An Ecological Analysis of Political Ideologies

Agustí Galiana

Unitat d'Ecologia, Universitat de València,
edifici FEDER, despatx 4-056, campus de Burjassot
E-46100 Burjassot, País Valencià
SPAIN[1]

Abstract

In this paper, progress in human ecology is used to help understand political ideologies. Two processes that occur in advanced, dense, urban, agricultural societies are highlighted: impoverishment due to population growth and stratification due to diverging breeding strategies. Political ideologies are classified according to how they go about both obtaining resources and controlling population. The "aggressive strategy" seeks new resources and leaves population control to spontaneous "social chaos," resulting in a climactically poor, stratified society. The ecological shortcomings of the liberal, communist and fascist variants that unsuccessfully try to avoid this result are reviewed. The "religious strategy" does not seek new resources, but conforms to poverty, however the outcome is identical. Therefore, the only possibility of achieving a stable, rather egalitarian society with high standards of living is the "ecologist strategy," which seeks population control and a sustainable use of renewable resources.

Keywords: *Malthus, breeding strategies, stratified societies, tragedy of the commons, environmentalism*

> *"I want my country to be ruled by science and reason, not superstition and ignorance."*
> *Taslima Nasrin, woman Bengali writer*

Introduction

To build up a solid natural-science basis for social sciences is one of the main goals of human ecology. In particular, the progress in human ecological knowledge is relevant to understanding and trying to solve the many disorders in modern human societies. In other words, politics — the science for the (fair) goverment of human societies — is a social science that could progress significantly by incorporating that knowledge.

Practitioners of previous approaches to the human nature — including academic traditions, political ideologies, and religions — reject the findings of human ecology and their possible practical applications. However, what little could be learnt from the ecological approach should be more highly valued than just mere opinions from those pre-scientific schools. On the other hand, many natural scientists reject the progress made in the scientific knowledge about the human species, as well. In that respect, it should be pointed out that several epistemological drawbacks have been overcome.

First of all, although such values are important in politics, they can also be treated scientifically, as a scientific analysis can tell us what natural processes are involved in how human societies function, and what the likely results of every conceivable course of action could be. Second, historic facts are amenable to scientific study (Boyd and Richerson 1994). Evolutionary biology has a historic object of study, and human ecology often takes an evolutionary point of view — see Mayr (1996) for a thorough epistemological defence of evolutionary biology. Popper's (1957) opinion against the possibility of a predictive theory of history has been cited repeatedly, but one should bear in mind that his criticism was put forward against the Marxist pseudo-science, and that Popper eventually accepted the scientific nature of evolutionary biology. Third, the fact that social phenomena are changeable by free will does not preclude scientific inquiry either — it just makes it more difficult to study (for example see Hardin 1993).

The first proposal of a scientific theory for human social behavior is in the classical work by Malthus (1798). Although humanists have usually ignored Malthus' contributions, they form the theoretical core of human ecology — population numbers in relation to resources is the single most important aspect of populational phenomena, which include those corresponding to human society. This paper owes much to the former work of two great ecologists, Garrett Hardin and Paul Colinvaux, who have built a little known but considerable theory on the Malthusian foundations.

Ecology of the Human Species

General ecological concepts can be extended to our species, as suggested by different authors (Margalef 1971; Colinvaux 1982; Siegel 1984). This task is quite straightfor-

ward if hunter-gatherers are considered. Cues on this ancestral way of life can be seen in Harris (1989), Diamond (1992), Cavalli-Sforza (1993) or Campbell (1995). This ecological niche — i.e., the hunter-gatherer way of living— results in a low population density, similar to other social "hunter-gatherers" such as wolves, baboons or chimpanzees. Members of our species lived like this for hundreds of thousands of years. Inventions made by those humans extended the human niche, culturally adapting to many different environments around the world, so that our species populated all continents by the millions, from a modest original population size of tens of thousands (von Haeseler et al. 1995). However, throughout this expansion our way of life remained essentially much the same. Only quite recently have the inventions of farming and industry substantially changed our ecology.

Agriculture and related cultural adaptations are usually referred to as the *neolithic revolution*, which first occurred about 10,000 years ago, well after the biological traits of our species evolved. This amazing ecological change (through cultural evolution) experienced by humans — only social insects have achieved something similar — is described in several works (for instance, Moore 1985; Boyden 1987; or Harris 1989). Very likely, people became — and remained — farmers in the several regions where agriculture evolved as the only solution in the face of dense populations. The initial high density of hunter-gatherers is considered to be a result of increased foraging efficiency, although perhaps other processes could have been involved, such as increased breeding efficiency or a reduction of both foraging area and prey abundance due to the climate change after the last glaciation. A more thorough discussion on this point can be found in Diamond (1997).

The increase in available resources associated with food production elicited the greatest population growth in history, a 10- to 100-fold increase in local human density. However, other less positive changes arose from the neolithic revolution, including hard labor, a low standard of living, a poor diet based on few foods, sicknesses caught from livestock, and an increase in intrasocietal conflicts. Politics refers to the complex social organization typical of those advanced, dense, urban, agricultural societies.

According to Colinvaux (1976, 1980, 1982) farming humans do not occupy a single ecological niche, but several, corresponding to the many social classes or groups of inherited occupations. The ruling class lives by controlling the agricultural surpluses produced by others. This control — together with sedentarism — makes it possible for a few to accumulate many riches, i.e., live in a much broader niche than that of the hunter-gatherer. Surpluses also allow for a (small) middle class of soldiers, merchants, artisans and public servants. The remaining population is poor peasantry. Inheritance of status and assortative mating according to status (however cultural in nature) lead to a stable population division into wealthy, middle class, and poor. An intermediate social situation between the egalitarian hunter-gatherer society and the stratified agricultural one could well be that of redistributive potlatches (Harris 1989), with the "great man" in an intermediate situation between a tribal chief and a king, who has most of the population working for him but without using coercion or enjoying a specially wealthy way of life or automatically inheriting his position.

Once a society has achieved an efficient agricultural technology it evolves towards a stratified society. This general pattern of social stratification should be considered a great scientific discovery, and finding the reason it occurs could be of the greatest practical importance. Colinvaux (1980) suggested that the divergence of wealthy and poor is explained by diverging adaptive breeding strategies. The theory of breeding strategies considers two possible extreme strategies: somatic effort (few offspring, high parental investment), associated with stable environmental conditions, and reproductive effort (many offspring, low parental investment), associated with unpredictable, transient favourable environments (Colinvaux 1976; Clutton-Brock 1991). The diverging human breeding strategies would be as follows.

The rulers got into the habit of using up the many resources they easily and steadily received, and even invented new ways to use them. Concomitant facts to this broad niche include the expensive rearing of children, low fertility, low infant mortality and alternative occupations to child-rearing for women, which feed back to increase their standard of living, as there are fewer people to share the resources. This trend only stops when they barely reproduce. Now and then this situation can lead to negative growth, making some room for social mobility. Offspring of wealthy individuals who chose not to behave in this wealthy way of life would be lost from the wealthy subpopulation. Biological offspring from the wealthy that are not reared in the wealthy life style would not belong to the upper class, so they would not contradict the very low fertility typical of it.

On the other hand, farmers would rear more children than former hunter-gatherers or horticulturalists, as child rearing is not limited by the movement of people, and children can help the family economy from a young age. The next generations must then find new lands, improve the technology and/or work harder to maintain their living standard. As this will be increasingly difficult, they will eventually be forced to reduce their use of resources. This process causes strong population growth along with progressive impoverishment, only declining when the subsistence level is reached. The easiest way to imagine how this process worked is through cultural natural

selection: those choosing to lower their standard of living would have more numerous offspring and would eventually become predominant, establishing a new tradition of high fertility and poor living. This cultural evolution was impossible for humans with earlier technologies, as a family could never have managed to rear many children.

The above breeding-strategy divergence seems to fit in well with anthropological evidence, although some data could be conflictive. Horticultural societies, making use of an unintensive form of agriculture, do not usually show social stratification and are rather simple politically (Lenski et al. 1995). In some horticultural societies (Kaplan 1994) one can find that the cost of children is greater than the help they afford to the family economy. Hence, changes associated with intensive agriculture (i.e., beyond horticulture) should be taken as a critical step in social evolution.

Those diverging breeding strategies can be considered as variants of a single general one where the aim is to have as many babies as one can afford (Colinvaux 1980). This general strategy and its diverging outcomes would not be possible without the previously-evolved high mental abilities typical of our species. Human *social niches* have evolved their own diverging population controls. The wealthy subpopulation is limited by its broad niches and the produce of the poor subpopulation. But the poor subpopulation — and the overall population — is controlled by a new set of controls, the *social chaos* phenomena (Table 1). Social chaos includes famine (when surpluses are scarce and expensive), war (made possible by armies) and epidemics (new sicknesses brought by high densities and livestock). The first two are particular forms of intraspecific competition, the last one is a form of parasitism. Judeo-Christian tradition has long known these controls as "the horsemen of the Apocalypse" (Moore 1985). Under these controls, humans have destroyed both their health and environment while their numbers thrive.

Table 1. Human population control mechanisms, corresponding to three phases of human evolution. The population controls in every phase correspond to sophistications of controls from the preceding phase.

POPULATION CONTROL MECHANISMS		EVOLUTIONARY PHASES
Conventional animal mechanisms		
predation		GENETIC
parasitism		EVOLUTION
abiotic destruction		
interspecific competition		
intraspecific competition		
Social chaos human mechanisms		
famine	disease	SPONTANEOUS
war	poverty	CULTURAL
inflation	housing shortage	EVOLUTION
crime	unemployment	
distress		
Advanced human mechanisms		
high living standard		CONSCIOUS
temperance		CULTURAL
		EVOLUTION

Sources: Colinvaux (1980), Ehrlich and Ehrlich (1991) and Hardin (1993); Ornstein and Ehrlich (1989) for evolutionary phases.

Social Ecological Laws

Once a stratified society has been achieved, history teaches us that it can last a long time. The social organization will change most likely by an ecosystemic disruption in the flow of resources. And this disruption is most likely to be brought about by unsustainable agricultural exploitation. This was the case with soil salinization in Mesopotamia, or excess tree felling on Easter Island. The longest lasting stratified societies known — China and Egypt — were long lasting because of periodical river floods in well-drained soil.

There is always the possibility of increasing a population's resources, making the few wealthy wealthier and the many poor a little less miserable. But this economic growth has always been ephemeral, because population growth leads to misery again. As the bulk of the population has its breeding limited at the subsistence level, any additional resources would allow more children to be reared. This is Malthus' core argument and deserves being named the *first social ecological law*, identical to Colinvaux's (1980) "all poverty comes from continued population growth," or Hardin's (1993) "demostat" model — in which, analogous to a thermostat, the culture of a population sets its equilibrium carrying capacity. The next social ecological laws are restatements of those in Colinvaux's (1980) book with minor modifications.

The second law is that reproductive differences cause populations to become stratified, as we have already discussed. According to Colinvaux's (1980) suggestion, the stratified social organization can be considered a climactic political system for advanced, dense, urban, agricultural human societies. This second mechanism of a spontaneous social stratification allows a deeper ecological understanding of human societies than the one achieved by the Malthusian mechanism alone. Interestingly, Hicks (1969) described a parallel economic process leading to social stratrification; both processes could be two sides of the same coin. The general result of stratification makes it possible to speak simply of "wealthy" and "poor." The existence of middle classes (scanty for most of history) does not essentially disrupt the model.

The middle classes suffer more from a reduction of resources than the already miserable lower classes. The

wealthy might spend less on luxury goods and services provided by the middle class, or collect taxes from the middle class for what cannot be extracted from the lower class. Thus, the third law could be: "the relatively wealthy are the first to experience the effects of overpopulation." Certainly, this overpopulation is relative, as they could just conform by reducing their standard of living (eventually they are forced to do so), but this reduction is fiercely resisted. Here we must distinguish *overpopulation* (relative to resources) from *crowding* (absolute numbers).

History teaches us that the middle classes developed ways of getting new resources, through trade, technology and conquest — which are interrelated phenomena (Colinvaux 1980; Diamond 1997). Without these innovations, history would have been a rather boring continuity of Pharaonic societies. The fourth social ecological law could then be: "the middle class tries to get additional resources from their own or other people's land." In *The fates of nations* many historical events are seen from this point of view, ranging from the forming of Greek city-states to the 1960's student revolts.

The industrial revolution was the second great cultural change for our species. Science discovered new, efficient ways of using natural resources, mainly taking advantage of the energy stored in fossil fuels. Great economic growth had barely begun in Malthus' time, fooling him into his prediction of inevitable return to misery. Malthus could not foresee the yet to come possibilities of exploiting nature that would raise the world's carrying capacity to billions of people. As everyone knows, it has not been a story of ever-increasing wealth and happiness. When the tradition of trade or conquest of a nation was impeded, its population suffered from want. The "decadence" following every resource boom signified a return to the stratified social climax equilibrium.

Western civilization has so benefited from science that, for the first time in history, the bulk of some agricultural societies enjoy high living standards. In other words, a majority has adopted a broad niche. However, this has only happened in the last decades, after 200 years of "revolution." It seems that this overall high standard of living — an escape from the Malthusian mechanism — has been possible due to women's education and rising social status, "distracting" them from reproduction (Ehrlich and Ehrlich 1990).

The fifth law says that "all processes of economic growth end in an empire of military conquests." The empire is the typical political form of the stratified society. Empire-forming can be inhibited by rival empires of similar strength, or otherwise can last a long time. In a long-lasting empire with stable resources, population growth leads to the progressive impoverishment of the middle classes (which made it possible in the first place), through taxes and exhausting ways to make new fortunes. An accompanying sixth law says that "the dimensions of an empire are given by its technology." Western civilization has achieved such a high level that it now rules the whole world. These last social ecological laws would include corollaries such as "population increasingly concentrates in the cities" or "all expansion causes bureaucracy."

The Basic Aggressive Political Strategy

For the first time human ecology provides a solid base for a political science and technology. From an ecological point of view — i.e., considering resource use and population control — advanced, dense, urban, agricultural, human societies have three general kinds of political practice (see Table 2) that can be named *political strategies*. We have already commented on the first, aggressive strategy: resources are taken when found; population control is achieved through social chaos. This covers almost all political history, with several variants. The aggressive strategy is the original human strategy, and the predominant one even today. There has been some discussion whether human aggression is

Table 2. Political strategies for an advanced, dense, urban, agricultural human society, from an ecological point of view. Here their essential traits are summarized: how they aim to obtain resources for the population, how they try to control the population, and what the climactic result of each operation is. For the aggressive strategy, four variants are shown.

STRATEGIES	RESOURCES	POPULATION	CLIMAX
AGGRESSIVE	effort to find new resources	social chaos controls	stratified society
variants:			
CONSERVATIVE	*stress on rich/poor separation*	*stable*	
LIBERAL	*stress on free market*	*unstable, evolves to conservative*	
SOCIALIST	*stress on central planning*	*unstable, evolves to liberal*	
FASCIST	*stress on moral oppression*	*unstable, evolves to liberal*	
RELIGIOUS	conform to poverty	social chaos controls *unstable, evolves to conservative*	poor eglitarian society
ECOLOGIST	sustainable effort	advanced human controls *stable?*	rich egalitarian society

innate or not, but it is simply spontaneous behaviour for ecological and psychological reasons: when resources are limited, the easiest way to get them is taking them by force. Sometimes this force is used against other people, other times against natural resources.

Our psychology was fixed in the evolution of our species long ago, and trying to change its fundamental traits would probably be an idle task. There is increasing interest in the new science called evolutionary psychology (Barkow et al. 1992; Wright 1995; Ridley 1996) which takes into account that our brains were shaped by natural selection and have potential and constraints in accordance with our evolutionary past. Hardin (1968, 1993) described a process that frequently happens in dense, advanced, agricultural human societies and clearly shows our limitations in intelligence: the "tragedy of the commons." The free-access to a limited resource (the "commons") by a population leads to short-term individual reward for an unsustainable use of the resource, so that the resource is exhausted in the long-term which is harmful for all individuals (the "tragedy"). The long-term process is rarely seen, and it is even denied when explained. This process is of great importance in understanding the aggresive strategy.

In the following paragraphs the main aggressive ideologies and utopias are analysed in an archetypical way, acknowledging that all the mixed strategies are possible.

The conservative climax. Conservatives seek only their own upper class benefit, and they do not care for a global utopia. However, we can consider that their social ideal is the caste society, i.e., the ecological climax of the aggressive strategy. In this sense the conservative strategy is the only successful political ideology to date. In a stratified society, the upper class sees its power as natural and fair, and any challenge to this *status quo* is taken as a threat. Usually the hopeless lower class learns to share this view.

An intriguing possibility deserves to be mentioned. We can imagine a society in which almost everyone belongs to the upper class, which would appear to be the case in most current industrialized societies. This could be congenial with the conservative ideology, but measures ought to be taken to keep a high living standard and to avoid the extension of a lower class. In that case the conservative strategy would become the ecologist one (see below). Hardin (1985) has already commented on the dual conservative-revolutionary nature of human ecology.

The liberal utopia. The first successful subversions to the conservative society were those of the merchant bourgeoisie, asking for free trade and enterprise to make money. The liberal utopia believes that free trade will bring welfare to everyone, including the working class, as free people will become employees of the most prosperous enterprises. But there are several ecological shortcomings in this naive belief. Adam Smith does not deserve complete responsibility for this utopia, as he thought that sometimes specialized labor and free trade could bring economic growth, not that they must always do so (Hardin 1993).

First of all, many costs — the so called *economic externalities* — are not considered in the marketplace and are eventually paid for by society as a whole through taxes and environmental degradation. Recently, the minimum amount of economic externalities has been estimated as twice the global gross national product (Costanza et al. 1997). Businessmen — those most in favour of liberal politics — try to obtain maximum benefit with minimum cost, passing as many hidden costs as possible to the "commons" of society — i.e., the externalities suffered by all (Hardin 1993). Putting these costs out of the market contradicts a strict liberal ideology, which is then of almost impossible application. Neoliberalism — the current dominant Western ideology — occurs at the same time as heavy subsidizing in most economic activities.

A second mistake is that resources are taken as infinite or infinitely substitutable. This might be true with many technologies, but certainly not with the most essential resources, such as food, water, or clean air. Ecologists are aware that humans currently exploit the possible yield of those resources almost to the maximum, and certainly beyond the long-term maximum sustainable yield (Vitousek et al. 1986; Pauly and Christensen 1995; Postel et al. 1996). Hardin (1993) has also argued that resource limitation together with compound interest necessarily lead to inflation and financial cracks.

A third problem for a liberal utopia is the process of monopolization that occurs in any free trade society, easily understandable from an ecological point of view as a process analogous to competitive exclusion (Hardin 1960). Liberals demand international free trade including the abolition of tariffs, and although this could make the best enterprises earn more money worldwide, the result could well be to impoverish all nations in the long run. Daly (1996) has argued that a return to mainly nationalised markets would be a necessary part of a sustainable economy.

We can take the New York stock exchange crisis of 1929 as the first failure of liberalism, and neoliberalism (made possible by means of increased technology) will lead to another big failure in the near future. Financial cracks, inflation, lowering of wages, externalities, and monopolization are processes brought about by the liberal ideology that would eventually bring the society back to a stratified condition. If this has not yet occurred it is probably because in fact, as Lenski et al. (1995) argue, current political practice follows a pragmatical line.

The communist utopia. Among liberal-governed industrial societies of the last 200 years, where middle classes became numerous, there has been a belief in extending wealth to everyone. It first happened in the French revolution, when this belief was named the *left*. Jacobins and later communists, Marxists and socialists have (acritically) considered themselves the only fair political alternative. Their communist utopia relies on a central government to plan for the good of society, a government proceeding from the laboring class. Karl Marx defined his doctrine as asking and giving "from one according to his capacity and to each according to his need." Here the "tragedy of the commons" applies: wealth distribution becomes a sharing of misery. It seems that overall benefit is curbed by resource limitation, and solidarity is curbed by responsibility blurring (Hardin 1993). The "commons" are found in many aspects of social life, as one should expect from making almost everything common property. We can date communism's main failure to the Fall of the Berlin Wall in 1989.

The social democrat subvariant seeks no proletarian dictatorship — proletariat having disappeared altogether from Western industrial societies — but a democratic government. It has been rather influential in those societies, and indeed succeeded in establishing a welfare state and universal education — measures that effectively raised the living standard of those societies. However, after the Fall of the Berlin Wall this ideology is becoming weaker and even merging to neoliberalism. Some short-sighted liberal ideologists have seen this latter process as the "end of history."

Although an increasing number of scholars are trying to integrate ecological considerations into Marxism (Martínez-Alier and Schlüpmann 1987; Eduardo Bedoya, personal communication), their concern is focused on the exhaustion of resources and increased pollution, but avoid the population problem. Communism has traditionally been pronatalist, with people being seen as a country's most valuable wealth. The dialectic materialism has recently been criticised by Marxist authors as not being materialistic enough — it failed to consider natural, ecological limits to human behavior, particularly population limits. The current Chinese communist regime deserves to be mentioned as the only non-natalist government in the world, reversing its initial policy.

The fascist utopia. The fascist ideology is another answer to social problems that shares its concern for the laboring class with the socialist one, but substitutes a rigid moral control (together with political oppression) for a huge central government. Religious topics are considered to be very important, providing the main way to control the masses. Its usual means of gaining new resources are to commit aggression against foreign countries and ethnic/religious minorities. However, after the initial plunder, resources stop growing. This violent aggression makes this political option a short-lived one. In practice, we know that the only long-lasting fascist government (Spain under Franco) converged quickly to liberalism.

The Religious Strategy

This first distinct alternative to "aggressive politics" sprang from among the most miserable in the first advanced, dense, urban, agricultural societies (Toynbee 1934-61). The civilized religions teach people to conform in poverty and renounce aggression. Usually, they also demand big families, and resources are not taken into account. Thus, impoverishment is guaranteed, but not feared. The religious utopia is a rural society where everyone is poor and peaceful. However, renouncing all luxuries in exchange for some spiritual peace is psychologically unacceptable for many people and would become increasingly unacceptable as resource availability diminishes. This *religious solution* has only worked with small groups, such as sects, or religious minorities among the poorest. As it is not a solution for society as a whole, the less religiously-inclined faction of society tends to aggressively abuse the more religious faction. A dynamic equilibrium should be achieved between both strategies, one that is similar to the doves and hawks in game theory. Ironically, this equilibrium is equivalent to a stratified society.

Opposition to traditional aggressive ideologies makes for several coincidences between the religious strategy and the communist and fascist variants. On the other hand, the religious utopia is similar to the lowest-class way of life in a caste society. The religious ideology faces the unavoidable contradiction between the defence of the poor and compliance with poverty. It has even been criticised for its strongest character — moral superiority — as it is doubtful whether an overpopulated, miserable society is the best possible society. Hardin (1993) has argued that reproduction has no moral superiority to long-term carrying capacity.

Christianity has adapted itself to the changing predominant (aggressive) political ideologies. The Roman emperor Constantine took advantage of the efficient moral control of miserable crowds by Christianity, and ever since the church high hierarchies have been a part of the ruling, upper class — i.e., adopted the conservative strategy. Later on, Protestantism was associated with the emerging liberal regimes in Northern Europe. The Roman church did not adapt to this liberalism (previously thought of as congenial to a dangerous moral relativism) until the end of the Nineteenth century, when the governments of several European Catholic states accorded subsidies — from tax money — for the church. Certainly religions could adapt in the future to an ecologist strategy, as suggested by Daly (1996).

The religious strategy can be extended to secular ideologies. Anarchism could be an example. Current fashion in "solidarity" — another name for "charity" — seems to follow this as well. There are other ecological approaches to religions, such as the effect of cultural natural selection on the evolution of religious beliefs (Lynch 1996).

The Ecologist Strategy

This last, but not least, important strategy seeks to ask the environment what it can produce steadily, while keeping the population size low enough for a high living standard. Searching for new resources alone only leads to a society where most of the population lives in misery, so that population control is the other logical way to achieve a high living standard. It would seem that former human societies never tried this second option. Maybe it never occurred to them. As Diamond (1992) comments, archeology tells us what the result was, so that now we can learn from the past and act more wisely. However, the ecologist ideology opposes many deep-rooted beliefs and traditions, such as individual freedom to breed or to profit from resource exploitation. As we have seen, this is the type of freedom in unmanaged commons that leads to a tragic ending. Conscious population control is essential to the strategy: although future long-term sustainable resources would be less than current resources, individual "slices" of the "resource cake" could grow bigger.

The ecologist strategy is neither *right* nor *left*, it is a radically different option that shares particular points with both ideological groupings. For this reason it has been attacked from both "sides." It can also be seen as a worthy proposal accessible from any former political standpoint. Taking into account the goal of a just government, and the reality of ecologic limits, one should begin critically considering one's own political prejudices — be they communist, liberal, conservative, fascist or religious. Human ecology clearly shows that population control (not birth control) is a necessary (if insufficient) condition for the solution of social chaos. Lack of knowledge about human social functioning, together with interests of those performing bad resource management, act against the spread of the ecologist view. Contrary to some criticisms, public instruction, free press and democracy are compatible with the ecologist strategy (see Ehrlich and Ehrlich 1991).

To reach an equilibrium between resources and human population, action has to take place on three fronts: population control, consumer control, and the control of the technological impact on the environment (Ehrlich and Ehrlich 1991; Hardin 1993; Daly 1996). The Malthusian theory says population growth can only decline if people feel miserable, although a "relative misery" can work equally well. Wealth is a relative concept; people with a low normative living standard feel wealthier than traditional wealthy people with similar per-capita income (Lee 1986). According to Hardin (1993), a good measure of relative wealth is fertility. The new population controls can be considered variants of the former "anomy or distress" category (see Table 1, advanced phase). Hardin (1993) listed several proposals in this sense, although he acknowledged they are preliminary contributions that need more study and more testing.

Individual consumption should be high in a high living standard population, but it should not sky-rocket as now seems to be the case, for it would require — in a stable population — a reduction of resources used for a substantial part of the population. It seems that the more we have the more we want, but we can learn to appreciate a sufficient wealth. Also, we could satisfy new needs in ways that do not consume additional resources (Daly 1996).

The use of renewable energy sources is a technological aspect of great practical importance, it establishes the total resources to be shared in the long run by individuals in society. However, the stress of the ecologist ideology is not on scientific technological problems, but on problems of "ethical technology" to convince people that other strategies are false solutions, and on "legal technology" to find ways to achieve ecologist goals in a progressive and socially acceptable way.

High-fertility groups will appear recurrently, threatening the living standard of the population. An ecologist government would have to control them, treating them as a "populational cancer." It might seem odd that there should be law against high fertility, but it would have been equally odd to our ancestors that today we prohibit free access to source waters (that could be poisoned). In the past, officials had to resort to measures such as red staining of fountain water to keep people from drinking, as in the last cholera epidemics in Barcelona. Now most people see those restrictions as a natural, practical thing, beneficial for everyone and generally without need of law enforcement.

Laws should be found that achieve the ecologist goals with a maximum of democratic agreement and a minimum of application problems (making difficult decisions affecting social groups with divergent interests). Hardin (1993) suggested the best management of states would be a mixed system of private and common property owners — with a limitation of individual rights by central democratic governments through "mutual coercion mutually agreed upon." To be effective, restrictive laws have to force the citizen to behave responsibly by means of rewards, not punishments. Also, the smaller the state, the more efficient the democratic control. As every country has distinct cultural traditions and somewhat different problems, they could also follow different

paths towards an ecological government (Hardin 1993; Daly 1996). A diversity of approaches would also mean a trial-and-error process to this difficult matter. Reports from specialist committees would be constantly needed, but they should be controlled to avoid corruption, fatigue and esotericism (Ornstein and Ehrlich 1989).

The ecologist strategy would benefit from citizens being well-informed about public affairs. Ornstein and Ehrlich (1989) and Hardin (1993) suggested some changes in education, journalism and administration to reach this goal. The most important fields of knowledge for the creation of a conscious, ecologist society are probably biology and psychology. From evolutionary biology we can learn the necessity to adapt to an ever-changing environment. From evolutionary psychology, we can learn how to overcome the limited abilities evolved in our brains to solve our social problems. Other matters that can help to reorient cultural evolution are history and economics. Ecological history provides the first world-wide account of human facts that makes sense (Colinvaux 1980; Ponting 1991; Diamond 1997) and can be used to teach people globally. Ecological economics is essential to define the new society (Daly 1996), and people should be taught this and the failures of former economic theories.

It seems that some steps have already been taken towards an ecologist strategy. The increase in living standards in heavily populated Western societies during the last 50 years is an indication of population detachment from the Malthusian mechanism. However, this has been made possible only with a huge increase in the consumption of resources. Because of limited resources, this solution is not available for most of the world population. Furthermore, unsustainable consumption means a future reduction in the global flow of resources, so that current aggregate consumption in developed countries is not granted either.

A second indication is that Catholic Southern Europe (and some countries of the Far East) seem to have spontaneously and rapidly evolved both a great reduction in fertility and a significant rise in living standards. Although these countries became industrialized much later, their societies managed to catch up within 20 years. It seems that people felt an acute "relative misery" and acted accordingly.

Common to both paths of social evolution (slow and fast) within industrial societies is the massive entrance of women into the labor market and a consequent reduction in fertility. For Catholic Southern Europe, the current total fertility rate has dropped to less than 1.5 children per woman. High social status and alternative occupations for women seem to be an integral part of maintaining a high living standard — and it was also the case for the upper class in stratified societies.

We cannot expect a spontaneous cultural evolution to establish a reduced fertility and a stable ecological political strategy everywhere. This spontaneous evolution would probably lead us to resume the Malthusian and Colinvauxian mechanisms of impoverishment and stratification. People could return to a higher fertility-lower living standard scheme if current expectations for a continued high living standard in industrialized societies are not fulfilled (because of ecological-economical limits). Of course they would return to it if a social collapse ever occurred.

The environmental movement has been reluctant to address population control. Several authors — for instance Ehrlich and Ehrlich (1990) and Hardaway (1994) — have criticized this short-sightedness for hindering the development of an ecologist ideology. Malthusian predictions can be seen as catastrophist, but they should rather be taken as a call to change our spontaneous cultural evolution, in an effort to overcome the catastrophes. As long as the resource-consumption conflict is unresolved, Boulding's *utterly dismal theorem* (Hardin 1993) would derive from Malthusian theory: any temporary social conquest will end in a social situation worse than the one before the conquest (more consumers, less resources).

Intellectual resistance to Malthusianism fosters alternative suggestions, most of them — leaving aside stark providentialism — belong to two hypotheses (Hardin 1993): that either charity or health improvement would curb fertility among the poor. But these are predictably false solutions, as their only effect would be to increase fertility. In fact, Third World demographic explosion and poverty is an outcome of well-intentioned foreign aid to poor countries, which increases reproduction but not living standards (Abernethy 1993). Fortunately, we can use our knowledge of human ecology to build a new, happier society, the first utopia that could work.

Endnote

1. Email address: agusti.galiana@uv.es

Acknowledgements

This manuscript has been improved thanks to corrections suggested by two anonymous reviewers.

References

Abernethy, V. 1993. The demographic transition revisited: Lessons for foreign aid and U.S. immigration policy. *Ecological Economics* 8, 235-252.

Barkow, J. H., L. Cosmides and J. Tooby (eds.). 1992. *The Adapted Mind.* New York: Oxford University Press.

Boyd, R. and P. J. Richerson. 1994. Com els processos de la microevolució varen donar lloc a la història. *Treballs Soc. Cat. Biol*. 45, 157-172.

Boyden, S. 1987. *Western Civilization in Biological Perspective.* Oxford, UK: Clarendon.

Campbell, B. 1995. *Human Ecology*, 2nd Edition. New York: Aldine.

Cavalli-Sforza, L. L. 1993. *Chi siamo*. Milano, Italy: Mondadori. English version: *The Great Human Diasporas*, 1995. New York: Addison-Wesley.

Clutton-Brock, T. H. 1991. *The Evolution of Parental Care.* Princeton, NJ: Princeton University Press.

Colinvaux, P. A. 1976. The human breeding strategy. *Nature* 261, 356-357.

Colinvaux, P. A. 1980. *The Fates of Nations.* New York: Simon and Schuster.

Colinvaux, P. A. 1982. Towards a theory of history: Fitness, niche and clutch of *Homo sapiens. Journal of Ecology* 70, 392-412.

Costanza, R., R. d'Arge, R. de Groot, S. Farber, M. Grasso, B. Hannon, K. Limburg, S. Naeem, R. V. O'Neill, J. Paruelo, R. G. Raskin, P. Sutton and M. van den Belt. 1997. The value of the world's ecosystem services and natural capital. *Nature* 387, 253-260.

Daly, H. E. 1996. *Beyond Growth.* Boston, MA: Beacon.

Diamond, J. M. 1992. *The Third Chimpanzee.* New York: Harper Collins.

Diamond, J. M. 1997. *Guns, Germs and Steel.* New York: Norton.

Ehrlich, P. R. and A. H. Ehrlich. 1990. *The Population Explosion.* New York: Simon and Schuster.

Ehrlich, P. R. and A. H. Ehrlich. 1991. *Healing the Planet.* New York: Addison-Wesley.

Hardaway, R. M. 1994. *Population, Law, and the Environment.* Westport, CT: Praeger.

Hardin, G. 1960. The competitive exclusion principle. *Science* 131, 1292-1297.

Hardin, G. 1968. The tragedy of the commons. *Science* 162, 1243-1248.

Hardin, G. 1985. Human ecology: The subversive, conservative science. *American Zoologist* 25, 469-476.

Hardin, G. 1993. *Living within Limits.* London, UK: Oxford University Press.

Harris, M. 1989. *Our Kind.* New York: Harper & Row.

Hicks, J. 1969. *A Theory of Economic History.* London, UK: Oxford University Press.

Kaplan, H. 1994. Evolutionary and wealth flows theories of fertility: Empirical tests and new models. *Population and Development Review* 20, 753-791.

Lee, R. D. 1986. Malthus and Boserup: A dynamic synthesis. In D. Coleman and R. Schofield (eds.), *The State of Population Theory: Forward from Malthus*, 96-130. Oxford, UK: Blackwell.

Lenski, G. E., P. Nolan and J. Lenski. 1995. *Human Societies*, 7th Edition. New York: McGraw-Hill.

Lynch, A. 1996. *Thought Contagion*. New York: Basic Books.

Malthus, T. R. 1798. *An Essay on the Principle of Population*. London, UK: J. Johnson. Reprinted by Oxford University Press, UK, 1993.

Margalef, R. 1971. L'home, part de la biosfera i objecte d'estudi de l'ecologia. *Treballs Soc. Cat. Biol*. 30, 13-25.

Martinez-Alier, J. and K. Schlüpmann. 1987. *Ecological Economics*. London, UK: Blackwell.

Mayr, E. 1996. The autonomy of biology: The position of biology among the sciences. *Quarterly Rev. Biology* 71, 97-106.

Moore, J. A. 1985. Science as a way of knowing - Human ecology. *American Zoologist* 25, 483-637.

Ornstein, R. E. and P. R. Ehrlich. 1989. *New World, New Mind.* London, UK: Methuen.

Pauly, D. and V. Christensen. 1995. Primary production required to sustain global fisheries. *Nature* 271, 255-257.

Ponting, C. 1991. *A Green History of the World.* London, UK: Sinclair-Stevenson.

Popper, K. 1957. *The Poverty of Historicism*. London, UK: Routledge.

Postel, S., G. C. Daily and P. R. Ehrlich. 1996. Human appropriation of renewable fresh water. *Science* 271, 785-788.

Ridley, M. 1996. *The Origins of Virtue*. New York: Viking.

Siegel, P. M. 1984. Human ecology and ecology. In M. Micklin and H. M. Choldin (eds.), *Sociological Human Ecology*, 21-49. Boulder, CO: Westview.

Toynbee, A. J. 1934-61. *A Study of History*, 12 vol. London, UK: Oxford University Press.

Vitousek, P. M., P. R. Ehrlich, A. H. Ehrlich and P. A. Matson. 1986. Human appropriation of the products of photosynthesis. *BioScience* 36, 368-373.

von Haeseler, A., A. Sajantila and S. Pääbo. 1995. The genetical archeology of the human genome. *Nature Genetics* 14, 135-140.

Wright, R. 1995. *The Moral Animal*. New York: Vintage.