussion* and *the novelty of a work doesn't give it precedence*. And finally, New York City is the home to the meeting; *such debates are not and should not be taking place only in the urban areas of the first world*. This dream is an allegory that captures the biases that I bring to the interpretation of the PG debates.

Upon a cursory inspection of the relevant literature, one easily surmises that there exist differences, as well as similarities, among the various spokespersons of population growth (PG). However, the relative ease with which one recognizes differences is not indicative of the effort required to get at the root of the different viewpoints. In a effort to come to a deeper understanding of the thinkers' differences, I will attempt to answer the following questions

in this chapter:

(1) What are the major reasons why PG is/isn't a problem?
(2) What are the critical claims upon which these reasons are based?
(3) What are the underlying assumptions and values?
(4) What communication patterns exist among the thinkers?
(5) What are the neglected features and why are they overlooked?

In what follows, I will answer these questions for eight spokespersons on the issue of PG. The order in which I examine each thinker's views is rather arbitrary but each figure scrutinized has something unique to offer the discussion. My review is by no means exhaustive of the material but I do make an effort to touch as many bases as possible within the limited space provided. As indicated in chapter 1, the personalities I will be dealing with are Julian Simon, Barry Commoner, Paul Ehrlich, Bernard Gilland, Garrett Hardin, Herman Kahn, Robert McNamara, and Lester Brown. A general discussion which answers the above questions in more specific detail will follow the brief overview provided of the major themes of each thinker.

The Voices

In order to start on the right footing, the discussion will begin with a highly controversial and unorthodox thinker of PG. Julian **Simon**, a professor of business administration at

the University of Maryland, has written extensively on the economic aspects of population. *Population Matters* (1990), one of his most comprehensive works, is a collection of bits and pieces of Simon's earlier work; a format which allows Simon to discuss the population question from many vantage points.

Simon holds that PG is in the long term (i.e. in the next 30-120 years (1990, 172)) a positive development. Other self-proclaimed unconventional ideas upheld by Simon are the following: (1) raw materials and energy are becoming less scarce; (2) the world's food supply is improving; and (3) the U.S. needs more immigrants. For the most part Simon defends these positions by referring to economic models (some of which he developed) and historical trends. Throughout his arguments he makes considerable use of tables and charts for support, generally ones that have been tabulated by reputable sources, who upon first inspection, would be unlikely to support his views, e.g. USEPA. Interestingly enough, Simon also goes to great lengths to articulate why it is that his propositions are overlooked or poorly received when they do get attention, stating emphatically that the messages which "his side" has promoted "have stood the test of time." (1990, 1)

In terms of specific arguments, Simon's thinking on PG is very intriguing. Resource shortages are not to be avoided. The main economic mechanism is as follows:

> PG and increase of income expand the demand for raw materials as well as finished products. The resulting actual and expected shortages force up prices of the natural resource. The increased prices trigger the search for new ways to satisfy the demand, and sooner or later new sources and innovative substitutes are found. Eventually these new discoveries lead to natural resources that are cheaper than before this process begins, *leaving humanity better off* than if the shortages had not appeared. (1990, 2) (my italics)

Moreover, the use of more resources and the creation of temporary shortages will result in a higher standard of living for those nations supplying these products, often the developing countries. Not surprisingly the notion of conservation as a definite good is a myth in Simon's account. He states, "the appropriate question is the best way to create resources, and whether it is cheaper to create more resources or to prevent use of resources and require saving of waste." (1990, 7)

As regards Malthusian theory (see page 3), Simon states that the evidence does not confirm the conventional theory, i.e. "the more people using a stock of resources, the lower the income of the person, if all else remains equal." (1990, 166) He notes the explosion of population and economic development in Europe from 1650 onward and the individual countries of Australia, Norway, and France as illustrative examples how output per capita and PG are not correlated. A fundamental fact of economic growth, which Simon claims has been left out of the standard (i.e. neo-classical) model, is

the increase in productivity that results from people's creative powers (1990, 171). Simon also supports the notion of "economies of scale," i.e. the greater efficiency of larger-scale production.

In sum, while he recognizes that in the short term there will be suffering of many forms, "on balance the long-run effects are positive." (1990, 1) His strong reliance on well-developed theory and data is evident when he says, "We wish to reach a conclusion that is warranted by the empirical evidence rather than resting on prejudice or intuition or metaphysical speculation or casual observation." (1990, 189)[10] His staunch pro-PG attitude is further exemplified in the following sentiment: the concentration on PG as the major cause of starvation, illiteracy, pollution, supplies of natural resources and slow growth "has directed our attention away from the factor that we now know is central in a country's economic development, *its economic and political system.*" (1990, 174)

Barry **Commoner**, a biologist currently directing the Center for Biology of Natural Systems at Queens College in New

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[10]Empirical evidence cannot always be assumed as valid criteria. Bruce Wallace, a biologist at Virginia Tech and member of the National Academy of Sciences, points out that William Shockley prefaced his argument that Blacks are intellectually inferior to Whites in much the same way.

York City, has authored three best-selling books--*Science and Survival* (1963), *The Closing Circle* (1971), and *Making Peace with the Planet* (1992). In the latter work Commoner describes the world as broken up into two spheres: the *ecosphere*, comprising the natural things in the world, e.g. air, water, soil, plants and animals; and the *technosphere*, consisting of man-made things, i.e. factories, power plants, automobiles, petrochemicals, etc. It is within this framework that Commoner proceeds with his arguments. To him the central issue humanity faces is:

> not how to facilitate environmental quality by limiting economic development and PG, but how to create a system of production that can grow and develop in harmony with the environment. *The question is whether we can produce bountiful harvests, productive machinery, rapid transportation, and decent human dwellings sufficient to support the world population without despoiling the environment.* (1992, 148)

Implicit in Commoner's remarks is a support of scientific and technological progress but one within the bounds (or limits) allowed by the environment. He also believes, unlike Simon, that economic growth has limits as well; he writes, "the ultimate limit on economic growth is imposed by the rate at which renewable, solar energy can be captured and used." (1992, 147)

Central to the Commoner thesis is the belief that the type of production technology employed determines the extent to which the ecosystem is destroyed. Further, PG, here not

seen as the root cause of environmental stress (1992, 175), tends to wither away as countries accrue wealth and "demographic transition" occurs, as has been characterized by all industrialized nations (1992, 156-7). Similar to Simon, social and economic factors are seen as equally powerful as biological factors (i.e. fertility and contraception) in the determination of PG. Although, Commoner warns that the future looks bad because distribution still poses a serious problem and energy use by developing nations will be outrageous, the environment, and, hence, its people, could be spared if "ecologically sound technologies" were utilized (1992, 166). But the major source of the present "overpopulation" rests not on scientific choices but political ones. Commoner writes,

> the world population, which is the ultimate outcome of the exploitation of poor nations by rich ones, ought to be remedied by returning to the poor countries enough of the wealth taken from them to give their peoples both the reason and the resources voluntarily to limit their own fertility. (1992, 168)[11]

A biologist at Stanford University and author of best-selling books, Paul **Ehrlich** represents a third viewpoint on

[11]Kahn (1976) feels the notion that the rich are taking from the poor is pure propaganda, "contrary to the facts and counterproductive." (115)

the subject of PG.[12] Of his many books, the best selling (Paehlke 1989, 55) are *The Population Bomb* (1971), and more recently, its sequel, *The Population Explosion* (1990, co-authored with his wife, Anne Ehrlich). In these works, Ehrlich attempts to delineate the crisis state he envisions arriving in the near future. Due to the ever-expanding population of our world, he predicted in 1967 that "sometime between 1970-85 the world [would] undergo vast famines--hundreds of millions of people are going to starve to death." (in Hardin 1985) The resulting tragedy would occur because the population density in many parts of the world would make insufficient the available resources and the capacity for the environment to sustain human activities (1990). In response to these ominous developments, Ehrlich supports population control and government intervention of many forms.

Concomitant with starvation, problems including flooding, desertification, water shortages, and other stresses on ecosystems, are, in Ehrlich's view, inevitable. Ehrlich states that all nations are overpopulated, and such a condition necessitates the unequal access to wealth and resources that we observe today (1990, 39). Thus, PG isn't seen as a problem

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[12]Ehrlich is Bing Professor of Population Studies at Stanford and member of the National Academy of Science, as well as co-founder (in 1968) and honorary president of ZPG (zero-population growth)--an organization "that works to achieve a sustainable balance between population, resources, and the environment." (Waddell, 3)

of redistribution but rather an overabundance of people, some with too much wealth, who have reached critical mass, i.e. reached a stage where I, in the equation I (impact) = Population x Affluence x Technology[13], has become increasingly large (1990, 58).[14] As evidenced by the subject matter of his work, Ehrlich, unlike Simon, is also cognizant of the connections between warfare, environmental deterioration, poverty, racism, sexism, smog, and crime. Further, he makes explicit the need for understanding the world from alternative perspectives: "we must learn to identify with the plight of our less fortunate fellow on Spaceship Earth if we are to help both them and ourselves survive." (1971, 2) However, his unrelenting focus on

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[13]The unit of I, as given by Ehrlich and Holdren (1972) and Commoner (1972), is the amount of pollution, which is arrived at by multiplying P (population), A (production (or consumption)/population), and T (pollution emitted/production (or consumption)).

[14]Paul and Anne Ehrlich are credited with coming up with this equation (UNPF 1991, 12), which simply expresses that the major factors contributing to environmental impact are to be multiplied rather than added when accessing total impact. In Ehrlich and Holdren (1972), this equation is discussed at great length in order to discredit Commoner's (1971) account for putting too much emphasis on the impact of technology.

population as the major source of many of the world's problems has prompted many to pejoratively call him a "population reductionist" (see Swaney (1991, 502) and Boyce (1990)).[15]

Bernard **Gilland**, in his book *The Next Seventy Years* (1979), attempts to outline what the critical elements will be through the middle of the next century in the areas of population, food and resources. According to Gilland, a practicing civil engineer, there are two aspects to the problem of food-population. First, the inhabitants of the developed countries tend to eat well while the populace of the less-developed countries (LDCs) (constituting about 3/4 of the world's population)[16] doesn't, i.e. they consume less than adequate quantities of calories and protein. Second, the populations of the LDCs may potentially increase four fold before stabilization is achieved and as such, per capita food supplies must be maintained for their survival.

As may be intimated by these remarks, Gilland adamantly

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[15]In fact, Swaney (1991) accuses both Simon and Ehrlich of population reductionism, in that, "both overemphasize the *number* of people, obscuring the fact that the *behavior* of people matters more." (505)

[16]In 1990, 77.2% of the world lived in "less developed regions," as noted in chapter one (UNPF 1991). However, Gilland is perhaps overstating his case that the substance of one's diet can be ascertained strictly from one's national identity. There are wealthy people in the LDCs who eat "western" diets and there are those from the DCs whose diets who are inadequate.

maintains that the developed world suffers little or nothing from the Malthusian threat, i.e. PG inducing resource depletion which ultimately produces a crisis situation. On other hand, the LDCs are approaching a critical juncture, and "political relaxations must occur for the necessary technologies to be of use, a development which requires foreign assistance." (1979, 97) And while he doesn't blame the developed countries for the current sad state of affairs in the LDCs, if funding were necessary, Gilland thinks it "inconceivable for industrialized countries to choose to sacrifice several trillion dollars to the LDCs." Further, he finds "the infrastructure in most LDCs is altogether inadequate to enable them to effectively utilize a rapid increase of development assistance." (1979, 97)

Gilland predicts that the global dichotomy (developed vs. less-developed nations) will exist until well past the year 2050. And given that he thinks that there is only sparing evidence that any specific set of economic conditions are necessary for falling birth rates (1979, 6),[17] the prospects

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[17]The relationship between socio-economic position and population rate is a controversial one. A great number of low PG nations seemingly got where they are through economic growth of one sort or another. But exceptions exist as well. Kerala, a state in the southwest coast of India, has a amazingly low GNP (if it were a country it would be the ninth poorest in the world) but has a relatively low birth rate (about 2/3 that of India as a whole and half that of other low-income countries) (Ekins 1992, 79). Perhaps there is more to low PG than economic success and mobility.

for future stabilization are increasingly unlikely. Under these circumstances, some LDC's are doomed to natural population decline in the form of famine and disease (1979, 96).

Known best perhaps for his short article "The tragedy of the commons" (1968), Garrett **Hardin,** an ecologist at the University of California at Santa Barbara, has received much notoriety. As an arch supporter of population control, Hardin has taken controversial positions, as indicated by the following statement:

> How can we help a foreign country to escape overpopulation? Clearly the worst thing we can do is send food. . . . Atomic bombs would be kinder. For a few moments the misery would be acute, but it would soon come to an end for most of the people, leaving a few survivors to suffer thereafter. (in Commoner 1992, 167)

According to Hardin, strict governmental regulations are necessary to curb the world's ever expanding population.

On numerous occasions Hardin refers to the lifeboat as analogous to the world's current status. Since the lifeboat has a maximum weight above which it will sink, Hardin contends that a sizable portion of the original passengers must be left to drown; "It is literally beyond our ability to save them all." (in Commoner 1992, 156) This severe form of triage is defended without hesitation or remorse and by necessity.

Hardin conceives of PG as problematic in that the

"commoner" following a rational, self-interested logic thinks she is better off if her family grows. Unfortunately, those who, recognizing the limits to which society can exploit the environment, decide to abstain from procreation are the ones who suffer ultimately. They must suffer because the large majority of society continues to overpopulate and thus wreak havoc on the earth. Along these lines, Hardin attacks Adam Smith's concept of "invisible hand" as ludicrous and unfounded (1968, 1244).

Finally, Hardin classifies the population problem as a "no technical solution problem," i.e. requiring not only change in the techniques of the natural sciences but also change in values and ideas of morality (1968, 1243). The necessary reductions in population, the root cause of environmental damage, will therefore require a moral paradigm shift. But, since humans are characterized by their "persistence and ubiquity of denial" (1969a, 47), many of these changes will need to be coercive and limit personal liberty, especially the right to procreate. However, Hardin doesn't see this as so tremendous an alteration of society, stating that "the tragedy of the commons" has brought about similar regulations, including those on waste disposal and property tax.

Founder of the Hudson Institute, former RAND researcher

and practicing futurologist, Herman **Kahn** was an economist who has stubbornly insisted that the state should keep its hands off in terms of regulating the economy. Kahn's work includes the books *On Escalation: Metaphors and Scenarios* (1965) and *Thinking about the Unthinkable* (1962), which have been called "Cold War classics" and "leading examples of the militarization of 'future scenarios.'" (Ross 1991, 173) In 1976, Kahn co-authored an elaborate treatise, entitled *The Next 200 years*, on the world's future with respect to PG, economic development, energy, raw materials, food and the environment. Also, collaborating with Julian Simon, Kahn produced a collection of essays, *The Resourceful Earth: A Response to Global 2000* (1984), "systematically refuting the findings and policy recommendations" of *The Global 2000 Report to the President*, an involved project put together by the Council on Environmental Quality as Ronald Reagan entered the White House in 1980 for his first term (Wagar 1991, 37).

Kahn's view concerning PG is rather straightforward. He contends that many of the problems which the limits-to-growth position deems "insoluble," including energy, resource availability, and food, have, or will soon have, practical solutions. According to Kahn, the recognition by some of the woes of modern society can be attributed to a few factors. Either the data is misconstrued, administration is of a unnecessarily poor quality, or bad luck has taken its toll

(1976, 20). In the latter two cases, long-term prospects are very good with the

> opportunity and the foundation for an environment of relative peace and prosperity for nearly everyone, and hopefully one of relative joy and fulfillment as well. (1976, 8)

Moreover, the struggling nations of the world will ultimately "join the ranks of the coping [i.e. successful] nations" (1976, 211). And, since "the resources of the earth will be more than sufficient--with a wide margin of safety"--only gradual reductions in PG are necessary to bring about a greater prosperity for the world (1976, 26-27),

Robert S. **McNamara**, former US Secretary of Defense under Kennedy and Johnson, and former president of the World Bank, contributed a chapter, entitled "The Population Problem," in a recent U.N. Environment Programme publication (Tolba and Biswas 1991). In this article, McNamara begins with the premise that PG rates have been falling "significantly" in most developing countries during the 1970s. This observation entails for McNamara, unlike the conclusions drawn by Simon or Kahn, that more stringent reductions be made before population in many parts of the world grows "far beyond the limits consistent with political stability and acceptable social and

economic conditions." (McNamara 1991, 48)[18]

According to McNamara, inevitable byproducts of current PG are "rising numbers of labour-force entrants, faster-expanding urban populations, pressure on food supplies, ecological degradation, and increasing numbers of 'absolute poor' [i.e. people living beneath any reasonable definition of decency]." (McNamara 1991, 56) These expansionary ills, McNamara believes, cannot be adequately dealt with by vigorous improvement in economic growth. Unfortunately, McNamara continues, in the attempt to eliminate the problems associated with PG, brutal, inhumane, and coercive governmental and familial actions have been one of the major solutions. In response to these developments, McNamara thinks governments must take an active, yet humane, role, in so far as they encourage small families and provide ample means to implement that desire.

Self-congratulatory remarks about recent trends in PG, McNamara holds, do not serve in the interests of the world,

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[18]Eduardo Galeano (1973), a Third World historian, takes offense at McNamara's views on population control. Galeano feels that population controls, like those advanced by McNamara and others, aim

> to justify the very unequal income distribution between countries and social classes [and] to convince the poor that poverty is the result of the children they don't avoid having," (16)

both of which ignore the real cause of the Latin America's poverty, that being, the U.S.'s continual exploitation of its economy and people.

both rich and poor. The effects of PG will impact the developing world the greatest, but "ripple effects--political, economic, and moral--will inevitably extend to the rich as well." (McNamara 1991, 48) In this regard, McNamara feels that the entire world must now put aside substantial financial sums to combat the PG problem, before the price in dollars and lives skyrockets.

Lester **Brown**, currently president of the Worldwatch Institute, has published extensively on issues concerning agriculture, PG, and the environment. In 1974, while at the Aspen Institute, Brown published the book *In the Human Interest*, a thorough examination of PG, to serve as the major backdrop for the historical U.N. Population Conference held in Bucharest in August 1974. He has followed up this work with numerous Worldwatch Papers including the broad, yet impressively simple, work "Twenty-two Dimensions of the Population Problem" (1976, co-authored with Patricia McGrath and Bruce Stokes). Without question, similar to other voices we have heard, Brown has dedicated his life to resolving the PG-related questions.

Brown, like Commoner, breaks up the world into two parts. However, unlike Commoner, the divisions he sees are the rich/poor, the literate/illiterate, the overfed/hungry, and the affluent (consumption-oriented)/poverty stricken

(subsistence-oriented) (1974, 99). When deciding the ways in which PG cause distress to society, Brown examines the impacts on a large variety of elements, e.g. inflation, urbanization, deforestation, political conflict, etc. Upon doing so, Brown concludes that the myriad of relationships open for discussion are vast and deceptively complex. However, Brown warns us that single-minded analysis, as practiced by those who are overly focused on quantifiable demographic variables, has prevented many from seeing the breadth of consequences wrought by PG.

According to Brown, the problems manifested during times of PG will touch all. However, some problems are more likely to affect the developing nations more harshly, e.g. inflation. In order to rectify this predicament, Brown issues a plea for altering values and shifting priorities. In Brown view, fertility programs (e.g. family planning services) are the most productive way to deal with PG. Secondary, yet still important, are measures which would improve social conditions (e.g. nutrition and literacy) and reshape economic and social policies (minimum age for marriage and limiting tax deductions for procreators).

The following two tables (Tables I and II) provide a brief description of the above thinkers and their views on some of the more pertinent PG issues.

Table I--The PG Thinkers

Name	Disciplinary Background and Position(s) Held	Pro/Anti PG*
Lester R. Brown	Agricultural Science and Agricultural Economics, President of the Worldwatch Institute (1974-Present), Aspen Institute Fellow (1972-74)	Anti
Barry Commoner	Biology, Environmental Science and Geology, Currently Director of the Center for Biology of Natural Systems at Queens College in New York City	Pro
Paul R. Ehrlich	Biology, Bing Professor of Population Studies at Stanford University (1976-Present)	Anti
Bernard Gilland	Civil Engineering, Educated in London, Teaches in Denmark	Pro
Garrett Hardin	Ecology, Professor at UC-Santa Barbara	Anti
Herman Kahn	Physics and Mathematics, Founder and former Director of the Hudson Institute, former RAND researcher	Pro
Robert S. McNamara	Business Administration, President of the World Bank (1968-81), U.S. Secretary of Defense (1961-68), member of Brookings Institute	Anti
Julian L. Simon	Economics, Professor of Business Administration at the University of Maryland	Pro

*For a description of this categorization see page 38-9.

Table II--PG Thinkers' Views

Position Statements	Brown	Commoner	Ehrlich	Gilland	Hardin	Kahn	McNamara	Simon
Continued population growth will wreak havoc on the world.	S	U	S	U	S	R	S	R
Population growth is good for the economy.	R	U	R	R	R	U	R	S
Resource shortages function as a positive mechanism in the economy.	R	R	R	N	R	N	R	R
The proper use of technology in the future will have a tremendous impact on resolving most of society's present maladies.	S	S	R	U	R	S	R	S
The world is overpopulated.	U	R	S	R	S	R	S	R
Population control assistance from affluent countries to the developing world is required.	S	R	S	R	S	R	S	R

Key: S - supports, U - uncertain, R - rejects, N - no opinion offered

Having now introduced eight central figures in the area of PG, let us now analyze how these people, all of whom are apparently committed to the amelioration of our global predicament, have been engaging with the arguments and with the other participants. This analysis serves as a forum for relating the thinkers' PG outlooks, the significance of which will become apparent in chapter 4.

Analysis

(1) What are the major reasons why PG is/isn't a problem?

Although the voices have stated quite clearly why they think population is/isn't a problem, their reasons differ considerably, especially given the specificity of the question. In answering this and subsequent questions I have paired the thinkers into two camps, as given below. This is done for the sake of clarity and ideological convenience, as the camps have alternative views of the effects of PG.

Even among those who are adamantly opposed to PG and consider it a key liability to our future--i.e. the anti-PGers, namely Ehrlich, Hardin, McNamara, and Brown--there is contention over the primary reasons why it is so. Ehrlich focuses on the existence and perpetuation of famine. He also emphasizes the burden placed on the environment and the Earth and the resulting catastrophic effects on the ability of

humanity to survive. Hardin concentrates his concerns on the natural predisposition of many humans to procreate with reckless abandon. PG is a dangerous development because it has no technical solution and, thus, any potential solution requires moral and value shifts of immense proportions. And given that the prospects for these changes are slim, the population will eventually saturate the planet. McNamara puts less weight on any one particular area, although he does tend to stress that the number of people living under conditions of "absolute poverty," will do nothing but grow, especially in Africa, if fertility is not substantially reduced. Closely related to this sentiment is his concern that the gap between rich and poor will grow and result in an increase in inflammatory hostility among nations. Brown, like McNamara, stresses no set of consequences greater than any other. However, he interjects many more subjects into the discussion. He writes, "the population problem is not one but many. Its many facets often interact, amplifying each other." (1976, 79)

I characterize the other voices (i.e. the pro-PGers),[19] namely Simon, Commoner, Gilland, and Kahn, by either their positive regard for PG (Simon and Kahn) or their denial that

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[19]I am categorizing the thinkers as either pro-PG and anti-PG because it provides a useful symmetry for the discussion, one which classifies the thinkers based on whether they see PG as the key cause of the world's present and future problems.

population is the root cause of the world's problems (Commoner and Gilland). Simon, while recognizing that the short and middle term effects of PG may be unsettling, holds that moderate PG, in the long term, will have favorable consequences, according to his and other notable economists' models. He is also ready and willing to explain why his views are not readily accepted by the layperson. Commoner, who also doesn't see PG as the ultimate cause for current and future tensions, is supportive of the view that the choice and use of technological knowledge and artifacts contributes much more to the welfare of the world. In his view, "demographic transition" will take place within the developing countries as they accrue wealth, making PG a thing of the past. Gilland sees food, or the lack thereof, as the major reason why PG may in the long run be ruinous. But this concern is overridden by his belief that economic growth in the LDCs, spurred on by foreign assistance, would be a sufficient remedy. Kahn, à la Simon, rejects the idea that PG is fundamentally bad. He blames "public policy and resource allocation" for the current woes of the world.

As one can see for oneself, the primary reasons for why PG is bad or good vary considerably. Perhaps this is why little consensus exists on the matter.

(2) What are the critical claims upon which the above reasons are based?

Given the information provided in the previous question, we now expect to find similar differences in each thinker's supporting assertions.

Among the anti-PGers, there is little consensus about which claims are most relevant. Ehrlich holds that a doubling in population requires a doubling in other essentials, including food, roads, power, transport systems, trained doctors, and teachers, for living standard to remain the same (1971, 7). Concerning PG's effect on the environment he writes "social and environmental problems not only increase with growing population and urbanization, they tend to increase at an even faster rate." (1971, 17) Further, he maintains that

> regardless of changes in technology or resource consumption and distribution, current rates of PG guarantee an environmental crisis which will persist until the final collapse. (1971, 44)

Hardin's central assertions are slightly more forceful. He maintains that, everything else being equal, as population density gets too big, the natural chemical and biological recycling processes become overloaded. Along these lines, "only one thing can really help a poor country: population control." (in Commoner 1992, 145) And lastly, the prospects for resolving the population problem through the utilization of technology alone are nil.

McNamara's and Brown's claims are also strong, yet more moderate than Hardin's. McNamara asserts that predicted rates of PG in much of the developing world are inordinately above corresponding rates for social and economic advance. In McNamara's opinion, political instability engendered by PG pressures will cause governments and citizens to use more coercive measures of fertility regulation. And, lastly, McNamara maintains that the major barrier in resolving the crisis of population will not be the lack of comestibles, since it is not difficult to expand food resources using technology (McNamara 1991, 55). Brown connects with similar ideas. He sees chronic scarcity of many vital raw materials as a definite possibility in the near future. He also think that without substantial financial investment in the world's croplands, soils will continue deteriorate making future food supplies insufficient. And further, Brown senses that a sustainable society will be necessary to ensure human survival:

> Our prospects hinge ultimately not on our ability to tune economic policies, but on our success in stabilizing our numbers and protecting our environment (1982, 6)

The pro-PGers similarly have a wide variety of claims which they think are crucial to their outlook on PG. Simon's position rests on the following considerations: Raw materials and energy are and will be less scarce. The world's food

supply is improving (1990). And, PG results in "additional work input by parents in response to increased needs of more children, higher industrial investment in response to higher demand, and economies of scale." (1977, 11)

The assertions made by Commoner are of a different sort. He claims that

> the increasingly acute global environmental crisis can only be resolved by a comprehensive transformation of the present systems of production--in agriculture, manufacturing, power production, and transportation. (1992, 211)

Specifically, ecologically sound technologies are prerequisites for a stable society. Commoner is also adamant in his view that private enterprise precludes the public's long-term interests from properly being considered (1992, 193), in sharp contrast to Simon and Kahn who champion the cause of the free market. Moreover, in the effort to effectively reduce or eliminate hazardous and toxic chemicals from our *ecosphere*, Commoner feels that industrial regulations are insufficient and must be replaced with bans and increased funds for research on "safe" chemicals and methods.

Gilland holds that political and economic differences between the developed and less-developed countries are bound to constrain any positive moves toward joint equity among nations. In the LDCs, where future problems are likely to exist, Gilland sees a decline in per capita food production unless there is a rapid fertility decline and a swift

transition to modern agro-technology. However, modern technology can only come from the industrialized world, a source unlikely to commit much investment to these poorer nations.

And finally we deal with Kahn. Kahn derives his confidence in the pro-PG position from the his adherence to the following tendencies and hypotheses. Energy costs are very likely going to decrease indefinitely (Kahn in Simon 1990, 91). Economic development will result in a lower birth rate. "Sources of most raw materials are great and, with new discoveries, are growing." Famine is due to poor public policy and resource allocation. And, "new technologies are regularly being designed which either will make pollution control unnecessary or create situations where the gains in permitting pollution will be small but the losses large." (1976, 219)

In summary the claims considered the most important come in many different flavors. While the lack of food might be the area of greatest interest, the thinkers hardly agree on its degree of availability in the long term. And characteristic of many of the concerns, the primary object preventing its abundance varies from thinker to thinker, although many think political barriers are very important.

(3) What are the thinkers' underlying assumptions and values?

Differentiating between claims, assumptions, and values

may be a complex task, given that the differences are often subtle. Nonetheless, the following discussion will attempt to do just this. Given that the assumptions and/or values may be stated explicitly or presented less conspicuously, apparent only to the meticulous reader, I have made an effort to ensure that both types are discussed.

The assumptions of the thinkers fall into a few natural categories. The first deals with the behavior, the inclinations, and the ideas of the human being. Hardin thinks that the "freedom to breed will create ruin." (in Commoner 1992, 143) This statement is exemplary of his belief that humans are, in general, unable to consider the "other" because of their myopic self-interest. Supporting this statement, Hardin reminds us that procreators, following their own rational logic, are the most likely to survive by virtue of the fact that they will exist in the largest numbers. This premise overlooks the power of the nation-state in determining who succeeds (in terms of adequate levels of food, education, and health care) and who doesn't. Taking Hardin to his logical conclusion, people will not change their orientation toward reproduction. Such a belief requires that specific communities within a population will maintain a constant birth rate, which historically has not been the case. Also, along these lines, Simon insists that people are the "ultimate resource" given that they "will exert their will and imaginations for their

own benefits, and so, inevitably for the benefit of us all"; an apparent non sequitur. In demanding this, he is equally making a false presumption, albeit one of the opposite sort. Commoner states that feeding the hungry will result in greater hunger. In doing so he is as well questioning the ability of humans to change their practices.

Central to Brown's and Hardin's prescriptions for the future is the necessity of major value alterations (or paradigm shifts). However, both gentlemen assume that such changes are unquestionably good. Thus, they have overlooked the possibility that change can be dangerous if not disastrous; as I can easily envision a turn toward eugenics ideology, resulting in catastrophic losses of life. One need look no further than recent evolutionary and biological arguments which tend, perhaps unknowingly, toward similar conclusions as that of sociobiology and eugenics of our recent past.

Simon takes personal liberty as a primary value when analyzing positive and negative factors. He also holds that people's creative and inventive power is a legitimate source of solution for any foreseeable contingency. Each of these assumptions neglect potential infringements on humans in other ways (e.g. food supply, mandatory education), not to mention the Simon's overly optimistic outlook.

The second category considers those premises which are central to relations within or between nations. Ehrlich speaks of the "Netherlands fallacy," referring to a country that is capable of supporting its population only by relying on immense imports[20]; Ehrlich writes,

> The Netherlands can support 1,031 people per square mile only because the rest of the world does not. . . . Saying that the Netherlands is thriving with [such a density] ... simply ignores that [its inhabitants] . . . far exceed the carrying capacity of that square mile. (P. Ehrlich and A. Ehrlich 1990, 39-40)[21]

In stating this, Ehrlich is implying that there is something inherently unsound about: (1) nations that rely too heavily on other nations for materials; or (2) communities that survive, or prosper, in part, on the labor, or at the expense of others (note: isn't every person, community, nation subject to this to some extent?). Commoner holds that developing countries are due by their ontological status as nations "an equitable share of the world's wealth," suggesting that equity is an inviolable right by virtue of existence.

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[20]Interestingly, as Charles Mann points out, Pollyannas, the group of thinkers who see PG as essentially innocuous, of the seventeenth century used the Netherlands as an example supportive of their view; the Netherlands strength, prosperity, and urban density was due to its size as "only such a populous place could be so rich." (Mann, 49)

[21]As of 1990, The Netherlands was the third most densely populated country behind Bangladesh and South Korea (Ekins 1992, 14). But to its credit, The Netherlands has developed one of the most sophisticated environmental databases (Ekins 1992, 64).

Brown sees the world as only rich or poor, which inevitably leaves out a considerable number of nations that on the whole do not see themselves fitting either category. It seems also that this view disallows a gradual transition from one extreme to another, for how would a country go from poor to rich instantaneously? Brown also assumes that national governments need to be the major players in changing the population/resource relationship, a presumption that under estimates the potential contributions made by the individual or the community.

On related fronts, McNamara supposes that employment will always be found even if labor practices must change. Simon speaks of growth only in terms of the aggregate, assuming that the individual parts are not relevant (or perhaps expendable). Kahn argues for immediate Third World industrialization and rapid worldwide economic growth (1979,1), apparently side-stepping the issue of environmental degradation and human sacrifice altogether. Gilland presumes that the infrastructure of LDCs makes them extremely vulnerable to crisis situations and at the same time unable to absorb assistance adequately. Gilland also assumes that long-term forecasts will be totally ineffectual; he writes,

> considerations of what might happen, or even of what must happen, in the long run, i.e. over several centuries or millennia, do not have, never have had, and never will have any weight in shaping policy. (1979, 24)

And finally, Commoner feels that future energy use by advancing nations will be outrageous.

The third category of assumptions and values I label "measures and trends." Ehrlich feels population control could ultimately solve the PG problem assuming that this is the most humane and tolerable way. Simon contends that resources are changeable rather than fixed in response to human efforts (1990, 7). He also, as noted by Swaney (1991), considers the earth "completely malleable," and, thus, assumes there will always be oxygen to breathe, water to drink, rainfall to nourish crops, and so forth." (501) Kahn says that the world need not worry about energy shortages or costs in the future, because long-term energy prospects--resting on sources that are inexhaustible--are very good. Each of these ideas presume that neither changes nor quantities have limits. Brown, in stating that problems interact amplifying each other, is implicitly asserting that a problem will not get corrected without ample analysis of the nitty-gritty. A second oversight of this simple statement, is that the weighting of causes (variables) may be such that one predominates in the ultimate effects.

The fourth, and last, category concerns definitions and goals. Simon believes the economic measure of scarcity is the cost of raw materials. Further he considers life expectancy is a fair measure of society success. Gilland takes the ratio of

NRR (net reproduction rate) to the GRR (gross reproduction rate) as a very good health indicator. And, finally, Commoner promotes as the ultimate goal of humanity, "harmony with the environment and . . . peace among the peoples who live in it." (1971, 292) Each of these opinions is insufficiently justified and ultimately fails to be relevant due to its subjective nature. However, as will be discussed in chapter 4, the statement of one's goals and definitions are a critical part of an any account.

Though this list is not exhaustive, the information provided gives one a general idea of what background assumptions and values the various thinkers bring with them to their work. A deeper examination of these materials might reveal much more penetrating associations.

(4) What communication patterns exist among the thinkers?

In our quest to understand the PG discussion better, it behooves us to look at how, and to what extent, the thinkers are talking to, about, and around each other. Presumably, the interactions we discover will help us answer the question: "Does there exist a debate concerning PG, or rather, is the discussion one of fragmentation and avoidance of the real issues?"

Among the thinkers, Simon introduces the others more often than anyone else. For instance, in *Population Matters*,

he dedicates two rather lengthy sections to direct discussions with opposing views--one is an interchange with Ehrlich and the other a discussion with Hardin, each of whom find their way into his work on a regular basis. On occasion, Simon also refers to the other thinkers (all except Gilland), spending more time on Brown, but in a fairly irregular way. However, Simon's lack of real engagement with Commoner may indicate an unwillingness on his part to engage with someone who challenges the means of technological production so vehemently. In most instances, references are made to either show "how wrong the other side is" (Ehrlich and Brown) or "how supportive of his views a position might be" (Kahn). Although Simon's inclusion of other's thoughts doesn't generally contribute positively to the debate, when he publishes longer pieces by the "challengers" in his works (see Simon 1990, 369-374, 397-404) they do serve as good counterpoises.

In contrast, Commoner engages only a few thinkers but pays no attention to those outside the scientific community (i.e. Kahn and Simon). And when he quotes a thinker (in particular, Hardin and Ehrlich), he does so as a springboard to illustrate how his views are considerably different; case in point, Commoner (1972) where he outlines his differences with Ehrlich. And finally, he makes no direct mention of Gilland, McNamara, nor Brown, of which the last is by far the most surprising.

Gilland makes one reference to Commoner and one to Kahn in his book *The Next 70 Years*, but otherwise ignores the other voices. Interestingly, in referencing Commoner, Gilland attempts to destroy Commoner's propositions concerning the relationship of LDCs and the industrialized world. Gilland refers to Kahn as a "technological optimist," but makes no further judgement of him.

Kahn mentions a few names in passing, including Commoner, Ehrlich, and McNamara. Such references, especially the one made of McNamara, are opportunistically chosen to pick the opposition in its mildest form. Fascinating, however, is the listing of works by Brown, Commoner, and Ehrlich, in the Selected Readings section of *The Next 200 Years*.

Ehrlich, while an author of many books and journal articles, tends not to mention the other PG thinkers very often. Of the thinkers Brown gets the most citations, Hardin and Simon get mentioned less often. And outside a rather heated debate with Commoner (see Ehrlich & Holdren 1972) the other thinkers receive little or no mention.

Hardin involves himself with the other thinkers' works to a greater extent then most. He (1972) dedicates a chapter to Commoner's thoughts and he (1981a) provides a fairly extensive review of Simon's *The Ultimate Resource*. Hardin also includes two short pieces by Ehrlich in his edited volume *Population, Evolution, and Birth Control*.

Except for a brief mentioning of Ehrlich, Commoner and Hardin in *State of the World, 1991*, Brown also pays no lip service to the thinkers. And, finally, McNamara, similarly, makes no makes reference of any of the other thinkers as his work tend to be self-contained tracts.

In conclusion, the thinkers do not, except on a few occasions, directly reference the other voices. When references are made they tend to be minor ones, except for a few more lengthy engagements between Simon/Hardin, Simon/Ehrlich, and Commoner/Ehrlich. The source of this lack of engagement among the thinkers isn't entirely clear. Perhaps these thinkers deliberately avoid including controversial opinions within their own work. If this were true then why wouldn't we see similar people (Brown/Ehrlich or Simon/Kahn (who actually have edited a large volume together)) integrating each other work more? Or, perhaps the thinkers are motivated to achieve their own identity and thus are disinclined to mention others who take an equally broad look at PG questions. I really can't say at this point. However, the communication patterns found do indicate that an interactive, constructive discourse has not manifested itself--a weakness among these PG thinkers.

Among other things that might help answer the above question are the following: (1) who do the thinkers talk to outside of the literature, i.e. how different are the people

they write about and the people they talk to?; (2) who are the people that these thinkers rely on for support or opposition if not the other thinkers?; and (3) when they do reference other people what is the specific context in which this is done? Maybe one should just ask a few of them. Unfortunately time does not permit for adequate evaluation of these questions.

(5) What are the neglected features and why are they overlooked?

At this point in my analysis, I find four major areas that suffer from tremendous neglect in the discussion of PG. These include:

(1) feminist perspectives and female contributions to society;

(2) modern communication forms and their consequences;

(3) environmental economics and the concept of externalities;

and (4) ethical and communal responses to population control measures.

Ultimately, these topics warrant considerable attention, and the lack of them at this time suggests that the PG discussion is not profiting from many of the philosophical and sociological discoveries made in the recent years by other disciplines.

Women are an overlooked gender within much of PG discourse. As noted by the choice of spokespersons (although I could have easily chosen Anne Ehrlich instead of her husband, and potentially a few others), the major figures making up the discussion are men. Perhaps, not surprising, then is the utter lack of women's issues in the discussion. Other PG thinkers, e.g. Ekins (1992), are more aware of women's concerns, although only a limited way, than are the voices central to our discussion. McNamara pays lip service to women's involvement in pregnancy matters (1991) and the importance of enhanced status of women as linked to social and economic development. Ehrlich (w/A. Ehrlich 1990) is more descriptive about how female education and equal rights for women are two critical prerequisites to reduced fertility (216). Others are apparently unaware of women's relation to PG. Take for instance, Brown's essay, *Twenty-Two Dimensions of the Population Problem* (1976), which claims that it is very broad analysis, fails to include as a category anything specifically referring to women, a finding which is even more bizarre when one considers that a woman, Patricia McGrath, co-

authored this article.[22] But the extent of neglect doesn't stop here.

No reference is made to feminist politics, feminist economics or feminist epistemology. And it isn't as if tremendous contributions haven't been made in these areas. Take for instance M. Waring's *If women counted: a new feminist economist* (1983), Blau and Ferber's *The Economics of Women, Men, and Work* (1986), Okin's *Women in Western Political Thought* (1979), and Harding's *Whose Science? Whose Knowledge?: Thinking from Women's Lives* (1991). Such works have much to contribute to the discussion of PG. These authors and women more generally must be given greater recognition by our voices. In Chapter 4, I will discuss in more detail what specifically can be gained by incorporating ideas from these sources into the PG dialogue.

A second area of neglect is with regard to recent technological developments in communication. International computer linkages, fax machines and the like have certainly altered the conversations of and the information available to interested parties, coming from all parts of the world. Obviously, people have communicated by less technologically

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[22]Brown does in fact make up for this to some extent by including in his 1974 work, a section dedicated to the future role of women (166-168). However his account is more a description of the changing status of women then a sketch of what women have and offer the world.

advanced means for centuries, but more recent methods of communication allow for greater frequency of interaction. Ultimately, continued change in communication accessibility might have an effect on PG and perceptions of it, in particular if improved interaction is the catalyst in the process of arriving at conclusions. However, little mention is made of this; except for Hardin who notes that "exchanges of information are not bound by conservation principles" (implying that information systems will ultimately be the source of progressive change) (1986, 604), Brown (1974) who provides a simple yet significant account of the media's capacity to mobilize people and resource (183-184), and McNamara who makes only a brief mention of it. Future models could benefit by adding technological advances in communication to the puzzle.

A third area of neglect concerns environmental economics and the concept of externalities. Over the last twenty years a great number of works has been produced which represent a more holistic economic paradigm, one, it is claimed, that will sustain humans on the earth, at least through the next few centuries (e.g., Daly (1977, 1986), Cobb & Daly (1989), Boulding (1978, 1992), and Hamrin (1983)). This paradigm, which is a definite reconceptualization of standard economics, offers a great number of concepts, highly germane to PG matters. The specific details of the relevance of this work to

PG thinkers is held off till chapter 4. Suffice it to say that the PG question has every reason to integrate this material, and little reason not to.[23]

The last of my preliminary list of neglected areas PG pertains to the ethnic or communal differences in response to population control measures. As all will agree, PG is currently a fact of life throughout the world, in almost every nation, in almost every community. As such, responses to any of the proposed population control measures will vary according to where and how they are conducted. Given the magnitude of population control activities throughout the world, now and in the near future, it seems imperative that a much greater emphasis been placed on understanding the repercussions of introducing such initiatives. Mahmood Mamdani's *The Myth of Population Control* (1972)[24] and the U.N. Population Fund's (UNFPA) recent book, *Population Policies and Programmes: learned lessons from Two Decades of Experience* (1991), is a step in this direction. The limited degree to which this vantage point is found within the PG

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[23]I should mention however that recent work of PG thinkers, in particular Commoner (1992), Ehrlich & Ehrlich (1990, 1991), and Brown (1991), has incorporated some of the ideas generated in ecological economics though explicit mention is rarely made.

[24]In this work, Mamdani, a Third World theorist, outlines the pessimistic results of early population control programs, as indicated by the Khanna Study in India.

discussion gives further credence to the view that our thinkers are conducting a disconnected, perhaps outdated, discussion of PG.

Summary

Having thus completed my examination of the PG "debate," it is time to reflect on my findings. The select group of PG thinkers discussed in the chapter have the following characteristics. They tend to fall into two categories. Some are convinced that PG is the major source of civilization's problems. Others either think that PG is in the long term a positive development and/or PG isn't one of the primary causes of today's problems, i.e. famine, malnutrition, political turmoil. Independent of the group they fall in, the thinkers have quite distinguishable reasons for feeling the way they do. Similarly, assumptions and values incorporated in their writings do not fall along these divisions. And finally, the public communication networks among these thinkers are very flimsy if not altogether missing.

Among the areas drastically needing recognition in the PG discussion, I have specified the following:

(1) feminist perspectives and female contributions to society;

(2) modern communication forms and their consequences;

(3) environmental economics and the concept of externalities;

and (4) ethical and communal differences in response to population control measures.

While this list is a preliminary one, these additions will, with respect to the current PG discussion: (1) enlarge the number of interested parties; (2) make relevant those items that need consideration; and, (3) allow for further improvements in the future.

CHAPTER 3
Problem as a Philosophical Construct and PG Thinkers and Their Different Problems

Introduction

Historically many disciplines, including sociology, philosophy, and engineering, have defined themselves as being in the business of articulating and solving problems. With such an ideal propelling intellectual activities, one might expect to find volumes of literature expounding on the existence of and the significance of a problem-solving methodology. However, according to Larry Laudan, a distinguished contemporary philosopher of science, literature concerning the construct of problem has been lacking.[25,26] Within the last fifteen years, the number of philosophers writing on this subject has grown. While their efforts have been rather simplistic in nature (due to the dearth of

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[25]It is important to recognize that here "problem" is functioning like "theory" and "model" have in much of philosophy of science literature, where each is described as tangible entities which help drive the scientific and technological enterprise throughout history. Each problem is unique, as constituted by modern scholars, both in its application and its explication. But, the construct of problem is most useful here because it represents the term in which the PG debate has most often been set.

[26]The following discussion will also be most relevant to the issue of problem *formulation* as opposed to problem *resolution*. While problem resolution might be seen as taking precedence in terms of policy deliberations, I contend that problem formulation is more fundamental to the PG debate, as will become more evident in this and the subsequent chapter.

antecedent scholarship in this area), their works are detailed enough as to provide many interesting contributions to the PG controversy.

In order to provide a proper understanding of problem, I will first introduce recent thoughts in the philosophy of science on the subject. Here I will describe the conceptions of problem offered by two scholars, Larry Laudan and Thomas Nickles. Then, I will specify the definition and domain of problem that I will be working with in later sections. Finally, I will explain how I see the PG spokespersons working with different conceptions of problem as it is my contention that little constructive discussion has taken place among the spokespersons of PG because their conceptions of 'what a problem is' are fundamentally different.

Problem as a Philosophical Construct: definition and domain

This section will focus on accounts provided by two philosophers of science, Larry Laudan and Thomas Nickles. Each has developed a well-organized and concise argument specifying how he sees problems as units of philosophical analysis working within the scientific world. The introduction of their views will provide me with sufficient structure to propose a synthesized conception of problem, one that will be particularly suited for the purposes of this project.

In his book *Progress and its Problems* (1977), Laudan starts with the view that "science fundamentally aims at the solution of problems," i.e., science is a problem-solving and problem-oriented activity (1977, 4-5).[27,28] And recognizing a lack of exploration of this phenomenon, Laudan feels obliged to offer a thorough account of problems as they are generally found within the scientific community. Laudan's main objective is to offer an alternative way of cognitively evaluating scientific practice. His offering lays out an clear and concise model of problems, and as such, is of great use to our project.

Laudan, as mentioned above, concentrates on solutions to problems and is principally concerned with their activity within scientific methodology. He notes that the literature of the methodology of science has failed to deal adequately with: (a) a taxonomy of the types of scientific problems; (b) a gradation of their relative importance; and (c) criteria for the adequacy of solution (1977, 13). This questionable negligence on the part of philosophers prompts Laudan to offer

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[27]While Laudan states explicitly that there are other frameworks within which to examine scientific developments, he also feels that the problem-solving framework will be the most informative and revealing of all.

[28]Despite the fact that Laudan's book concentrates on "scientific" problems, he states that his model could easily be applied to all intellectual disciplines, as other problems aren't fundamentally different from scientific ones.

as a thesis the following, perhaps one of his most significant points for us,

> In appraising the merits of theories,[29] it is more important to ask whether they constitute adequate solutions to significant problems than it is to ask whether they are 'true,' 'corroborated,' 'well-confirmed' or otherwise justifiable within the framework of contemporary epistemology. (1977, 14)[30]

This statement implicitly deals with two major weaknesses of the philosophy of science. Philosophers, Laudan claims, are inclined to ask, when concerned with the adequacy of a given theory, how many facts confirm it rather than whether these facts are significant and how many problems a theory solves, rather than if the problems are relevant. These subtle rephrasings will yield a great deal of interesting findings when related to the PG discussion.

Now for Laudan's conceptualization of problems. Problems come in two basic forms--empirical and conceptual--according

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[29]According to Laudan, the search for such problem solutions involves dealing with theories. He writes

> Theories matter, they are cognitively important, insofar as--and only insofar as--they provide adequate solutions to problems. If problems constitute the questions of science, it is theories which constitute the answers. (1977, 13)

While there may be more to the scientist's work, these two items--i.e. problems and theories--take precedence in Laudan's model.

[30]Here Laudan is implicitly saying that epistemic goals (truth, knowledge) are irrational goals of science because we can never know when we have attained them or how far we are from obtaining them.

to Laudan. Empirical problems are defined as "substantive questions about the objects which constitute the domain of any given science" and referred to as first order problems (1977, 15). Examples of such problems include (a) how and why heavy bodies fall toward the earth?, and (b) why alcohol left standing in a glass disappears over time? (While these problems may appear mundane and rudimentary to some, Laudan is only trying to give simple illustrations.) In short, empirical problems consist of archetypal queries about the observable natural world.

Conceptual problems are defined as "higher order questions about the well-foundedness of the conceptual structures (e.g., theories) which have been devised to answer the first order questions [i.e., empirical problems]." (1977, 48) As with empirical problems, conceptual problems are closely connected with theories. However, unlike empirical problems, conceptual ones have no existence independent of the theories which conceive them. Conceptual problems have the following ontological character: they are either logical inconsistencies within a theory, conceptual ambiguities or circularities within a theory, assumptions attached to a theory, or implausibilities among two or more theories. Conceptual problems are also categorized as internal or external but this distinction will be of no use to us. Examples of conceptual problems include: (1) the inability of

thermodynamics to subsume the postulates about the relatively unchanging earth (1977, 57); and (2) the perceived discrepancy between 17th century mechanistic science and those theologies who hoped to "preserve an important role to God." (1977, 62-3)

Empirical problems fall into three subcategories--unsolved, solved, and anomalous. An empirical problem is categorized on the basis of whether it has been solved (fully or incompletely) by a theory or rather it has been shown to shed doubt on (i.e., appear anomalous to) a theory. Anomalous problems are confirmed by a least one theory but not another, one which is otherwise important in the scientific program. The importance of this classification rests in that whether an individual (say a biologist) considers a problem (e.g. hunger) unsolved, solved or anomalous, will in large part determine how she understands the larger picture (e.g. the population question).[31] Given the ambiguities in the above descriptions, let me provide a few examples of each, as comprehending this taxonomy will be paramount in understanding the distinctions among the PG spokespersons.

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[31] The primacy of this statement is furthered when we consider the following idea pronounced by Laudan:

> the aim of science is to maximize the scope of solved empirical problems, while minimizing the scope of anomalous and conceptual problems. (1977, 66)

This position specifies most generally how Laudan envisions science proceeding in evaluating proposed problems, however idealized or programmatic it may be.

First for the empirical problems. Unsolved empirical problems include organic findings in Antarctica's ice cap (Horgan 1993) and the solar neutrino controversy. In the case of the former example, such organic matter lends credibility to the idea that quite recently, say no more than 2 million years ago, the ice cap melted completely; a finding which is in definite opposition to other models of Antarctica. Concerning the latter example, data (measured neutrino flux on earth) and theory are considerably different. The non-existence of aether and human space travel (at least the ability to do so) are considered solved problems. Anomalous problems in history include Newton's failure to deal with the direction of planetary motion and the finding of non-integral atomic weights in the middle of the 1800s, after Proust had presented a theory excluding this possibility.

Conceptual problems are quite different beasts. They may result from logically inconsistent theories or they may come about because the theories are conceptually ambiguous or circular. Faraday's model of electrical interaction is an example of the former. While his ideal was to eliminate action-at-a-distance, his model actually required it (1977, 49-50). Conceptual problems may also result from hidden assumptions. In particular, those assumptions drawing from *prima facie* non-scientific world-views, normative stances, or methodological constraints can present serious conceptual

problems. Laudan refers to the *Leibniz-Clarke Correspondence* and quantum mechanics versus causality, change, and "reality" as controversies replete with such conceptual problems. Conceptual dilemmas along these lines play a great role in the PG debate.

Thomas Nickles has written much on the subject of scientific problems. In particular, his analysis has been concerned with locating problems within a scientific methodological framework. Though, Nickles focuses less on the specific types of problems, unlike Laudan, his work is no less revealing of the intricacies characteristic of problems. And since Nickles frames his discussion in terms of empirical and conceptual problems, à la Laudan, his contributions serve as a nice backdrop both to evaluate Laudan's model and to fill in loose endings where appropriate. So with this introduction let me highlight Nickles most interesting comments and proposals.

In its most simple form, a scientific problem is defined by Nickles as "a structure containing a 'gap,' plus a programmatic or methodological demand that the gap be filled" (1980b, 23), or in other words, "a problem raises a question; it postulates something that needs resolution." (1978, 142) (Though these definitions aren't revolutionary in nature, they do tell us that problems are inherently tied to a methodology, a realization lacking in the standard empiricist and positivist scientific model.) The gap mentioned in the first

formulated definition can be described by the various constraints (or conditions) which restrict the solution space of a specific problem, i.e. "delimit the range of admissible solutions to the problem" (1981, 111). And since the ultimate goal of science is to pose and solve problems, these constraints are of paramount importance to the structure of scientific inquiry.

In his constraint-inclusion model, Nickles goes to considerable length to discuss what constraints might be and how they define a problem. The constraints, originating usually through rational argument, consist of "a rich supply of premises and content-specific rules for reasoning toward a problem solution." (1980b, 37) According to Nickles, constraints "collectively 'describe' what a problem is" (1981, 109). In fact, Nickles sees it as impossible to formulate a well-defined problem without at least one constraint on an answer. Thus, constraints must be explicated in order for problems to be adequately understood.

Constraints normally do not remain constant over time, but adjust as new discoveries and findings are made relevant to the problem of interest. (Not surprisingly then, certain constraints may be temporarily (or indefinitely) unknown.) Also, Nickles states, "two problems differ if and only if (and insofar as) their constraints differ." (1981, 111) Therefore, constraints are a means for differentiating between problems.

However it remains unclear to what extent we want to make discriminations between problems based on potentially minor constraint differences. Along these lines, I suggest that while problems may be different objectively, they still may have very many commonalities, as would be expected if they have similar lineages. Important also is the observation that constraints may be different in substance and/or kind, and as such constraint differences may be more unwieldy in assessing divergences between problems than previously thought.

In his 1978 article, Nickles attempts to lay out a taxonomy of constraints. He envisions constraints as falling into two groups--*reductive* and *nonreductive*. Reductive constraints tend to "reduce," or simplify, the problem in some way. These include reduction of the number of independent variables, transformation to a more tractable form, and limitation or approximation in the scope of the problem. Nonreductive constraints include "logical and semantical constraints of consistency and clarity," methodological constraints (including simplicity or ones specific to a field), metaphysical constraints (e.g. Planck's concern with the absolute), foundational constraints (e.g. well-foundedness) and derivability constraints (which require that certain items be derivable from the problem) (1978, 137-39).

Nickles is quick to make the following points concerning this taxonomy. First, there must be flexibility among

constraints; otherwise the system would be too rigid. Second, a given constraint on a problem may fit more than one category depending what part of the constraint is the object of interest. Third, just because constraints may be a valuable source of problem solutions, it should not be expected that a such a solution will satisfy all its constraints, which allows for the solving of problems not directly related to the original problem; as an example Nickles mentions the blackbody problem as first formulated was unsolvable and thus any solution coming about through employing the initial formulation would necessarily be solving a distinct, though not entirely separate problem. Fourth, constraints may turn out to be inconsistent over time, a circumstance requiring a new assessment of constraints. And last, recognizing that his constraint model has many shortfalls, Nickles poses questions that are important to reconciling the usefulness of constraints in problem analysis. These comments are meant to clarify the activity of constraints within Nickles' model.

At this point, a few qualifications of the above models, as they are relevant to the PG debate, must be made. On the one hand, Laudan sets forth a definition of problem and a classification for scientific problems. On the other hand, Nickles presents a definition and a detailed discussion of constraints. Regarding the definitions, Laudan's and Nickles' proposals are not mutually exclusive, but in fact very

compatible. Combining the two, we recover something like the following:

> A problem is a construct that serves to ask questions about the natural world in order to fill in the gaps in our knowledge.

In this account, some, though not all, conceptual problems are considered meta-problems, i.e., problems concerning the "conceptualization" of problems, but problems nonetheless; in fact distinguishing between problems in this way may help clarify ambiguities. However, though this definition is concise, it fails to recognize that problems stem from interactions with the external world. A more appropriate operative definition for the purposes of this thesis is the following:

> A problem is a heuristic used to describe a discordant or inadequately understood situation that emerges from interactions of worldly entities.

Problem seen in this light is more congruous with the notion of problem as understood within the PG debate, in that it captures the fact that PG problems are typically presented as descriptions of an anomalous state of the world, e.g. Ehrlich identifying starving people or Commoner detailing the pollution of a given technology.

Concerning Laudan's taxonomy of problems, I find it very useful in laying out potential distinctions between problems. In particular, his dichotomies empirical/conceptual and unsolved/solved/anomalous are both clearly identifiable and of

considerable importance as one looks at the PG debate. Nickles' notion of constraints is equally promising in terms of how it will illuminate some very interesting contrasts among PG perspectives.

However, there are a few items which need to be clarified before an honest treatment of the PG thinkers and their problems can be conducted. First, the problems perceived by Laudan and Nickles are far too restrictive to include some of the controversies characteristic of the PG debate. Both of these philosophers conceive of science as consisting of those elements which have classically been associated with it, e.g. laboratories, instruments (mass spectrometers, etc.), natural phenomena (Doppler shift, etc.), mathematical formalisms (Fourier analysis, etc.), and scientists. However, as many scholars in Science and Technology Studies (as well as other fields) have come to realize, any account of science must include institutional structures, e.g. research grants, and, more importantly, social settings (attitudes), including a group's, as well as an individual's, philosophical commitments. The introduction of values and agendas, which are located in PG perspectives,[32] and thus will be included in

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[32]Hardin (1969b) points out that population is quite different from science, understood classically, in that "values" and "initiatives of man," i.e. productions by humans, are at the core of population (3). Interestingly, Hardin, like me, finds it useful to extend methodological models of science (e.g. T.C. Chamberlin (1890)) into less technical matters,

our discussion, should not detract from successfully importing Laudan's and Nickles basic taxonomies.

Second, a further limitation of Laudan's and Nickles' models is their reliance on a "research tradition," a scientific community from which ideas are produced, accepted, and established. Given that two or more of Laudan's research traditions may exist at one time and each must be judged on its own terms, there is an inherent incommensurability among different traditions. Nickles' model makes an effort to avoid overly constraining scientific problem-solving by allowing different traditions to identify a common set of constraints, however much they may differ in the significance assigned to them. For reasons that will be discussed in the next paragraph, the PG debates are not tied enough to the practices of particular research traditions so Laudan's sense of incommensurability becomes irrelevant for our purposes.

Also, within a research tradition one observes problems that have come exclusively from internal forces. In other words, in a particular research community problems are raised solely by and for members of the same community. However, in the PG debate, ideas often come from a variety of sources (including intellectual disciplines, as well as social

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such as population, in the quest for suggestions (techniques) which will ameliorate the discourse and yield new ways at resolving controversies.

movements or attitudes) and thus it would be impossible to draw an a priori boundary around the contributing parties. In fact, one way to understand this better is to recognize that PG is a problem that comes *to* science, not *from* science,[33] which in part explains why the PG thinkers tend to cut the larger PG problems down to the size of their disciplinary standpoints. Hence, much of the content of the PG discussion comes from *outside* the traditional scientific sources, as evidenced by the many social issues discussed by PG spokespersons. Under these circumstances, PG is better understood as an amorphous social or public issue rather than the technical issues that dominate the minds of Laudan and Nickles. Here again, the philosophical models of Laudan and Nickles cannot be taken wholesale, because they don't take seriously enough the possibility (or reality) that problems can arise from outside disciplinary sources. (This is a liability that they share with the standard and philosophical models of scientific change, such as Kuhn's (1970) and Lakatos' (1978).)

At this point something more fundamental bears notice. Laudan's notion of research tradition necessitates that a lineage of ideas be identifiable. With regard to the PG debate, while many of the ideas are clearly tied to particular

[33]I am indebted to Steve Fuller for alerting me to this insightful rephrasing.

historical contexts, nevertheless the contributors to the debate come from such a multitude of backgrounds (e.g., biology, economics, futurology, philosophy) that there is little sense of common history that can serve as general background to the debate, as alluded to in the introductory chapter. Once again Laudan's model fails to depict the reality of the PG debate.

With the above said, we can now engage the spokespersons once again in a dialogue concerning problems. In the following discussion, the model proposed above shall serve as a guidepost.

PG Spokespersons Working With Different Problems

From the accounts given of the PG spokespersons in the previous chapter, it should be clear that the PG question consists of a variety of views and attitudes about a multitude of subjects. Even a cursory inspection reveals that the thinkers generally talk about similar objects (e.g. food, technology, limits). Nevertheless, a more detailed examination reveals that, despite such similarities, the way in which the objects are regarded as problems is often quite different, the consequence of which is some of the perceived incommensurability and/or disagreement among the spokespersons. Having alternative conceptions of what a

problem is also entails that alternative senses of the "real problems" are being addressed, which only decreases the likelihood of purposeful discussions taking place.

Support for my contention that the spokespersons are dealing with different conceptions of problems can best be exhibited by separating the evidence into three categories. These categories, listed below, are aptly chosen in that they reflect the concerns of Laudan and Nickles and at the same time they allow for the inclusion of equivocation, ideology, and externally driven concerns of PG matters. The spokespersons can be shown to be functioning with alternative conceptions of problems in that: (1) some thinkers take as empirical what others consider conceptual (and vice versa); (2) different views exist as to whether specific problems are solved, unsolved, or anomalous; (3) the thinkers' constraints are equivocal and sometimes ideological in nature. Each of the above factors play a significant role in building the PG debate as an amorphous controversy. In the following paragraphs I will provide support for the above propositions.

(1) The explicit or implicit identification of a problem as either empirical or conceptual says much about a thinker's outlook on an issue. Within the PG discourse one finds several instances when one thinker takes as conceptual what another takes as empirical (and vice versa). Take for instance the topic of resource availability. Whereas Simon has an

empirically based argument, Hardin tends to rely strongly on the conceptual. Simon, drawing from Barnett and Morse's *Scarcity and Growth*, looks at historical trends of raw materials in terms of scarcity (which he directly associates with cost). Numerous graphs and charts contained in his works compel Simon to conclude that over the past two hundred years most metals and energy sources (e.g., oil, electricity) have become less expensive, and thus more plentiful. Simon insists that his critics have chosen (perhaps with no other choice) "to argue purely on a 'theoretical' level, and a level that is practically impossible to address empirically, such as that the 'world' must 'necessarily' run out of energy 'sometime.'" (1990b, 381)[34]

Hardin prefers not to argue with Simon's figures. But he feels that the numbers only tell part of the story; he writes,

> Just because the figures add up, the issue isn't settled. This is the worst feature of economists. They deal only with figures and sometimes don't know what's behind them. You have to look behind the figures. (in Simon 1990b, 397)[35,36]

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[34]Not all of Simon's arguments are empirically supported, especially, his belief that technological breakthroughs in the future will make potential shortages in important minerals and metals a non-issue. Hardin calls this Simon's "substitutability game," one which he equates with musical chairs, something not possible in a "finite supply." (1981, 32)

[35]Illustrative of this view is Hardin's belief that no "deep insights" have been provided by professional demographers (Mann, 52).

Here, Hardin is simply fed up with empirical extrapolation, especially ones that focus on such a large time scale that the recent developments are taken as mere "natural fluctuations." Hardin's arguments surrounding future resource availability are apparently conceptually interdefined with notions of finiteness (e.g. limited resources on the earth) (1968), competition among peoples (the inevitability of the "tragedy of the commons premise"), and increased use (brought about by greater population with increased want for amenities) (1988).

Around the concept of carrying capacity (CC), one also finds the empirical/conceptual clash. Hardin defines the CC of a territory "as the maximum number of animals that can be supported year after year without damage to the environment." (1986, 600) And although he recognizes that a precise CC is difficult to ascertain, Hardin feels obliged to stay well below its best estimate because it is always better to stay on the safe side, especially when CC diminishes with PG and when the consequences of overstepping the CC are disastrous. In addition, when speaking specifically about humans, Hardin introduces the concept of cultural carrying capacity. Cultural carrying capacity is, as with CC, concerned with the

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[36] Though Brown is not one to refrain from presenting relevant statistics, as evidenced by the number-ridden quality of his Worldwatch Institute's yearly report *State of the World*, he also recognizes that "single minded analyses" focused solely on the quantifiable will strongly diminish our ability to observe other important forces.

environment, but it adds the dimension of cultural amenities to the picture, where cultural "is taken in the anthropological sense to include all of the artifacts of human existence." (1986, 603) Besides offering per capita energy use as a possible metric for quantifying "level of living," Hardin's cultural carrying capacity relies more on conceptual appreciations of human/environment interactions; he writes that cultural carrying capacity "must play a central role" in reexamination of human rights as well (1986, 606).

Ehrlich, in discussing CC, also tends to stress the conceptual. He substantiates the power of CC by way of mentioning abstractions concerning human behavior, resource availability, and the future.[37] Brown has a more empirically grounded notion of carrying capacity. Upon noting that the CC of three natural systems (i.e., grasslands, fisheries, and forests) is "essentially fixed," Brown provides an informative chart indicating per capita world production within these systems (1979, 7, 9). The data on the chart indicate that terms of production per capita commodities (e.g. beef) rises, peaks and then begins to diminish, implying that if population

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[37]According to Michael Mortimore, a senior research associate at Cambridge University, England, "the Cassandras [i.e., those who believe that continued PG at the current rate will inevitably lead to catastrophe] base their case 'on intuitively powerful hypotheses that slide over the need for empirical verification.'" (Mann, 62)

continues to increase the product per person would drop precipitously.[38]

(2) The PG spokespersons also have dramatically different views as to whether certain problems have been solved, remain unsolved or are anomalous in some way. Views about the status of "demographic transition" exemplify this divergence. Demographic transition (DT) is the idea that as a nation accrues more wealth, its citizens begin, more and more, to procreate at replacement level. (That is, each person, on average, brings into the world one additional person. For a couple that would mean two children, or one child per parent.)[39] Simon is rather certain that a "European pattern of demographic transition is being repeated now in other parts of the world as mortality falls and income rises." (1981a, 71) Commoner senses that demographic transition does set in as poorer nations accrue wealth and could ultimately solve many PG related problems; he writes, "there is a kind of critical

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[38]Additionally, it is interesting to note that both Simon and Kahn pay little or no attention to the concept carrying capacity, assuming, I suppose, that such a quantity has no practical utility given technology's feverish pace.

[39]When discussing DT it is imperative to remember the difference between the onset of DT and zero-population-growth (ZPG). ZPG will only set in years (up to 80 or more) after DT has been established, because more than two generations live at the same time now, with life expectancy rising sharply in the last one-hundred years. The consequence of which is the continued growth in population in most of the underdeveloped world for at least half a century after DT has been engaged.

standard of living which, if achieved, can lead to a rapid reduction in birth rate and an approach to a balanced population." (1992, 159) Although Commoner thinks it is unlikely that a balance in the distribution of wealth will occur, he does picture DT as a major part of any potential solution to PG related problems. McNamara feels DT has arrived in many countries but still remains non-existent in much of Africa and other developing countries. Further, he finds it unlikely that any such DT will set in soon due primarily to the political infrastructure within these areas. McNamara, à la Commoner, believes that DT has some hope (i.e., could serve as a solution to PG), adding the additional requirement that government and community efforts to reduce population must be implemented as well. Contrarily, Ehrlich feels that "automatic" DT is an absurdity, in that countries waiting for it to occur are deluding themselves. Hope of this kind has only fostered inactivity where activity (e.g. population control) is mandatory. Thus, Ehrlich's view is one of DT as a impractical solution to PG, noting further that "in fact industry per se had little to do with lowering birthrates." (P. Ehrlich and A. Ehrlich 1990, 37) Kahn is of the opinion that while DT has apparently occurred in much of the world (e.g. North America, Soviet Union), future economic success isn't predicated on its continuation, even in the developing

world (1976).[40] Thus, Kahn holds DT as anomalous, in that PG is evidently influenced by other factors to a greater extent.

The PG thinkers also have alternative perspectives on the ability of technology to handle future contingencies. As noted earlier, Simon's optimism regarding human ingenuity coupled with his conviction that natural resources are changeable in response to human efforts makes him a firm believer in the power of technological innovations as PG problem solvers.[41] Commoner suggests that "appropriate" technologies have already been developed, many of which could dramatically reduce the impact of a growing population on its environment. The major drawing block, in Commoner's account, concerns that of profit margin and market share, as those who control the technology have monetary incentive to mass-market something at the greatest profit (1992, 80). Kahn, who is also optimistic of

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[40]Lindsey Grant, Department of State coordinator of *The Global 2000 Report*, points out that Kahn's reasoning comes very close to "economic vitalism," stressing that Kahn's graphs have more airbrush than "intellectual discipline." (1983, 17)

[41]And Simon even goes as far as to say that "we need more and bigger problems" to stimulate more knowledge and more powerful solutions (1984, 15). However, the US National Academy of Sciences and the Royal Society of London aren't so optimistic, issuing, in a 1992 joint statement, a

> warn[ing] that people should not expect too much from science. . . .'it is not prudent to rely on science and technology *alone* to solve problems created by rapid population growth, wasteful resources and harmful human practices.' (Maddox, 1992)

technology's power to remedy some of today's problems, suggests that the possibility of "ocean-based, industry-oriented complexes" and "migration to outer space," which are "entirely feasible during the next century," may serve as such a panacea (1976, 31). Ehrlich takes a quite different line. According to Ehrlich (1971), technological growth, under relatively high levels of PG internationally, will ultimately cause environmental collapse; in which case, technology is a misleading panacea. Ehrlich (1991) withdraws slightly from his initial position, noting that the choice of technology is crucial to the rate of environmental destruction, however "brute numbers [of people] are no guarantee of technological innovation." (1984, 381) Hardin (1968) states emphatically that PG isn't a technically soluble problem, stressing that meeting required energy levels and continuing economic growth are mutually incompatible with a growing population; he continues with, "Technology can't help." (1988) Representing even another view, McNamara spends a great deal of time talking about potential political instabilities, in which he is implicitly viewing technologies as of lesser importance in terms of its relevance to the PG issue. Thus, technology is seen as anomalous to the PG question, in that it doesn't solve the immediate concerns of Hardin or McNamara. Concisely stated, while Simon and Commoner view technology as a key to solving PG related problems, Ehrlich doesn't see technology

solving such problems, and Hardin and McNamara treat technology as anomalous.

On a related front, the status of our environment is also a subject of disagreement. On the one hand, Ehrlich and Brown champion the cause of a supposedly debilitated environment and ecosystem. Throughout their books and articles, these thinkers reiterate their concerns for environmental issues, including global warming, biodiversity, deforestation, and air and water pollution. Although these men emphasize particular problems more than others, both of them regard PG as a major contributor to environmental degradation. Therefore, these two men view the environment as unsolved relative to current PG, i.e., current PG will not allow necessary improvements in the environment to occur. On the other hand, Simon and Kahn spend little time discussing environmental change. Besides noting that the air and water quality has improved in the United States and elsewhere over the last 40-50 years, Simon doesn't seem interested in the other environmental developments, including global warming, ozone depletion, and biodiversity (not coincidentally, the ones held most critical to human survival by many biologists).[42] To him apparently, current

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[42]James Swaney, an economics professor at Wright State University, writes, "Simon believes that environmental services will ultimately always 'be there,' that wherever these services come from, their source is unassailable." (1991, 501)

environment trends require little concerted attention, as he writes that "threats of air and water pollution have been vastly overblown." (1984, 14) Kahn goes a bit further than Simon in his discussion of the environment, but comes to a similar conclusion: pollution is a "temporary phenomenon." (1976, 8) And although Kahn is better tuned into the fact that the earth may be "fragile," he thinks ("intuits" may be the proper term) that the concept of fragility is misleading, stating without hesitation that: (a) "Man has already experienced many disasters and strains in the earth's history"; (b) "It is less than 10,000 years since the last ice age."; (c) "Man's impact normally is much less than that of natural forces and processes" (1976, 180); and (d) "Industrial pollution . . . reached high levels in some developed countries, but these countries have been able to use their resources and technological capabilities to avert disasters, if not all serious problems, by dramatically reducing the rate of pollution while there was still time." (1979, 55) Once again we notice a solved/unsolved dichotomy exhibited within communications about the environment.

(3) The third, and final, category to be discussed is that concerning the PG thinkers' constraints. These constraints tend to be defined either in equivocal or more explicitly ideological terms. They are equivocal in that many spokespersons either operate with more than one connotation

for the same term or use a term differently from the other thinkers. The ideological nature of constraints is more involved. Sometimes the constraints are in the form of strict value judgments and thus very obvious.[43] Other times they consist of weakly supported claims motivated by certain preestablished biases, that are largely suppressed in explicit communication. As the substance of these hidden motives is at times difficult to discern, my contributions in this area are somewhat speculative. But given that differences along these lines are taken to be among the most important in existing controversies within the PG debate, the examination proceeds without hesitation.

As with almost any well-documented discussion, the PG debate contains abundant catchwords, most of which attempt to make complicated ideas readily accessible. Unfortunately, but perhaps wittingly, the thinkers use these words in different ways. (However, there exists little recognition of this fact among the thinkers' ample literature.) Two of the terms which are particularly confusing at times are "limits" and "long term/short term."

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[43]These values are somewhat different from those found in chapter 2, in that, here, relevant values must play the role of a constraint. That is not to say that the discussion in chapter 2 ignored such values but here it becomes most important to show in sketchy, yet conclusive fashion that: (a) values act as important constraints on the thinker's models; and (b) values are ideologically contextualized.

A good starting point for any current reflection about limits is the Club of Rome's often discussed tract *The Limits to Growth* (1972).[44] One of the major objectives of this work was "to gain insights into the limits of our world system and the constraints it puts on human numbers and activity" (1972, 185), by way of world simulation modelling on computers.[45] Among its conclusions were that supplies of natural resources are finite (1972, 54-59). Simply put, this is a substantial proclamation because Ehrlich, Hardin, McNamara and Brown support the finding and Simon and Kahn do not. While the former group sees the earth and the sun as the limits to our resource base, the latter group, especially Simon, states explicitly that there is no need to restrict our stock in that way. Simon writes,

> Since 'the more people {being the ultimate resource}, the more minds there are to discover new deposits [of natural resources] and increased productivity,' it follows that 'an increase of human beings . . . constitutes a crucial addition to the stock of natural resources.' (Dunlap 1983, 59) (my braces)

Simon also suggests in many instances that the universe is the

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[44]While this work offers an intriguing account of the resource problem, it is not without harsh criticism, particularly concerning its simplicity (Spengler 1978, 23).

[45]The Club of Rome's computer model was specifically designed to give an account of five major trends of global interest--"accelerating industrialization, rapid PG, widespread malnutrition, depletion of nonrenewable resources, and a deteriorating environment." (Meadows et al. 1974, 21)

only adequate limit warranting our attention. Alternatively, Ehrlich specifies limits well before the edge of the solar system, noting that copper cannot be made from other metals, a claim of Simon's (Simon 1980).[46] But, Ehrlich's limits are also more broad in scope. The changes, he foresees in our civilization, environmental as well as political, are "much too rapid to allow biological or cultural evolutionary processes to adapt people to them." (1989, 28) However, Ehrlich also views "our species" as "now living on its capital--a one-time resource bonanza that will not be replaced on a time scale of interest to society." (1984, 381) On an entirely different front, Hardin concludes that interstellar migration cannot allow the limits to be expanded, because those who chose to leave would be the ones interested in protecting the planet while the ones left on earth would continue to decimate it (1985).[47] Hardin also specifies limits in reference to the fact that ore grade continues to diminish as humans continue to mine the earth. As one can

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[46]Actually, as Hardin clarifies, one can make copper from other metals but the process is extremely costly, in terms of either energy or money, and thus in no way practicable (Hardin in Simon, 1990b, 396).

[47]This is also exactly why Hardin thinks a coercive phase of population control is necessary as "voluntary population control selects [in the Darwinian sense] for its own failure," or in other words "noncooperaters outbreed cooperators." (Paehlke, 63)

readily see, "limits" hasn't a limited meaning, pardon the pun.[48]

The concept of long term/short term is also a source of confusion, especially when one takes a deeper look at its usage. Simon and, to a lesser extent, Kahn, stress that while short term effects of PG may be devastating (for a few), the moderate to long term benefits will be good.[49] Unfortunately, what they, and the spokespersons more generally, mean by long term varies from text to text, and even chapter to chapter. In Simon (1990b), the pertinent trends span a 200 year interval. However, in the same book, he implies that 4500 years is more reliable for making predictions than 180 years, yet 180 seems acceptable. Then again, in the same book, he characterizes the long run as "both before, and also subsequent to, the year 2000." (356) Further, he writes, "It is true that the long run--30 to 70 years--is far from now, and therefore is of less importance to us than is the short run." (1990b, 50) So which

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[48]Interestingly, as Riley Dunlap (1983) points out, economists are also in stark disagreement over the issue of ecological limits--e.g. Simon and Herman Daly (see exchange in May 1983, *Bulletin of the Atomic Scientists*) who have "contrasting perspectives on the supply of natural resources" as well as "competing images of humans." In fact, many economists, according to Dunlap, have offered "ecologically challenges to traditional economics--e.g., Daly (1977), Boulding (1981), Georgescu-Roegen (1971), Hamrin (1980) (Dunlap, 59).

[49]Simon even goes as far as to write, "one of the best things ecologists have done for us is to urge us to take a long-range view." (1990, 393)

is it? Also, since it is the long run that Simon relies on for prosperity, how is it that he says the short run is of more importance? He can't have it *both* ways. Hardin debates with Simon specifically on the relevant time interval of our past. Hardin finds more recent trends, having taken place within the last 30 years as taking precedent to times more distant. The time scale issued by Brown's Worldwatch Institute before the onset of serious environmental destruction is only 40 years. Given these different perceptions as to the relevant time frame for human concern, it is not surprising that conclusions differ as what changes need to be made and how to execute them.

Constraints can also be a problematic feature of PG discourse if they are ideological in character. For our purposes, ideological constraints fit one of the following descriptions: (1) weakly supported by evidence; or (2) strictly an individual's value judgment. They also must be motivated by a thinker's underlying objective. As it concerns the first category, PG thinkers accounts are replete with unsubstantiated claims. Cases in point: Simon holds that PG adds people to the world that are in a position socio-economically, or otherwise, to use the creative powers that they have for productive purposes, a prerequisite for his technological fix-it state which contains few political barriers. Ehrlich states that all nations are overpopulated,

as indicated either by the numerous abuses sustained by the environment (now and as expected in the future given present PG trends); a statement I feel is motivated by his desire for reduction of all populations. Hardin believes that only strict governmental regulations can curb world population. Hardin holds dear the idea that "rational" humans are bound to serve their self-interests, creating a situation which precludes the possibility of a harmonious global community. Hardin, in somewhat barbaric terms, suggests that in a world where population cannot be adequately controlled,

> the allocation of rights based on territory must be defended if a ruinous breeding race is to be avoided. It is unlikely that civilization and dignity can survive everywhere, but better in a few places than in none. Fortunate minorities must act as the trustees of a civilization that is threatened by uninformed good intentions. (in Commoner 1971, 297)

These remarks are consonant with and, more importantly, underlie his aspiration for government directed population control. Kahn feels confident that struggling nations of the present will rapidly join the ranks of the economically well-to-do in the future (1976, 34), supportive of his "trickle down" model of international development that Brown finds inappropriate when resources become scarce (1981, 276). And finally, McNamara, Ehrlich and Brown support the notion that PG related variables tend to amplify one another and work synergistically to elicit more damage, feelings which are

engendered by these gentleman's urgent desire for speedy change.

Also entering into the discussion of constraints are values. And while the following examples are just a sampling, a salient point still comes to the fore. That is, values can be an important source of biases within the PG debate. Simon, holding that personal liberty is his most treasured value, claims that

> we need rules that will provide maximum freedom for people to try out new and better ways to takes advantage of the opportunity to serve the public and make a *profit* that an environment constraint imposes. (1990b, 11) (my bold)

Clearly Simon has little regard for the *whole* of humanity; "Who is going to suffer when someone profits?" and "And is the public, at large, served?" Also, intimately related to these subjects, Simon relies on what Hardin takes to be the "invisible hand" to provoke those who seek achievement to promote the public's interest.[50] Perhaps, all of these assertions are provoked by Simon's devotion to continued economic growth, a feeling which comes through when he harshly criticizes past structural economic changes which have choked the markets (1990, 356).

Not surprisingly others also contribute value judgments

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[50]Hardin is so adamantly opposed to this notion because he feels that the direction of population policy rides on its validity (1968, 1244).

as constraints. Commoner thinks that nations, given their ontological status as nations, are deserving of an equal share in the world's wealth. Ehrlich's arguments, like Simon's, are replete with conjectures about human physiology as the source of certain incorrect notions about PG and civilization. For example, he thinks our evolutionary heritage has endowed us with "quick reflexes" and not the "slow reflexes" necessary for emancipating humans from their present frightful course (1989, 28). And, perhaps appropriately, we end with Kahn who writes that

> the limits-to-growth position . . . creates low morale, destroys assurance, undermines the legitimacy of governments everywhere, erodes personal and group commitment to constructive activities and encourages obstructiveness to reasonable policies and hopes (1976, 210).

Unquestionably, the above opinions could seriously limit a PG thinker's ability to recognize other perspectives as important.

Summary

The first half of the chapter consisted of an introduction to the philosophical conceptions of problems as presented by two philosophers of science, Larry Laudan and Thomas Nickles. The compatibility of their definitions and the breadth of their combined account made their models especially useful. Laudan's dichotomies empirical/conceptual and

unsolved/solved/anomalous and Nickles' account of constraints served as conceptual instruments for understanding the PG thinkers' different notions of problems. However, the utility of their models had limitations. Specifically, we had to extend their domain to include social controversies as well as purely technical ones. Also, imported into their models was the notion that contributions can come from outside the established domain. Once the groundwork for problems was laid, the discussion moved into the PG debate, and I attempted to identify the apparent incommensurability and confusion within it.

From the taxonomy of problems presented in this chapter, we see that PG thinkers have alternative conceptions of what a problem is, which then leads them to have incommensurable outlooks of specific PG problems. Given that this is the source of miscommunication and, in some instances, conflict, we have the necessary incentive to conduct the examination, i.e. the second half of this chapter. The character of the problems for the PG thinkers vary in that: empirical is taken for conceptual (and vice versa); solved is considered unsolved or anomalous by some; or constraints are defined in equivocal or more explicitly ideological terms. Each of these points was demonstrated, which together drove home the following points. Reliance on the empirical rather than the conceptual can fundamentally alter ones basis for assessing evidence. When a

sub-problem is deemed solved or anomalous, the problem space gets smaller, but perhaps too rigid for further analysis. And finally, constraints are all too often ambiguous or insufficiently supported, allowing the problem space to take many forms.

The objective of this chapter was to bring out some of the weaknesses in the PG outlooks by concentrating on their inadequate conceptualizations of what problems are. This was done in order to provide a context for the framework to be offered in the next chapter. Our goal is not that the PG question will, or should, be resolved any time soon, but that the spokespersons' arguments become more focused by being more mutually responsive, and that genuine efforts be made to establish norms for their interaction.

Chapter 4
Recommended Framework for Future PG Debate

Goal

As the questions of population size, population density, and population growth have attracted a great deal of attention in the last three hundred years (see Riley (1985) and Hutchinson (1967)) and given present patterns of population growth, there is every reason to expect that PG will remain an object of reflection in times to come. However, one hopes that the deliberations on these issues will evolve over time, and preferably in the direction of commensurability and greater utilization of the available knowledge. One method of improving the debate surrounding PG is by way of restructuring its dialogue. By doing this, ideological differences and assumptions may become more explicit and thus, perhaps, less of a barrier to constructive discourse. I aim in this chapter to provide such a restructuring of the PG debate by way of a framework within which the discussion of PG can proceed more effectively and more intelligibly.

The framework is broken into three sections. Section one will begin with a quantification of the PG spokespersons' ideas, in the form of two tables. A discussion follows, one dedicated to exposing a host of interesting relationships among the PG thinkers. In section two, a table of a different

sort acts as a reference source for a second, more in-depth discussion. This table lists, in a concise fashion, the key elements (ideology, assumptions, and omissions) of the thinkers' outlooks as described in the previous two chapters. General recommendations are made regarding presentation and format, with the ideal of establishing norms of conduct conducive for a more productive discussion of PG matters. Section three will focus on the omissions of these PG thinkers, as briefly described in chapter 2 and as noted in the table. Specifically, an attempt will be made to describe some of the implications of importing these omitted items into the present PG debate. Finally, suggestions for further research avenues will be offered.

Before entering into this venture there is something critical to mention. The PG spokespersons, perhaps contrary to popular opinion, do *not* generally fit the following description: people with well-defined class interests who opportunistically choose sources consistent with prefigured programs. Also, a thinker's views, as alluded to in the introduction and in opposition to what Mann (1993) and Simon (1987) have suggested, cannot be most easily demarcated on the basis of whether he is an ecologist, a biologist or an economist--a distinction which needs to be made because too often analyses of the PG debate make rigid demarcations based on disciplinary identity. Certainly there exist elements of

each of these characterizations within the PG debate, and to a greater degree among the eight spokespersons of interest, however, the PG debate, cannot be described so simply. I contend that, there are members within the community of PG thinkers who have a sincere desire to assess objectively the relevant data. Therefore, I have endeavored to provide a new framework, one not rigid like Laudan's (which has too little subjectivity).

Quantification of PG Voices

Any true discussion of PG problems ultimately involves population growth itself--both what it influences and what influences it. However obvious as this may be, the spokespersons have occasionally or even entirely disregarded certain elements. But, as important as what they don't say is what they *do* say. Table III and Table IV (see next page) represent my attempt to quantify what the thinkers say regarding PG specifically.

Reading about PG, one may run across a multiplicity of causal relationships, which serves as a source of confusion for many. Simplicity (in the form of one causal relationship) may be the ideal but prudence (and realism) suggests that any model of the world's PG or, for that matter, other world issues (e.g. global warming (see Michaels (1992) and Leggett (1990)) ought to involve a large number of variables. Such a

What degree of influence does PG have on:

Table III--PG influences . . .

	Food	Reso	Poll	Ecos	Mora	Tech	Dist	Equa	Peac
Brown	3 -	3 -	3 -	4 -	2 -	1 +	4 -	4 -	4 -
Commoner	1 -	3 -	2 -	2 -	2 -	3 +	NRG	NRG	NRG
Ehrlich	4 -	3 -	4 -	4 -	NRG	2 +	4 -	3 -	3 -
Gilland	3 -	3 -	2 -	2 -	NRG	NRG	3 -	3 -	3 -
Hardin	2 -	2 -	4 -	NRG	NRG	2 u	3 -	NRG	3 -
Kahn	2 -	1 n	1 n	2 +	NRG	NRG	2 u	NRG	NRG
McNamara	2 -	3 -	NRG	3 -	3 -	NRG	3 -	3 -	4 -
Simon	1 n	3 +	2 +	2 +	NRG	4 +	3 +	2 +	3 +

What degree of influence do improvements in the following have on PG:

Table IV--PG influenced by . . .

	Food	Reso	Poll	Ecos	Mora	Tech	Dist	Equa	Peac
Brown	3 +	3 u	2 +	2 u	3 -	NRG	2 u	1 n	NRG
Commoner	2 +	2 +	NRG	NRG	NRG	1 +	4 -	4 -	3 -
Ehrlich	4 +	NRG	3 +	2 +	3 -	1 u	2 -	2 -	NRG
Gilland	4 -	3 -	2 -	NRG	NRG	3 u	4 -	4 -	3 -
Hardin	NRG	1 n	1 n	NRG	4 -	1 n	2 u	2 +	2 u
Kahn	2 -	1 n	1 n	NRG	3 -	3 +	3 -	3 -	NRG
McNamara	3 -	3 -	NRG	2 u	3 u	3 -	4 -	4 -	3 -
Simon	2 +	2 +	1 n	NRG	NRG	3 +	2 +	NRG	NRG

Sources found on next page.
(Note: A positive influence on PG means a increase in population number. A negative influence on PG means a reduction in the overall effects of PG, not necessarily a decline in absolute population.)

Abbreviations: Food = Food; Reso = Natural Resources; Poll = Pollution; Ecos = Ecosystem Stability; Mora = Morality; Tech = Technology; Dist = Distribution of wealth; Equa = Equality among peoples; Peac= International Harmony (Peaceful relations among nations)

Scale: 1 - very little, 2 - minor, 3 - moderate, 4 - major, NRG - no relationship given
+ = positive effect, - = negative effect, n = neutral, u = uncertain

Sources (for Table I and Table II): **Brown**-Food (Brown 1974, ch. 4; Brown, McGrath & Stokes 1976, 30-31; Brown, Flavin & Wolf 1981, 142); Reso (Brown 1974, 28, 146; Brown 1979, 6-7; Brown 1981, 131); Poll (Brown, McGrath & Stokes 1974, 18-19); Ecos (Brown & Postel 1987, 12; Brown 1974, ch. 5; Brown 1979, 44; Brown, Flavin & Wolf 1981, 146); Mora (Brown, McGrath & Stokes 1976, 78; Brown 1981, 132); Tech (Brown et al. 1991, 157); Dist (Brown, McGrath & Stokes 1976, 46-48); Equa (Brown, McGrath & Stokes 1976, 76-78; Brown 1979, 45); Peac (Brown, McGrath & Stokes 1976, 56; Brown 1974, 87). **Commoner**-Food (Commoner 1992, 153); Reso (Commoner 1971, 117, 235); Commoner 1972, 48); Poll (Commoner 1971, 135; Commoner 1972, 43, 167); Ecos (Commoner 1992, 155); Mora (Commoner 1992, 166); Tech (Commoner 1971, 114, 131; 1972, 52); Dist (Commoner 1972, 51; Commoner 1992, 157, 166); Equa (Commoner 1972, 51; Commoner 1992, 157); Peac (Commoner 1992, 159). **Ehrlich**-Food (Hardin 1985; P. & A. Ehrlich 1990, 66-7); Reso (Ehrlich & Holdren 1972, 35); Poll (P. & A. Ehrlich 1990, 86, 113, 139); Ecos (Ehrlich & Holdren 1972, 26; P. Ehrlich & A. Ehrlich 1990, 37-38, 134; P. Ehrlich & A. Ehrlich 1991, 29-30); Mora (Ehrlich & Orstein 1989, 33); Tech (Ehrlich & Holdren 1972, 34); Dist (P. & A. Ehrlich 1990, 39); Equa (P. & A. Ehrlich 1990, 21); Peac (P. & A. Ehrlich 1990, 23). **Gilland**-Food (Gilland 1979, 22, 96); Reso (Gilland 1979, 83); Poll (Gilland 1979, 61, 65); Ecos (Gilland 1979, ch. iv); Tech (Gilland 1991, 42); Dist & Equa (Gilland 1979, 23); Peac (Gilland 1979, 97). **Hardin**-Food (Hardin 1968; Hardin 1981b, 151); Reso (Hardin 1968, 1244; Hardin 1981a, 33; Hardin 1981b, 152); Poll (Hardin 1968, 1245); Mora (Hardin 1968, 1246; Hardin 1985, 161); Tech (Hardin 1968, 1243; Hardin in Simon 1990b, 394); Dist (Hardin 1968); Equa (Hardin 1968, 1248; Hardin 1986, 606); Peac (Hardin 1988). **Kahn**-Food (Kahn, W. Brown & Martel 1976, 114); Reso (Kahn, W. Brown & Martel 1976, 27, 214-6; Kahn 1979, 71); Poll (Kahn, W. Brown & Martel 1976, 156); Ecos (Simon & Kahn 1984, 11); Mora (Kahn 1979, 71); Tech (Kahn, W. Brown & Martel 1976, 31-32); Dist & Equa (Kahn, W. Brown & Martel 1976, 33, 213). **McNamara**-Food (McNamara 1973, 34, 44; McNamara 1977, 30; McNamara 1991, 54, 56); Reso (McNamara 1991, 54); Ecos (McNamara 1991, 54, 56); Mora (McNamara 1977, 40; McNamara 1991, 48, 53); Tech (McNamara 1991, 64); Dist (McNamara 1973, 30-1; McNamara 1977, 32-3; McNamara 1991, 54, 58); Equa (McNamara 1977, 20; McNamara 1991, 57-60); Peac (Mcnamara 1991, 48, 57-9). **Simon**-Food (Simon & Hudson 1982; Simon & Kahn 1984, 16); Reso (Simon & Kahn 1984, 21-25; Simon 1985, 51); Poll (Simon & Kahn 1984, 10,12; Simon 1984, 14); Ecos (Simon 1984, 14; Simon & Kahn 1984, 2); Tech (Simon 1981a, 71, 73; Simon 1987, 19; Simon 1989b, 472, 476); Dist (Simon & Kahn 1984, 16); Equa (Simon 1990a, 100); Peac (Simon 1989a).

methodological rule is justified because it is not clear what the most important variables are at this point. Consistent with this methodology, I have produced Tables III and IV which indicate how nine oft-mentioned variables relate to PG. On the one hand, Table III focuses on the degree to which PG influences certain elements of society (e.g., food, ecological stability, distribution of goods and wealth, etc.), the causal mode given more attention by PG thinkers. On the other hand, Table IV focuses on the degree to which PG is influenced by these same elements, the causal direction less prominent than the former. Table IV is different from Table III in another important respect. It indicates what influence the improvement of societal elements will have on PG's effects, *not* what the deterioration of these elements might entail. Close inspection of the numbers and trends within these tables allows us to arrive at a few interesting conclusions about the current PG debate.

But before discussing the findings, I must explain the scaling system for the quantitative tables. A numerical value (e.g., 1, 2, 3, 4) does not represent how often a thinker talks about a particular element, but rather indicates that the thinker has spoken about it in the context of PG, and, further, has stated quite clearly how the element is related to PG. A NRG rating indicates that no clear relationship has been offered by the thinker. In several instances, the NRG

ratings also provide the basis for several of the omissions, listed in Table V (page 108), of the thinkers' accounts. So in a sense, the quantitative table reveals the collective limitations of the thinkers' accounts (limitations which could be overcome if third world and feminist perspectives were brought in).

Now for some of the more conspicuous discoveries. First for Table III. Notice that Simon's positions are altogether different from the other's, except in the case of PG's effects on technology. Brown, Ehrlich, Gilland, Hardin and McNamara find little if anything good coming from continued PG, a process which they claim entails significant damage. Commoner, as expected, is a little more subdued in his associating PG with negative outcomes. Peace, distribution of wealth, equality, and resource availability are seen as at least moderately degraded by PG. Also note that comments are lacking with regard to PG's influence on morality, indicating perhaps a general feeling of its irrelevance.

Now let us look at Table IV. Notice there that an improved ecosystem is deemed unimportant in terms of PG. And while Gilland and McNamara feel an improvement in almost any area will aid to diminish population's detrimental qualities, Simon, Kahn, and, to a lesser extent, Commoner feel that in a "better" world, PG has a greater chance to remain. There exists a more well-defined disagreement as to the effects of

more food and resources on PG. Also, half of the thinkers think that distribution of wealth and equality have a significant influence on reducing PG-related damage.

Examining the tables together, one arrives at the more interesting, and, perhaps more subtle, findings. Alterations in morality have a good chance in diminishing PG's effects, but, for most, PG doesn't influence morality. Antithetically, ecosystems are damaged severely by PG but improvements in ecosystems do not influence PG's effects. Also, just because an element may be negatively influenced by PG, that is no assurance that PG will diminish as improvements are made to the element; look at Brown or Ehrlich on food and pollution. And lastly, notice that issues concerning ecosystem stability, morality and international peace are the most often neglected in terms of their explicit relevance to PG and PG's effects.

What has the above done for us? The importance of the relations discussed in the previous three paragraphs lies in several areas. First and foremost is the potential utility of quantification as a methodological tool for discerning differences of opinion, whether they be large or small. Quantification also allows many relationships and correlations (as provided above) to be drawn from the data. Another very important feature of the given tables is that they allow the researcher to represent in a concise format the major interactions of a highly disjointed problem, such as PG. For

this particular reason, quantitative assessments are more easily compared than qualitative assessments. It is likely that if PG thinkers were to import a numeric oriented methodology into their frameworks they would be forced to rethink the "true" significance of the elements and give an explicit account of their conclusions. If every thinker were persuaded to function in this manner, the causality of a given framework might be less veiled and more obvious. Undoubtedly this would foster greater communication.

However, the success of the above presentation has serious limitations. If synergistic effects between the elements (for example, international harmony and resource availability may both influence equality) are to be included, the construction of relevant tables might become too demanding; often synergistic effects are ignored because of the complexity they add to the discussion (see Ehrlich & Holdren (1972) and Commoner (1972)). Nevertheless, reality suggests that important interactions occur at many levels which may be a major drawback of this or any quantitative analysis, though I do not offhand see a more revealing process. Another great liability of the table format is the difficultly in accounting for equivocal definitions for key words (e.g., ecosystem stability and morality), as discussed in the previous chapter. It is practically impossible to expect the thinkers to make the necessary qualifications when

using terms as deceptively simple as "PG." For example, by "PG" does a speaker mean rapid PG, moderate PG, incremental PG, or PG relative to changing environmental constraints? Recall as well, from the last chapter, the issue of long-term versus short-term or intermediate. Does the table indicate which of these the spokesperson is working with? No, but given the multifarious nature of the spokespersons' accounts, it is often difficult to satisfactorily compare the thinkers, when much remains unequal. This is one of the major observations of this work.

With these promising and, at the same time discouraging remarks, let's look at the PG question through a different, yet compatible, lens.

Ideology, Assumptions, and Omissions

In our discussion of the spokespersons' different conceptions of the PG problem, it became clear that the outlooks of the thinkers are a conglomeration of a number of components, including catchwords, definitions, ideology, assumptions, and goals. By adding omissions, as presented in chapter 2 and as revealed by Tables III and IV (as mentioned earlier), to this list, we then have increased the relevant components from which to conduct a thorough examination of the PG debate (as conducted in the previous two chapters). Table

V (next page) provides us with a synopsis of three of these key components, namely ideology, assumptions and omissions. With this information in mind, I will propose a number of important ways the PG dialogue might be modified.

My proposals will concentrate on three areas within the PG debate which need particular refinement--*character*, *content*, and *domain*. A brief explanation of these is in order.

Character involves the style in which the thinkers discuss the question of PG. How often do the thinkers denigrate others, involve themselves in open debate, or integrate other thinkers' works into theirs? Also, to what extent are agendas and sources made explicit and stressed?

Content represents the substance of the thinkers' argument defense. That is, do the thinkers rely on ideology, empirical data, "intuitive" relations, biological predispositions or assumptions for defense of their claims? Also, what is the scope of the elements in interest, for example are global or national interests given more attention and which humans are considered pertinent to the discussion--the northerners/southerners or the affluent/impoverished?

Domain consists of those disciplines in which the spokespersons' thoughts are immersed. Are ecologists making economic based arguments or are economists telling us how biological mechanisms operate? In what follows I will bring attention to these concerns and make recommendations as to

Table V--PG Thinkers' Frameworks

	Ideology	Assumptions	Omissions
Brown	(a) interacting problems amplify one another; (b) certain problems will be more taxing for developing nations, e.g. inflation; (c) fertility programs are most effective means to reducing PG; (d) rural-urban balance essential for society optimization; (e) PG problem simultaneously global, local and individual	(a) change is generally good; (b) world is comprised of rich/poor; (c) national governments are the major players for ameliorating population/resource relationship	(a) new technologies as potential solutions; (b) cultural dimensions to population control
Commoner	(a) countries are due their equitable share; (b) world consists of *ecosphere* and *technosphere*; (c) goal of humanity is harmony with environment and peace among peoples; (d) scientific and technological growth tied to progress; (e) profit for profit sake is dangerous	(a) future energy use of advancing nations outrageous; (b) future economic growth not necessarily ecologically damaging	(a) women's role in the human process; (b) communication as a potentially strong link among peoples
Ehrlich	(a) all nations are overpopulated; (b) synergistic interactions amplify problems; (c) government intervention key to PG reduction; (d) humans must now learn to control their own evolution	(a) population control only humane way to solve PG problems; (b) human physiology precludes humans from understanding PG dilemma; (c) demographic transition is absurd	(a) powers that control distribution practices; (b) significance of distribution to affects of PG
Gilland	(a) infrastructure of LDCs makes them extremely vulnerable to crises; (b) NRR/GRR as good health indicator	(a) LDCs cannot absorb assistance adequately; (b) DCs will not be compelled to aid the LDCs	(a) the role of women; (b) externalities; (c) power of agents at local level
Hardin	(a) short-term changes are not just natural fluctuations; (b) strict government regulation necessary to curb PG; (c) lifeboat analogy; (d) PG not a technological soluble problem	(a) humans will breed too much; (b) competition between people inevitable as people serve self-interests; (c) moral paradigm shift necessary	(a) power of nation-state in determining who succeeds; (b) equal distribution as a remedy
Kahn	(a) developing nations prosperous soon; (b) poor administration of political matters has been source of societal woes	(a) energy shortages very unlikely; (b) limits-to-growth are intrinsically disruptive	(a) human sacrifice during industrial-ization; (b) conflict in the past
McNamara	(a) economic growth at core of necessary improvements; (b) governments active, yet tempered, role in population control; (c) world (especially first world) must allocate funds for development assistance	(a) "inevitable" byproducts of PG; (b) PG effects (political, economic, and moral) will be felt throughout world	(a) ecological economics; (b) pollution as related to PG
Simon	(a) individual liberty primary; (b) equitable distribution not necessary; (c) aggregate (not individual parts) most important; (d) intermediate and long-term most important; (e) cost as correct measure of scarcity; (f) life expectancy good measure of society's success; (g) conservation as a good is silly; (h) economies of scale	(a) humans will work for benefit of all; (b) human creative power practically endless; (c) available resources always changeable in response to human efforts; (d) future technological breakthroughs a certainty	(a) many people in the world are in no position to "invent"; (b) ecological externalities; (c) irreversible environmental damage

Definitions: "Ideology" - statements appearing in the thinkers' texts and reflect overt disciplinary and/or political orientations
"Assumptions" - statements that rarely get explicitly made and are not specific to any discipline or politics

what adjustments can be made to improve the PG dialogue.

Since PG is fundamentally tied to human well-being, we might expect to find the thinkers of PG expressing what they take to be their ideals for human existence--an issue of character. However, rarely are such things included in PG publications. As Swaney notes "an important question not addressed in this [PG] debate is 'in what kind of world do we want to live.'" (1991, 508) Assuming that the thinkers work with such a set of ideals, why should they be so disinclined to state them explicitly? You might have the impression that this is a trivial, or even ridiculous, suggestion, however let me explain why it is very relevant to the PG debate. Suppose Simon were to state, as he might if given the opportunity, that he holds most dearly the value of human life and the ability of people to grow intellectually, technologically, and economically. What position would he then take if humans were dying in California because harmful pesticides were being sprayed on their food products? The owner of the grape vineyards was benefiting economically, though at the cost of human life. Whose side would Simon take? Thus, he must be more precise when articulating his ideal. Either human life takes precedence or economic growth, but not both; certainly one might attempt to order any number of elements, as long as precedence is established. The key point is whatever the ideals articulated by Simon, he would be held accountable for

them, and thus, his pleas for change (or business as usual) must remain consistent with them. Arguably the number of relevant items in the PG debate will complicate matters a bit but again I reiterate that there seems to be no reason for the author not to make her ideals (goals) explicit. Ultimately the offering of ideals focuses a thinker's attention on her work as well as the topic more generally.

Along similar lines, a thinker ought to be forthright with the major reasons why PG is beneficial, harmful or precarious--an issue of content. If the author fails to distinguish between primary and secondary factors adequately, then the causal relationships become blurred and the major points lose their bite. For instance, Brown has investigated an endless number of elements in search of their relationship to PG. However, despite the fact that his work has undoubtedly established new areas of research, it is still unclear what the "major" factors are in his view (see 1991, 15-18). And as it is this that policy people will hear before anything else, these distinctions need to be made. McNamara does a little better job of indicating what are the most relevant relationships. McNamara notes that current PG rates will cause "certain regions and countries [to] grow far beyond the limits consistent with political stability and acceptable social and economic conditions." (1991, 48) Later in the article he goes into detail to describe those specific factors that are of

greatest significance in bringing about unwanted changes--worsening employment, pressures for food supplies and environmental degradation (1991, 54-59). In conclusion, the burying (or clouding) of key relationships with other, less important, relationships has negative consequences especially as the policy maker is made to squirm from confusion and ambiguity.

Thinkers also, unnecessarily blur their comments by offering problems and interjecting solutions at the same time--an issue of character and content. For a given a problem, many, few, or no solutions may be available; recall the philosophical cliché "you can't get an 'ought' from an 'is.'"[51] Thus, thinkers need to separate the *why* (something is a problem) and the *way* (it might be solved). It needs to be stressed that I am not advocating a withdrawal of policy considerations from the thinkers' publications, as I feel strongly that the thinkers have a responsibility to engage themselves in problem solutions as well as problem formulations; particularly the case for the PG question, which has strong policy implications. Generally a policy maker must

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[51]This isn't always the case. As Harding (1991) notes, "in a racist society, 'pure descriptions' of racial difference have little chance of functioning as pure information." (89) Do PG thinkers take this same view, assuming that their accounts are consistent with only one worldview, and thus description entails a specific course of action? No, I don't think they go this far.

be convinced that something is a problem before attempting to treat it.[52] Thus, if the PG thinker fails to sufficiently disentangle descriptions and prescriptions the policy person may equally fail in understanding the necessity for a solution. Here again, my comments here reflect my concern that there is a serious need to simplify communications when possible in order that incommensurability be avoided. This is especially true when PG thinkers are coming from such disparate backgrounds. Ehrlich's *The Population Explosion* (1990) and Brown (1979) do a fairly good job of separating the descriptive and the normative.

Fundamental to any real debate is the lively interaction of the participants--an issue of character and domain. As noted in chapter 2, the spokespersons engage each other less often than might be expected. Even when a group of PG conscientious biologists and economists were gathered at a recent meeting "convened with the noble intention of reconciling [their views]," each group "completely ignored everything the other side said. Then, apparently satisfied, everyone went home." (Mann 1993, 64) Unfortunately, it appears

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[52]John Cairns, a professor at the University Center for Environmental and Hazardous Materials Studies at Virginia Polytechnic Institute and State University, has worked extensively on defining ecosystem services (see Cairns & Pratt 1992). His feeling is that policy makers need a context for valuing such services, which the environment provides humans (as well as other organisms) for "free," because they often do not "see" the degradation of the ecosystems as problematic.

that lack of communication in the PG arena is commonplace.

By contrasting the Commoner/Ehrlich debate of 1972 (see Commoner 1972 and Ehrlich and Holdren 1972) and the Hardin/Simon discussion of 1982 (see Simon 1990, 381-397), one can easily see some potential pitfalls of integrative discussion. In the first instance, the dialogue has many promising attributes, including an even-handed critique followed by a focused and informative rebuttal. Although, the passing reader may be distracted by the harshness of the criticisms, the remarks remain within the bounds of reason and are for the most part constructive in nature. Taking a look at the Hardin/Simon discussion we find a very different picture. Simon and his cohort Ben Wattenberg (who acts as the moderator) dominate the course of the discussion. Hardin is able to make a few points here and there about resource availability and food consumption but is unable to focus the discussion for any length of time. Hence, not much gets accomplished.[53] Thus, although the thinkers' intentions are sincere, the discussion may still proceed with little vigor or animation. With the above said, I suggest that the thinkers adopt norms of conduct for conversations (published or otherwise). Natural scientists have norms for publishing

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[53]To Simon's credit however, he publishes, in full, a reprint of Hardin's review of *The Ultimate Resource* (see original Hardin 1981a), a review in which Hardin steadfastly rejects many of Simon's ideas.

information or announcing new findings (which sometimes get breached as in the cold fusion affair), so why shouldn't the PG thinkers adopt similar policies? Certainly most articles published by the thinkers have been peer reviewed but apparently this hasn't prevented the writings from failing to internalize alternative perspectives or even from adopting an antagonistic tone. From the tenor of the writings of these thinkers, and in particular Commoner and Simon, I have every reason to believe that they want their views to gain acceptance by honorable and scientific means. Perhaps this can be accomplished if more comprehensive and level-headed interactions were engendered.

Proposed norms of engagement may also include some of the following. Every effort should be made to avoid generalizing or categorizing along disciplinary lines. All economists do not think alike nor do all ecologists think the same. The thinkers should attempt to integrate their opponents, as well as their allies, into their articles and books. Otherwise it seems if something is being hidden on purpose. The voices need to be explicit about the scale (global, regional, national, or local) at which their arguments apply. Global concerns tend to yield blanket observations or prescriptions while local matters either get pushed under the table or are undervalued when they do get considered. On a related front, thinkers need to take seriously and make clear the human group(s) that they

are considering. There is a tendency either to overlook the suffering of great numbers of people (e.g. Simon and the starving Africans or Asians) or to ignore the rights of others (Hardin and the non-U.S. citizens).

And lastly, the thinkers might gain something by reconsidering the saying, "better safe than sorry"--fundamentally an issue of content--as this feeling penetrates deeply into the ethos of many people, albeit for different reasons. In other words, wouldn't it be wise for the PG thinkers to think pragmatically about which stance they adopt, given that they do not know with absolute certainty whether they are right? PG thinkers ought to give more attention to the potential negative consequences of their accounts being wrong. Acting pragmatically, the thinkers would choose to support those accounts which have less dire consequences, following a "minimax" (i.e. minimize maximum loss) strategy. Let us look at how implementing this principle might pan out in some of the PG thinkers' accounts. For example, Simon may be correct that PG accelerates the technological enterprise's ability to solve the world's problems, in which case, assuming that a consistent policy were followed, many would be happy in the long term (with short term suffering by many individuals still a reality). However, he may be wrong, and if his advice were followed, PG could ultimately result in massive

starvation, disease, or political turmoil,[54] as predicted by Ehrlich in the late 1960s (and even today). If Ehrlich happens to be wrong then at worst we *might* have fewer people starving in the future (as fewer people would have been born as a result of enforcing Ehrlich's population control measures). If we followed Hardin's advice, then we would let the high PG countries fend for themselves, which according to him would exact a heavy price in terms of lives. However, if he were wrong and the present high PG countries did not suffer to greatly, both we, the United States, (having not "wasted money") and the countries in question would be better off. And lastly what about Commoner? If he were right and changing the means of technological production as well as altering the distribution of wealth were sufficient to allay much of the world's suffering, then the majority of human beings would be content. However if he were wrong, PG would remain unaffected by his policies and would take its toll on many of the world's inhabitants. Thus, it appears that the "minimax" strategy favors pessimistic outlooks (e.g. Hardin and Ehrlich) which entail that you could cope with being right but would prefer to be wrong.

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[54]Simon's account lacks the reflexive moment, one which would make apparent to him the wonderful ability of the humans, presently on the earth, to recognize problems *now* and to take *non-technological*, preventive steps to avoid certain dangerous activities in the future.

Daly (1986) uses the metaphor of the slowly heated frog to indicate that a failure to come to grips with the changes humanity has wrought on the world may mean the ultimate collapse of our society (43). The frog adjusts to the incremental temperature changes gradually, but eventually "croaks" because it doesn't come to recognize its true predicament. As the uncertainty in the future track taken by many PG-related developments is particularly high, aren't humans well-advised to proceed with caution? Perhaps prudence is what we need now, at a time when humans are forcing our ecosystems to extents that the earth has not recently encountered. I am not *here* advocating strong measures to ensure population reductions (or any other strict actions), but rather that we remain open-minded to the multi-faceted nature of PG and enter the discussion with a clear understanding that human life and ecosystem stability *may* be in a very precarious position and not a predisposition for economic growth, exclusionist competition, or nationalism.

Implications of Omitted Items

As discussed briefly in chapter 2, the PG debate, at least as represented by our eight thinkers, lacks a few important elements. These omitted items have important things to say to the PG thinkers. In this section, I will elaborate

a bit more on the implications of two of these omissions, i.e. environmental economics and feminist perspectives. PG discourse could benefit greatly from work in these areas.

Though recent works of Commoner (1992) and Ehrlich (Ehrlich & Ehrlich 1990, 1991) make strides in incorporating many of the notions of ecological economics, on the whole PG spokespersons have neglected to internalize some very important concepts found within the recently developed field of ecological economics. Ecological economics have a variety of viewpoints (cf. Daly (1977) and Tietenberg (1988)). However, I will concentrate on the more conservative strain.[55] According to one of its foremost developers and advocates, Herman Daly, senior economist at the Environmental Department of the World Bank, standard economics fails to take into account the scale of the whole economy. As a result, the economy is regarded as a "perpetual growth machine," a supposition that has dramatic implications (Daly 1986). Among other things, economic growth itself neglects the question of distribution, equality, and freedom. And so if economic growth is considered a good in itself then present distribution problems could easily intensify.

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[55]I consider this strain more conservative because it is less willing to take a wait-and-see attitude. And so, it is more "conservative" with regard to allowing the earth to undergo continued, unabated change, as this change may wreak havoc on the world's ecosystem.

Basically, the ecological economists have attempted to develop a more "holistic economic paradigm" (Hamrin 1983), one which takes into account the ecological costs of energy use at all levels of production, differential growth patterns (Boulding 1978, 293), as well as the quantitative limits of our energy budget, the latter set by the influx of solar energy (Daly in Hamrin 1983, 90). The results of this reasonably simple effort have much to say to PG thinkers, including the following: The interconnectedness of population, energy use, resource depletion, pollution and ecosystem disruption are central to any understanding of future PG's effects. GNP is a poor indicator of "beneficial" activity, since it does not have an index of welfare (Daly 1986, 42). There are two alternatives to increasing sufficiency by technological advance--"reduce the population" or "give necessities priority over luxuries." As such, "the criteria of sustainability and sufficiency" remain critical to the issues of optimal PG and PG's effects (Daly 1986, 43). And, finally, the economy is "an open subsystem of a larger but finite and non-growing ecosystem." (Daly 1992, 22) All of the above comments speak to a variety of PG issues, ones that have been the source of conflict and intellectual dead ends. In particular, if PG thinkers use ecological economics as a way to deal with "faulty" economic presuppositions, then they will be less likely to get attacked for supposedly being ignorant

of economics, a just accusation given the PG thinkers' have at times relied on conjectural argument. Associating their ideas directly with ecological economics will make standard economists' allegations less convincing.

Feminist accounts of economics and science also have contributed ideas very relevant to the PG discourse. Waring (1988) notes that the present invisibility of women's labor and lack of imputed value for the environment are a result of international government institutions which have relied on myopic national accounts as a basis for their policy making. Among the items that "officially" account for "nothing" are a pollution-free environment, mountain streams with safe drinking water, leisure time,[56] the absence of a nuclear power threat, and, most importantly, "the great bulk of women's work--reproduction, raising children, domestic work, and subsistence production." (Waring 1988, 30) Outraged, she adds that, on the other hand, militarism and the destruction of the environment, in terms of jobs created to repair it, are recorded as growth. PG thinkers could gain much from coming to terms with these ideas, as national accounts play such a important role in the policy arena.

Okin (1979) criticizes Western political thought for its

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[56]See Gorz (1988) for a more in-depth discussion of the utility of incorporating much more leisure time into the lives of the general public.

androcentrism and its discriminatory underpinnings. She takes offense with standard hierarchical models of the family as well as functionalist modes of thought which make it impossible for women to "achieve economic, social, or political equality with men." (293) She also advocates the removal of sex roles (outside of women's procreative capacity) as found within society (303).

Harding (1991), having described the male dominated nature of science at all levels--theory, epistemology, experiment, production, and position--proposes a new epistemology one with stronger standards of objectivity and reflexivity. She attacks many of the conventional notions of gender, sexual orientation, and empiricism.

Incorporating some of the ideas of these works would definitely improve the PG debate. PG thinkers could benefit greatly from Okin's (1979) recognition of internal political prejudices as cornerstones for potential inhumane, unsympathetic policies. All the works might force PG thinkers to reconceptualize the substance of the demographic data they utilize by reconsidering the context within which this data has been collected and organized. And lastly, these women provide an opportunity for PG thinkers (who are all men) to see the world as an educated women might; differently than a man by virtue of her different social status within society (Harding 1991).

Ideas for Future Research

During the course of my research, I came across several intriguing ideas for future study. Below I briefly describe a few of these, some of which are direct extensions of this thesis and others that are only peripherally related.

Future research topics include:

(1) Map out, qualitatively or quantitatively, the thinkers' views on a whole host of variables (e.g., economic growth, energy use, and nationalism) that enter into the PG discussion, with special focus on the types of arguments and materials drawn on for support for each causal relationship stated or implied.

(2) Delve into the existence of networks (communication, institutional, etc.) among PG thinkers and those parties on the periphery of the PG question. This may provide a better picture of the origins of ideological biases and the direction of individual programs.

(3) Compare the thoughts of PG thinkers with the substance of U.N.'s world conferences on population (e.g. Bucharest (1974) and Mexico City (1984)). Are the ideas compatible or commensurable and are the PG thinkers' ideas specifically mentioned?

(4) Consider the position of ethical and aesthetic considerations within the PG debate. A lack of these

considerations may be an indication that natural science or economics has a stronghold on the debate, while an over abundance of them may be evidence that the thinkers recognize (perhaps subliminally) the ineffectiveness of science to provide an adequate solution.

(5) Investigate why PG, historically, has been considered a global problem rather than one specific to any one nation. What makes PG different from other "environmental" concerns (e.g., polluted waterways, toxic waste) which have only recent received worldwide attention.

(6) Consider PG thinkers who don't publish in English and in the United States. Alternative perspectives of PG might be found in thoughts from Second or Third World thinkers. Certainly any such views would need to be taken into account, if a more complete picture of PG thought is desired.

Final Remarks

The above remarks are an attempt to provide a variety of elements, which when taken as a whole, represent a proposed framework for future PG discourse. The quantification of PG thinkers' perspectives yields some interesting relationships. A more elaborate quantification, perhaps one that deals with synergistic effects, is suggested. Qualitative aspects of the arguments are considered and recommendations are made as to

how the debate might be amended in terms of its character, content, and domain. And the chapter concludes with a short list of future avenues of research.

If these remarks are found to be helpful, perhaps the PG thinkers can write up a joint declaration expressing their common interest in promoting the above framework as the norm for communication and articulation. However, given that the PG thinkers have up and till this point failed to incorporate each other works and given that they have serious interests in effecting policy, my comments would be better served if they were directed to the policy fora, conferences, etc., where decisions are taken on PG issues. These arenas might have a much more realistic shot at opening "blackboxes" of the PG debate. For instance, if the policy administrators were sufficiently convinced that PG thinkers were arguing with alternative senses of problems, they might be inclined to encourage the PG thinkers to amend the structure of their presentations. And as the PG thinkers have greater reason to listen to those forces they most greatly want to influence than to me, perhaps the policy makers would be successful in their efforts along these lines.

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