Extract concerning Malthus, taken from **Resources and Population: A Study of the Gurungs of Nepal**, Cambridge Univ. Press, 1976, ch.16, pp. 295-312.

p.295   One major hypothesis concerning the interrelation between resources and population is represented by the work of Malthus. As somewhat over simplified by his critics, Malthus' position appears to be a variety of Parkinson's Law: population expands to absorb the food resources available, and a little bit over. Certainly this is *one* of the arguments put forward by Malthus. He stated that "population has this constant   tendency   to   increase   beyond   the   means   of subsistence".[1] He also argued that "population invariably increases when the means of subsistence increase", unless halted by one of the three "preventive checks" of moral restraint, vice or misery.[2] Furthermore, he did see the chain of causation to be one which led from physical resources, particularly food, to population. Thus he wrote that "agriculture may with more propriety be termed the efficient cause of population, than population   of agriculture..."[3] Yet the determinism is not as simple as it may seem, for he continues the passage by stating that "they certainly react upon each other, and are mutually necessary to each other's support". Malthus did not merely see population growth as a reaction to increases in food production, it had a momentum of its own. Thus he wrote:

"We will suppose the means of subsistence in any country just equal to the easy support of its inhabitants. The constant effort towards population, which is found to act even in the most vicious societies, increases the number of people before the means of subsistence are increased. The food, therefore, which before supported eleven millions, must now be divided among eleven millions and   a half."[4]

To this extent population growth is an independent variable. But what Malthus

p.296 is unwilling to concede is that such growth will necessarily have beneficial effects on agriculture. Since his argument on this subject anticipates the major counter-thesis put forward since his time, it is worth quoting the passage in full. He writes:

"That an increase of population, when it follows in its natural order, is both a great positive good in itself, and absolutely necessary to a further increase in the annual produce of the land and labour of any country, I should be the last to deny. The only question is, what is the order of its progress? In this point Sir James Stewart . . . appears to me to have fallen into an error. He determines, that multiplication is the efficient cause of agriculture, and not agriculture of multiplication. But though it may be allowed, that the increase of people, beyond what could easily subsist on the natural fruits of the earth, first prompted man to till the ground; and that the view of maintaining a family, or of

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[1] Malthus, Population, i, p.6
[2] Malthus, Population, i, pp.314-5 and also p.304.
[3] Population, ii, p.144
[4] Population, i, p.15

obtaining some valuable consideration in exchange for the products of agriculture, still operates as the principal stimulus to cultivation ... We know, that a multiplication of births has in numberless instances taken place which has produced no effect upon agriculture, and has merely been followed by an increase of diseases; but per haps there is no instance where a permanent increase of agriculture has not effected a permanent increase of population somewhere or other."[5]

Here Malthus agrees with those who argue that population growth stimulates agricultural growth. He goes on to say, however, that there is no inevitability about this causal chain. Population *may* grow autonomously *without* leading to agricultural growth. If so, there will be disaster. We will see that Malthus is fairly close to his later critics in this view. He also shares their basic psychological premise concerning man, namely that he is lazy and uninventive, or, put in another way, that he places leisure above every other good. Thus Malthus speaks of "the natural indolence of man" and argues that "A state of sloth, and not of restlessness and activity, seems evidently to be the natural state of man".[6]

Malthus' four main propositions can conveniently be summarized as follows.
A. Population growth sometimes leads to agricultural growth.
B. Resource growth always leads to population growth (though he later qualified this).
C. Population will always grow, unless curbed by moral restraint, vice or misery.
D. Population grows geometrically (exponentially), resources grow arithmetically.

p.297 There are a number of major criticisms that can be made of these propositions, some of which are based on evidence which has been accumulated since Malthus wrote. There is little disagreement with Proposition A, indeed it is the central tenet, in a strengthened form, of those who criticize him most forcefully. The second proposition can be shown to be invalid as a universal generalization, even though many agricultural historians would agree with Slicher van Bath that "In an agricultural society, favourable economic conditions almost inevitably lead to an increase of population".[7] It is ironic that it is English history, in the century before his birth, that provides one of the best negative examples to this thesis. It is generally agreed that between about 1650 and 1730 the population of England remained static, despite considerable improvements in agriculture and communications and hence a growing gross national product and per capita income.[8] Increased wages "instead of occasioning an increase of population exclusively, were so expended as to occasion a decided elevation in the standard of their comforts and conveniences".[9] Another type of

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[5] Population, ii, p.144
[6] Population, ii, p.25 and i, p.59
[7] Slicher Van Bath, Agrarian History, p.314
[8] The evidence concerning population, wages and cost of living is conveniently summarized in Wilkinson, Poverty and Progress, p.71.
[9] Flinn, Induastrial Revolution, p.66 is here quoting Malthus; the same point is made by Chambers, Population and Society, p.59.

counter-argument has emerged from the study of what happens after a sudden high mortality. It appears to be a logical extension of Proposition B that if resources become more abundant, then population will grow quickly to absorb them, whatever the cause of resource increase. It would seem to be predicted that if an epidemic or famine significantly reduced population, without destroying the resource base, fertility would increase or expectation of life improve, so that the newly vacant resources would quickly become absorbed. This is found to be the case in certain societies, for example seventeenth century France,[10] but England is again a negative instance. In the high mortality of the 1630s, for example, the crisis was succeeded not by a rapid spate of marriages and births but the reverse.[11] Likewise, after the Black Death in England, population continued to decline for another century. The sum of all this is that Proposition B is false; increased resources do not always lead to an immediate expansion of population.

Proposition C is also untrue. Even in the absence of "vice, misery and moral restraint" population does not necessarily grow. A good example of this negative finding seems to be Tibet, whose population appears to have been declining since it reached its peak between A.D. 600 and 800. There are no obvious ecological or economic reasons to explain this; resources have been plentiful. Social and psychological factors have intervened.[12] Studies of animal behaviour support this negative conclusion. It is impossible to explain fluctuations in animal numbers merely in terms of food resources or to assume that numbers will always rise if there are resources available. Quite the opposite is true.

"All the animal populations which have been the subject of observation have been found to suffer periodic declines in numbers which are not

p.298 generally the result of starvation. These declines often continue in successive generations under conditions in which there could be no question of a shortage of food, and yet may result in the near-annihilation of a local population."[13]

It is, of course, just possible to reconcile these findings with Malthus's argument by defining "vice" and "moral restraint" very widely so that they include territoriality, the selective neglect of the young and the old, animal migrations, delayed marriage. Restated in this more general way the proposition would be "Population will always grow unless there are physical or cultural checks which prevent it growing". Although this appears to be a tautology, it does contain one central and crucial truth, namely, that, unimpeded, population always grows rapidly. If maximum fertility is allowed and there are no checks, there will be a huge expansion of any population. Given this premise, the problem is to analyse the checks. This would appear to be a more helpful way to look at problems than to assume

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[10] Graphs 18-20 in the supplement ot Goubert, Beauvais, show that baptisms, marriages and deaths moved together until the middle of the eighteenth century.
[11] Wrigley, Population and History, figure 3:4.
[12] Ekvall in Spooner (ed.), Population Growth, p.269.
[13] Stott in Vayda (ed.), Environment and Cultural Behavior, p.91.

that populations are normally in equilibrium, loss of which is the problem.

The final proposition concerns the speed of growth; exponential growth of population as opposed to arithmetical growth of food resources. With figures for world population in our mind there is no need to emphasize Malthus' prescience. Technological growth however has made the growth of resources appear to be exponential also. This, for example, is the background to the remark by Gellner that "one is tempted to invert Malthus and observe that technological advance makes resources grow geometrically, whilst population growth becomes at most arithmetical".[14] This is one of the cases where changes have occurred since Malthus' time which have made his analysis oversimple. The other enormous change, which in many ways only reinforces his warnings, has been in death control. Public health measures and antibiotics have added a new element to the debate, especially as they are not necessarily related to social and economic developments of other kinds.[15] Malthus' argument is based on changes in fertility, for this alone was really within the control of man when he wrote. The problem as he envisaged it was that fertility rose to absorb an increase in resources. What he could not have foreseen was that there would be huge decreases in the death rate, not only in wealthy countries but in materially poor countries. To take but one example, in Jamaica the deaths per thousand dropped from 26.9 in 1916- 20 to 9.5 in 1956, while over the same period the births per thousand *increased* marginally from 36.4 to 37.3.[16] The other major advance since Malthus' day has been in what he would have termed "vice", namely contraceptive technology. Although, so far, birth control has proved immeasurably weaker than death control, there is a new element in the various equations.

As Malthus stated, the causal chain between population growth and re-

p.199 source growth is the "hinge" on which the whole argument turns. If he is right, the picture is extremely pessimistic. Although population *may* grow autonomously it will *certainly* grow as a result of any technological advance. Mankind is trapped he quotes approvingly the remark that "distress and poverty multiply in proportion to the funds created to relieve them".[17] It follows from this position that the only way to break out of the vicious spiral is to control population rather than to increase resources; as he wrote, "Finding, therefore, that from the laws of nature we could not proportion the food to the population, our next attempt should naturally be to proportion the Population to the food".[18] It is not surprising that such a hypothesis should have many critics. Here we will consider the

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[14] Gellner, Thought and Change, p.118; Wrigley, Population and History, p.53, makes a similar point.
[15] As Lord Balogh, among others, has pointed out in the preface to Dumont & Rosier, Hungry Future, p.10
[16] Blake, Family Structure in Jamaica, pp.7,8. These crude rates do not take into account changing age structure and are therefore only a very rough index.
[17] Population, i, p.274.
[18] Population, ii,p.172.

most powerful of these anti-Malthusian attacks, that put forward most cogently by Boserup[19] and given statistical backing by Clark[20] and historical and anthropological support by Dumond and Wilkinson.[21]

The basic aim of what we shall call the Boserup thesis is to turn Malthus on his head, in other words to return to the position of Sir James Steuart and the eighteenth century agriculturalists. Boserup states that "population growth is here regarded as the independent variable which in its turn is a major factor determining agricultural developments".[22] Or, as Clark puts it, "population increase generally comes first, and then, usually with great reluctance, people adopt technically more efficient methods because they have to provide for the increased population".[23] As Boserup admits, the historical and anthropological evidence for such a thesis is really too thin to prove that the chain of causation runs one way or the other. She therefore argues from 'a priori' grounds as follows.

Proposition A. People prefer leisure to all other goods.

Proposition B. The intensification of production, for example the move from hunting and gathering to swidden cultivation and then from swidden to settled multi-cropping, always brings more work for less rewards.

Proposition C. The only force strong enough to force people to intensify production is increased population.

Proposition D. Since population growth can no longer be explained by growth in resources (since the chain works the other way) some other cause of such growth must be suggested, apart from improved living standards. The suggestion is that this is a purely technical improvement in health due to medical and sanitary developments.

Proposition E. Given the above propositions, population growth is not an evil, indeed it is necessary. For example, it is true to assert, as Boserup does, that "primitive communities with sustained

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[19] Conditions of Agricultural Growth (hereafter cited as Conditions).

[20] Economics of Subsistence Agriculture with Margaret Haswell; Population Growth and Land Use. Geoffrey Hawthorn has pointed out to me that Boserup and Clark are proposing crucially distinct theses; the former applying to the transition from hunting and gathering, through swidden, to settled agriculture, the latter to all socio-economic systems. It is therefore only at the most general level that the two can be bracketed together. He also rightly suggests that some of Boserup's theses can be saved by re-formulating them and limiting them strictly to hunting and gathering or swidden systems.

[21] Dumond, 'Population growth', was published in the same year as Boserup's work, yet the two seem to have had no influence on each other. Dumond's argument (especially on pp.313,318) that population growth is often a cause of economic growth is identical to Boserup's. Wilkinson, Poverty and Progress.

[22] Conditions, p.11.

[23] Allison (ed.), Population Control, p.231.

population growth have a better chance to get into a process of genuine economic development than primitive communities with stagnant or declining population".[24]

Proposition F. Population growth is not only a *necessary* cause of economic

p.300 development, it is also implicit that it is a *sufficient* cause. It will, except in exceptional circumstances, trigger off such development. When this supposedly automatic development does not occur it is explained away as a "special case" rather than dismantling the whole model. For example, Clark cites a number of cases of "extreme congestion" or "rural over-population" from all over the world and then explains that they "represent an unhappy by-road from the normal course of economic development". Yet he remains puzzled and concludes that "It is hard to give any generalized reason as to why this state of affairs should come about. On the whole we must seek for political and historical rather than for narrowly economic reasons. Historically, some deficiency in the political order often prevented or impeded the development of towns and of commercial activities...."[25] Since it is basically in this last proposition that the emotional appeal of the model lies, we will return to it later.

The assertion that people prefer leisure to all other goods, though echoing Malthus, seems untenable as a universal generalization, as any anthropologist could show. Status and prestige, power, material wealth, merit or other religious rewards, all these and other goods are frequently desired more than leisure. People may be inventive or work harder in pursuit of such goods irrespective of population growth. Once this is accepted, much of the rest of the model evaporates. The second proposition, that the intensification of production always brings more work for less rewards, has a considerable measure of truth. No longer is it possible to assert that the more primitive the means of production, the harder people have to work. For example the !Kung bushmen, who are hunters and gatherers, have been calculated to have a working week that varies from 1.2 to 3.2 working days per adult: Lee concludes that "hunters may actually enjoy more leisure time per capita than do peoples engaged in other subsistence activities".[26] But while there is much truth in the proposition, it is not universally valid. Ethnographic evidence can be brought against it, for example Waddell in a detailed study of a New Guinea Society concludes by arguing that there is "little to suggest that extensive systems are inherently more productive than intensive ones" per unit of labour input.[27] Another complication explains a certain ambivalence in the use of this argument. Boserup and Clark are not merely prepared to accept that economic development automatically leads to less and less productive labour. They hope to show that at a certain point "cultural and social" development will also occur, which requires growing leisure. Their case would hardly be a strong one if mankind were on a treadmill, working ever harder to feed more mouths. Thus it is necessary for Boserup to argue that "a period of sustained population growth would first have the

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[24] Conditions, p.118.
[25] Economics of Subsistence Agriculture, pp.159,162.
[26] Lee in Vayda (ed.), Environment and Cultural Behavior, pp.62,74. A general summary of the data is contained in Sahlins, Stone Age Economics, ch.1.
[27] Waddell, Mound Builders, p.218.

effect of lowering output per manhour in agriculture, but in the long run the effect might be to raise labour productivity in other activities and eventually to raise output per manhour also in agriculture".[28] This appears to contradict Proposition B, and the reason

p.301 why advanced industry should be able to free mankind from drudgery while advanced agriculture can not do so is not made clear.

The third proposition, that the only force strong enough to force people to intensify production is increased population, is linked with Proposition A, the leisure hypothesis, which has already been disputed. Counter-evidence of a historical nature can also be adduced. There is evidence for a considerable "agricultural revolution" in England during the period 1650-1730, yet this occurred in a period of static population in this country. Surpluses were produced to export and to raise the standard of ostentation of the rich and the standard of living of the middling, *not* merely as a response to threatened starvation. In fact the whole Weber-Tawney thesis of "acquisitive capitalism" is centred on the attempt to show how certain societies pursue economic growth apparently for its own sake, pushed on by the "work ethic" beyond customary targets.

Proposition D states that since population growth is not the result of growth in resources, some other external cause must be found and that this is medical improvement in the widest sense. Thus the emphasis is on a decline in mortality rather than, as Malthus argued, a rise in fertility. Although this is not a subject of central importance to Boserup for, as she says, "our inquiry is concerned with the effects of population changes on agriculture and not with the causes of these population changes",[29] yet it is rather essential that some alternative to agricultural growth as the cause of population growth be offered. Thus Colin Clark saw England's population growth during the late eighteenth century and onwards as due to a fall in mortality owing to the disappearance of plague and in the nineteenth century as due to the elimination of smallpox and discoveries such as anaesthetics.[30] Boserup also assumes that, "medical invention and some other factors", other than food production, explain population growth.[31] Clark realized that finding such an explanation "may seem to some trivial or irrelevant. But it is not. Here we find the underlying cause, for better or worse, of the increase in the rate of world population growth which has been going on ... since the middle of the eighteenth century".[32] Recent studies of demographic history suggest that Clark's interpretation is oversimple and mostly incorrect. Medical improvement and a decline in the death rate do not seem to have been the causes of population growth. A detailed comparison of two English communities based on the technique of family reconstitution has shown that it was a lowering in the age at marriage and hence a rise in fertility, as Malthus argued, that caused population growth, rather than a decline in mortality.[33] More generally, as we have noted, the data from Nepal and other parts of the world

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[28] Conditions, p.118.
[29] Conditions, p.14.
[30] Population Growth and Land Use, pp.50-1.
[31] Conditions, pp.11-2.
[32] Population Growth and LaND Use, Pp.50-1.
[33] McKeown and Brown, 'Medical Evidence' in Glass and Eversley

shows that rapid increases in population have often occurred long before any medical improvements can have been effective. Thus Proposition F is also incorrect.

p.302   If the previous propositions had been correct, it could be argued, as in Proposition E, that population growth is not an evil, in fact it is a necessary cause of economic growth. Since the causal chain has been disputed at every point, the proposition has little force. It is further weakened by a large number of studies which tend to show that population growth makes economic growth more difficult, rather than easier.[34] Having rejected the earlier propositions, it is even more difficult to accept the final proposition, namely that population growth is not only a necessary but also a sufficient cause of economic growth. Although this is not stated to be an iron law by Boserup, her message is essentially optimistic. She argues that "the scope for additional food production in response to population growth is larger than usually assumed" and dismisses the negative examples that could be brought forward as follows. "Growing populations may in the past have destroyed more land than they improved, but it makes little sense to project past trends into the future, since we know more and more about methods of land preservation and are able, by means of modern methods, to reclaim much land, which our ancestors have made sterile".[35] Yet Boserup admits that there is no inevitability of a technological advance occurring after population growth. "If it is true . . . that certain types of technical change will occur only when a certain density of population has been reached, it of course does not follow, conversely, that this technical change will occur whenever the demographic prerequisite is present".[36] This nod in the direction of the many great famines which have afflicted most of the great civilizations, India, China, France, has an implicit optimism and belief in "technology" behind it. This was perhaps understandable in 1965 before Bihar and Sahel and the growing starvation of the last few years.

While the emotional appeal of the Malthusian and counter-Malthusian arguments lies in rigid predictions which are not likely to be true, there is a principle which lies behind both positions which has very great implications for social anthropology. This is that while there is a two-way link between population and agriculture and social structure, population growth is, in itself, an important force for change. This is more explicitly recognized by Boserup and her followers. By asserting that population growth is the in dependent variable, mainly the result of forces outside the control of individuals, they let loose a chain of causation which is powerful enough to explain much of what

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(eds.), Population in History. David Levine, 'The demographic implications of rural industrialization' (Cambridge Univ., Ph.D., 1974).

[34] Major studies by Coale & Hoover, Hoover & Perlman, Ruprecht, Enke, Newman & Allen, are discussed by Jones 'Population growth' in the New Guinea Research Bulletin, no.42. All the studies show that per capital income will increase faster with lower fcertility. A less dramatic conclusion is reached in the survey of the problem by Easterlin in Ford (ed.), Social Demography, p.273.

[35] Conditions, p.43.

[36] Conditions, p.41.

anthropologists observe. Population is an independent variable, restructuring the world as we know it, altering institutions and modes of thought inexorably, if practically invisibly. If this is true, then it is patently the concern of the anthropologist. Yet this conception of population growth as the prime mover lies embedded in Malthus also. We have seen that he admitted the possibility that population growth could occur autonomously. In a sense, expansion of resources does not cause population growth, it *permits*

p.303   it. Such resource growth merely relaxes for a while the vicious controls which normally hold back the operation of this immensely powerful "natural law". The "natural law" of population growth to which he subscribes is that the superfluous fecundity of human beings which arises from the 'passions of man kind', is independent of all human institutions. Population expansion is more powerful than political and social systems; only death, from disease, famine, or war, can hold it in check. Arguing against the Utopian Godwin, Malthus wrote that "though human institutions appear to be, and indeed often are, the obvious and obtrusive causes of much mischief to society, they are, in reality, light and superficial in comparison with those deeper-seated causes of evil which result from the laws of nature and the passions of mankind".[37] The accidental amelioration of the environment by expansion of resources only allows such laws to operate to their full. Without committing oneself to a full Malthusian position, it is easy to see that both Malthus and his critics present a strong case for believing that population trends, rather than economic changes, provide a framework for understanding the current world. It certainly appears to justify the method adopted in this treatment of a Nepalese community where population growth has been taken to be the determining variable, while resources and social structure are treated as dependent.

In order to be convincing, however, we do not need merely to know *why* population grows, but also *how* it grows and how it is held in check. We need, therefore, to investigate actual models of population change. The search for such models led to the growth of what has been called "transition theory", that is an attempt to correlate demographic patterns with the major social transformation since Malthus' day, namely industrialization. The model is a fairly simple one. It divides population situations into three kinds as follows:

1. That in which neither mortality nor natality is under reasonably secure control and where the potential growth is large despite a possible current low rate of increase.
2. That in which, while both natality and mortality are declining, natality decreases at first less rapidly and then more rapidly than mortality, and the population grows until it reaches the third stage;
3. That in which natality and mortality are low and under secure control, and the population is stationary or in a state of incipient decline.[38]

This is illustrated in Fig. 16.1. Superficially such a model seems to fit with historical experience in the West fairly well. It also has the comforting virtue of predicting that all will be well in the end. Furthermore it offers some hope of fitting demographic change with stages of economic and social

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[37] Population, ii, p.12.
[38] From U.N.Determinants, p.44.

growth.[39] It goes further in that it also suggests reasons for the changes from stage to stage. These have been summarized as follows:

FIG. 16.1. THE DEMOGRAPHIC TRANSITION; CLASSIC MODEL

p.304 "Transition theory assumes that pre-modern populations maintain stability of numbers by balancing high, though fluctuating, death rates with high birth rates. As they begin to experience the effects of modernization, improvements in nutritional and health standards reduce mortality while fertility remains high and rapid growth ensues. Later, urbanization and other social changes associated with the more "mature" stages of industrialism create pressures favoring smaller families, and the birth rate falls, once again approaching balance".[40]

This theory is anti-Malthusian in that population growth is the dependent variable, medical changes and life styles the moving forces.

A number of powerful criticism can and have been made of this model. At the general level it fails to separate causal from descriptive propositions. It generalizes from the historical pattern of population growth followed by western Europe in the past three centuries, but such generalizations, even if they were based on much sounder historical evidence, would not necessarily apply to the rest of the world. Even as a descriptive model, however, recent evidence from a variety of sources casts doubt on its empirical accuracy. Three major criticisms are as follows. Firstly, there is no parallel between Europe before the industrial revolution and the contemporary Third World. It appears that fertility in Europe was much lower than in Asia and Africa and that population densities were not as high as in the main paddy areas today. Nor, as we have seen, is it clear that it was a drop in mortality that caused population growth in the late eighteenth century; a rise in fertility may have been just as important. Crucial differences between the West and the contemporary Third

p.305 World in stages two and three of the model have become obvious. For example, mortality has already declined in a number of non-Western countries far more rapidly than it declined in western Europe in the nineteenth century. Nor does industrialism and urbanism always bring a drop in fertility a number of cities, for example, have very high fertility rates.[41] Yet the stereotype lies at the back of much thinking on the subject and is therefore worth a closer examination. Since most social anthropologists have traditionally worked within societies which would be classified as in "Stage One", or "Stage Two", it is at these traditional patterns that we will look.

The major characteristic of "Stage One" or what we will call "Traditional" societies, according to the above thesis, is that there is little population growth because of high death rates which cancel

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[39] For example those suggested by Ryder and summarized in Hwthorn, Sociology of Fertility, p.70.
[40] Wrong, Population and Society, pp.18-19.
[41] Some of the evidence is summarized by B oyden in Harrison and Boyce (eds.), Structure of Populations, p.426.

out high birth rates. According to Boserup, for example, "until recently rates of population growth were low or very low in most preindustrial communities".[42] The logic behind the argument seems cogent and has been stated by Warren Thompson.

"There is mathematical proof that birth and death rates must have been at about the same level, on the average, throughout most of human history. This proof is quite simple. If population grows steadily at any given rate, even a very low rate, it will double in a given period of time . . . Man has had a high death rate until rather recently because of what Malthus called the positive checks to population growth - disease, famine, and war".[43]

Such a hypothesis has several important implications. It suggests that the main control on population has been perennial malnutrition and everyday disease. It also seems to suggest that fertility is high because mortality is high; in other words, people see that they have to breed in order that the race survive. It would then seem logical to argue that "One hard-headed argument for continuing efforts to lower mortality rates is that fertility is unlikely to be brought down very much until mortality rates are lowered".[44]

A closer look at both data and logic suggests many flaws in this hypothesis. While it may be true that on the average human population has grown at an extremely low rate over long periods, this may conceal an entirely different short-term pattern than that implied above. This pattern has been well out lined by Kunstadter as follows.

"A more nearly accurate model of demographic conditions in the small hunting and gathering or agricultural communities within which most non-modern men have lived may have been high fertility (beyond the level needed for replacement in normal years) with low-to-medium death rate, with occasional or periodic variations in death rates due to natural disasters (floods, earthquakes, climatic fluctuations disrupting the normal environ-

p.305 mental relations, insect plagues, crop failures . . . etc.), and probably more recently, epidemic diseases. Chronic food-shortages must also have been a limiting factor on population growth".[45]

This alternative pattern, which we may term a "crisis" model in accordance with its description by French historical demographers, may be understood more easily by way of Fig. 16.2, which contrast it with the original model implicit in the demographic transition hypothesis.

Although we have no long-term data for hunting and gathering communities, it is possible to examine the history of various agrarian societies. Diagrammatic evidence for Chinese population

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[42] Conditions, p.56.
[43] Thompson, Population and Progress, p.16.
[44] Jones, 'Population growth' in New Guinea Research Bulletin.
[45] In Harrison & Boyce (eds.), Structure of Populations, p.315.

500- 1953,[46] for Egyptian population 700 B.C.-1966,[47] and for French seventeenth-century parishes, all show a pattern similar to that suggested by the "crisis" model.[48] In normal years there is a fairly rapid growth, which is cut back periodically by massive disasters of various kinds. The important consequence of establishing this alternative traditional pattern is that it throws open again the whole question of why population growth has recently been occurring in many parts of the world. It is no longer satisfactory to explain it in terms of lowering of everyday very high mortality as a result of medical improvements or an improved standard of living. It is more profitable to look at the elimination of periodic crises. This is especially important for the study of Nepalese demographic history since it

FIGURE 16.2. TWO MODELS OF PRE-TRANSITION POPULATIONS

p.307 appears likely that, like most societies, those in Nepal fitted the "crisis" pattern. To explain the growth of population from at least 1890s, therefore, we need to look to the elimination of crises.

Of what nature, we may wonder, were such crises. If we look at the eight events which are believed to have led to massive declines in Egyptian population, it appears that five were conquests, in other words 'war'. Many of the Chinese declines were also caused by conquest; the invasions and devastations of the Mongols are thought to have reduced the Chinese population to half its former level within fifty years, over 60 million people dying or failing to be replaced.[49] One of the results of the conquest of Central Mexico by the Spanish was the appalling drop in the population from about 25 million in 1519 to 2.5 million in 1608.[50] The Thirty Years War, on a cautious estimate is reckoned to have lowered the population of Germany from 21 to 13.5 million.[51] But warfare, with its major side-effects of starvation and plague, has declined as a major check during this century. The two World Wars together are estimated to have led to the death of up to 60 million persons - a little more than the Mongol conquest of one nation, China.[52] The demographic impact of war, the localized famines and epidemics it brings, have been minimized and the percentage of world population destroyed by it this century will probably, on present levels, be the lowest for many centuries.

While war has evidently been a major check to the growth of large agricultural civilizations, the same is probably true in many of the smaller hunting and gathering societies studied by anthropologists,

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[46] Clark, Population Growth and Land Use, p.72.
[47] Hollingsowrth, Historical Demography, p.311.
[48] Goubert, Beauvais, p.45. The concept (and term) 'crisis' has been adopted from the work of the French historical demographers.
[49] Clark, Population Growth and Land Use, p.72.
[50] Hollingsworth, Historical Demogaphy, p.135.
[51] Russell, Violence, p.182. Dr Wrigley pointed out that the type of disease circulated by the Spanish invasion of Mexico (external) and by the armies in the Tnhirty Years War (internal) were very different.
[52] The figures are from Russell, Violence, p.9.

of whom the Gurungs, until recently, were an example. The lack of historical records makes it difficult to establish this fact but Brookfield and Brown, in their study of the Chimbu of New Guinea, argue that warfare and epidemics were common in the past and continued until the early part of the present century.[53] The elimination of such endemic warfare under external pressure is among the reasons for population growth. It is easy to see that the same may be true in many parts of Asia and Africa. In societies which are small and close to subsistence level, even a small skirmish at the wrong time of year can have disastrous effects on production and lead to high mortality. The effects of such mortality may last for several generations. If this second model is correct it helps to explain the previous puzzle of why population growth in many parts of the world seems to have started well before any medical advances or rise in the standard of living. For example, the population of Nepal, Java, Ceylon, Northern Thailand, and elsewhere seems to have been growing from at least the early nineteenth century. This could not be explained by the earlier model. If, however, there had been a "crisis" pattern, all that would be needed would be more effective peacekeeping, by an external force such as the British in India, to prevent

p.308 periodic wars. This explanation fits well with the hypothesis developed by Vayda and others that warfare is often developed, or acts, as a form of population control.[54]

The improvements in communications and agriculture which prevent localized famines have also helped to allow natural growth to occur. This is a complex phenomenon since technological changes are only a part of the explanation. As Kunstadter has put it:

"With regard to famine as a limit of population, perhaps as important as the introduction of new food technologies has been the introduction of social changes. The effect of these is to cushion the temporary fluctuations in availability of foods. Money, credit, markets, and wage-labour opportunities have meant the expansion of economic activities far beyond the bounds of primitive community ecosystems".[55]

Again, what has probably happened is not that yearly production has been increased dramatically, but rather that the periodic crises caused by bad weather, pests, or other phenomena which might reverse a generation's population increase in one year, have been eliminated. This process has been observed at work in eighteenth-century Europe and probably helped to eliminate the crisis pattern, in France.[56] This may not be such an important factor in some Third World countries since, as Wilkinson has observed, "starvation appears to have been a rarity before the disruptive effects

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[53] Brookfield & Brown, Struggle for Land, p.73.
[54] Vayda (ed.), Environment and Cultural Behavior, ch.10. Some striking evidence from medieval Europe and from China, as well as a similar argument to that in the preceding paragraphs, is presented in Dumond, 'Population growth', pp.304-7.
[55] In Harrison & Boyce (eds.), Structure of Populations, p.328.
[56] Goubert, Beauvais, ch.3.

of European contact".[57] Yet, during the last century, such changes have been important in allowing continued population growth.

It is also difficult to estimate the importance of the eradication of disease. As a correlate of warfare, epidemics have taken a huge toll. It is worth reminding ourselves, as a recent author has pointed out, that although pestilence and malnutrition are often assumed to have "always been a feature of human existence until . . . the advances of medicine in the past half century". "In fact, for well over 90 percent of man's time on earth, before the Neolithic development, neither pestilence nor malnutrition is likely to have been a common cause of ill health or death".[58] The major virus diseases of today, cholera, dysentery, plague, tuberculosis, typhoid, are all dependent on high human densities and can therefore have been prevalent only in fairly recent times.[59] Like warfare, they appear to have been a phase through which world societies passed when a certain density occurred. Like warfare and localized famine, however, they appear to have been temporarily eliminated on a large scale. The influenza epidemic in India in 1918-19 was the last great mortality; up to twenty million lives were lost.[60] As a proportion of the total population of India today, some 50 million deaths would be the equivalent. Even the current

p.309 tragedies in Bangladesh, Sahel, Bihar and elsewhere are not, as yet, on this scale.

The model above suggests that population growth is the normal condition of mankind, only held back by periodic crises. This view has been held by a number of historians and anthropologists.[61] It helps to explain much of the data we have, for though there clearly have been some societies with the classic features of perennial high mortality and high fertility, probably a greater number have followed the "crisis" pattern. Yet these two models do not account for all the pre-transition populations of which we know. A third model that needs to be developed is one where there is a homeostatic adjustment between births and deaths which keeps fertility below its maximum. Here the check is not mortality, but social controls on fertility. We shall call this third model the "homeostatic" pattern.

This pattern has been observed in England between the fifteenth and eighteenth centuries, in France during the later eighteenth century and in Norway at the same date.[62] In the latter two countries it developed out of an earlier "crisis" pattern. The "crisis" and "homeostatic" patterns are illustrated in Fig. 16.3. Perhaps the best example of the homeostatic pattern in action is in England during the period

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[57] Wilkinson, Poverty and Progress,p.23.
[58] Boyden in Harrison & Boyce (eds.), Structure of Populations, p.415.
[59] Idem.
[60] Quoted in Thompson, Population and Progress,p.125.
[61] For instance Helleiner, 'Vital revolution' in Glass & Eversley (eds.), Population in History, pp.79-86; Kunstadter in Harrison & Boyce (eds.), Structure of Populations, p.348.
[62] Wrigley, Population and History, ch.3; Drake, Population in Norway, p.39.

1650-1730 when population was kept level,not by very high mortality rates, but by keeping fertility below its maximum. Here England was strongly contrasted with France with its "crisis" pattern.[63] In England it was marriage patterns and, possibly, the use of contraception which

FIGURE 16.3. TWO MODELS OF POPULATION PATTERNS

p.310 kept population level with resources. In England this pattern even allowed resources to increase while population was static.

Interestingly, animal populations also appear to exhibit both "crisis" patterns and "homeostatic" ones. The "crisis" pattern is very similar to that described above. Here is one description of the process.

"Some of them (i.e. animals) accept crowding and violence as a recurrent situation, and populations of these animals have regular cycles of rise and decline, with crises that cut them down to size every four or five generations. These species include voles ... and muskrats.... At the beginning of the cycle, the population builds up rapidly, in an uncontrolled way. When a certain density is reached the animals become extremely aggressive . . . many pairs are forced into poor feeding grounds; but this reduction in density is only attained at the cost of savage fighting, including lethal attacks on the young ... The after-effects of violence .. . persist after the density has been lowered, and it takes some time before the population recovers and begins a new cycle of growth".[64]

This description of war and violence appears to be a good account of the situation in some of the societies we have examined. But there is another, homeostatic, pattern, especially among birds. The data and the thesis to explain it is particularly associated with the work of Wynne-Edwards. The argument is that what dictates fertility is not physical resources, in other words food and shelter as Malthus tended to argue, but social resources, particularly the availability of "social space". Though the food supply may increase, the population of some animals will remain constant because social space has not expanded. Mating behaviour, care of the young, and many other crucial determinants of population growth are all affected by the availability of territories. Large numbers of birds, for example, will not breed if there are no territories. Hierarchy is also a mechanism which intervenes to stop the easy flow from resources to population. Some of the animals dominate, others are pushed out. Animals and birds exhibiting this pattern rarely breed up to a point where they starve to death. On the other hand these "social controls" are often vicious. There is often a very high infant mortality rate arising from infanticide, abortions, neglect. Among some small songbirds up to 90 % of the eggs never produce chicks which grow to adulthood. One author has argued that "Animal populations would seem to be adapted to their food resources by a variety of built-in physiological and instinctive mechanisms rather than by starvation, and these come into play in response to signals of incipient overcrowding in

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[63] The various patterns are well describdd in Wrigley, Population and History, especially ch.3.
[64] Russell, Violence, p.158.

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advance of serious shortage of food".[65]

Although, as Benedict has pointed out,[66] territorial and hierarchical behaviour among humans has "conspicuously not led to a control of population"

p.311 in many societies, and it is necessary to add many other cultural factors to the rather simple model of animal behaviour, the homeostatic model is a useful one. It helps us to understand certain population patterns, for instance that of England, and it is possible that there are a number of societies, particularly, perhaps, those inhabiting confined areas such as islands, which have kept their fertility well below maximum in this way. Where this homeostatic pattern is present the explanation of sudden population growth is more likely to be a decline in the controls over fertility than in the elimination of perennial or crisis mortality. It is perhaps not a coincidence that Malthus, living in one of the first large-scale civilizations known to exhibit this pattern, should have concentrated on fertility changes as the major determinant of population growth.

The model which appears to fit the Gurung case best is the second one, though the evidence is very scanty. It seems unlikely that their present medium to low mortality is solely the result of modern medical improvements. Thus they are unlikely to have had their population over the last few hundred years held in check by perennial disease and high infant mortality. Nor is there evidence that they have controlled population by maintaining a homeostatic control of fertility, either through contraception, high age at marriage, or very considerable use of abortion and infanticide. This leaves the middle pattern. Their subsistence life and the frequent wars of pre-nineteenth century Nepal make this at the least a plausible explanation. If this hypothesis is correct it has several important implications. As far as the resources and population argument is concerned, it suggests that both Malthus and Boserup are both right and wrong. Malthus is right in arguing that population will expand to fill the resources available to it, but wrong if taken rather over simply to mean that resources expand first in time, to be followed quickly by population growth. On this issue Boserup is probably correct to believe that, in the absence of crises, population was the propelling force, driving the Gurungs into settled arable farming, for example. She was wrong, however, to believe that the cause of population growth was medical change. Peace and order were enough.

The practical implications of accepting this model are extremely grave. There are reasonable grounds for believing that as the moderately high mortality rates are cut back further, population will grow even faster than at present. There are only three ways in which an inevitable equilibrium will be reached. Firstly, there is the prospect of day to day mortality rising steeply to balance high

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[65] Scott in Vayda (ed.), Environment and Cultural Behavior, p.113. There is, as one might expect, considerable disagreement about 'animal' population dynamics and this is consequently an over-simplification/ One good summary of different views is in the appendex to Lack, Populations Studies of B irds. I owe this reference to Geoffrey Hawthorn.
[66] In Harrison & Boyce (eds.), Structure of Populations, p.82.

fertility, perhaps with a rapid rise in infant deaths. Secondly, there could be a return to the "crisis" pattern from which, for a short time, Nepal and the Gurungs have escaped. Thirdly, there is the possibility of establishing a control of fertility by a very considerable rise in the age at marriage combined with use of contraception on a scale beyond the dreams of family

p.312 planners. The alternatives to this third solution are bleak. The growing unemployment, inequality, landlessness, malnutrition, soil erosion and other effects of population growth which have been discussed in the account of Gurung agriculture in the first half of this work are likely to accelerate rapidly. Finally, population will be stabilized by a rise in the death rate.