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“Grand Goat,” Grand Canyon, Arizona by Jenny C. Growney

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From the Editor

Linda Kalof
George Mason University

There has been a substantial increase in the number of journal submissions over the last year. To avoid a backlog of manuscripts waiting for publication this issue of HER has increased as well.

We have also increased the size and diversity of the Editorial Board. HER’s success is due in part to timely and careful decisions to authors and increased visibility through its inclusion in most major databases. Of course our ability to move quickly but carefully on manuscripts depends on the extra efforts of reviewers who have given HER priority over the years. We are grateful to our reviewers for those efforts.

Once again we ask you to have your library subscribe to Human Ecology Review. We must continue to work on increasing the journal’s visibility, and library subscriptions are a critical way to support that effort.

The 11th meeting of the Society for Human Ecology is scheduled for October 18-22, 2000, at the Snow King Resort in Jackson, Wyoming, USA.

For preliminary information contact: http://members.aol.com/tdietzvt/SHE.html or http://members.aol.com/tdietzvt/HER.html
Abstract

Experts and the public frequently disagree when it comes to risk assessment, indicating a lack of trust among the general public. The reasons for such disagreement are discussed, and it is pointed out that disagreement among experts and lack of full understanding of real risks contributes to skepticism among the public. The notion that people are in general reacting in a highly emotional and non-rational, phobic, manner is rejected. The conditions for risk assessment, and common-sense cognitive dynamics, are better explanations of risk perception. If trust is to be established in a country or community where it is quite low some kind of politically regulated public influence on decision making and risk monitoring is probably needed, e.g. by means of a publicly elected and responsible ombudsman.

Keywords: risk, risk assessment, cognitive dynamics, ombudsman

Introduction

People’s reactions to risks have become an issue of central importance in policy making. The most well-known case is, of course, that of nuclear power, but many others could be mentioned as well: toxic waste, genetic engineering, food additives, etc. In most, or all, of these cases experts judge risks to be minor or even non-existent while the public is quite concerned about the risks and perceive them to be high.

The gap between experts’ risk assessment and that of the public has given rise to some very difficult policy problems. One such problem is that of siting a high level nuclear waste repository (Flynn, Chalmers, Easterling, Kasperson, Kinreuther, Mertz, Mushkatel, Pijawka, Slovic and Dotto 1995). No country has yet been able to find a voluntary local community willing to host such a facility, in spite of assurances about its safety. Previous statements that the Swedish public was willing to do so (Flynn et al. 1995) were based on results from one, leading, poll question. Extensive experience in Sweden shows that it has problems similar to those in other countries (Sjöberg, Viklund and Truedsson 1998).

Trust — or rather mistrust — is very salient in nuclear politics in the FSU (Drottz-Sjöberg et al. 1993; Drottz-Sjöberg, Rumyantseva, Martyushov, Arkjangelskaya, Nyagu and Ageeva 1994), to take another example.

Of course, the evaluation of most risks is uncertain for many reasons: lack of experimental data and incomplete theoretical understanding of the mechanisms behind a risk being perhaps one of the most important ones (Otway and von Winterfeldt 1992). The scientific majority sometimes finds itself pitted against a public opinion which simply does not accept its conclusions. Social turbulence follows and politicians are forced to allocate resources in ways which may bear little or no relationship to the real needs for risk reduction in a society (Ramsberg and Sjöberg 1997).

The first reaction that comes to mind upon reflection on this situation is that people are just misinformed and ignorant (Cohen 1998), and victims of various commercial and social/political vested interests that exploit their fear and ignorance. Is it not true that experts know much more about these risks than the public does? However, to try to explain the difference between experts and the public with reference to knowledge and lack of knowledge is somewhat futile, for several reasons:

1. People are not that misinformed about all risks. Data on judged mortality rates that I collected in Sweden show that the average public ratings have the same rank order and level as the true values, with one exception (heart attack) where the public grossly underestimated the risk (although they still placed it in the correct rank). Admittedly, there is tremendous variability of ratings behind such data, but, once again, the “average man” was just about right in his or her risk perception.

A second example: In a study of the perceived AIDS risk carried out in Sweden (Sjöberg 1991a) I found that people were extremely well informed. In fact, people were so well informed about these basic AIDS facts that it was almost impossible to construct a varying knowledge score.
2. In several studies we have found that there is, indeed, a correlation between perceived risk and knowledge about the issues involved in that particular risk. Those who know more judge the risk to be smaller (Johnson 1993). However, the correlation is typically quite modest in size, perhaps about 0.2. This means that very little of the variance in risk perception can be explained by variation in knowledge. If knowledge is measured by self ratings, i.e., people are asked to rate how much they know about a topic, the small correlation vanishes altogether. This finding does not deny that the variability between experts and the public reveals a clear correlation between knowledge and perceived risk, of course.

3. The difference in perceived risk between experts and the public does not necessarily demonstrate a causal influence on risk perception by a high level of knowledge. As an alternative, consider the possibility that experts first acquired their risk perception, then decided, perhaps partly on that basis, to devote themselves to the acquisition of expertise in a given area such as nuclear power or genetic engineering. We (Drottz-Sjöberg and Sjöberg 1991) studied high school students and found very strong covariation between line of study (science, technology, social science or humanities) and perceived risk. Those who participated in programs that led to university level studies of sciences and technology — and some of them were future experts in these fields — were much less concerned about risks of nuclear technology than others, although they had not yet, at this point in their lives, acquired expert knowledge. These differences were even larger than gender differences, which are always observed with regard to radiation risks, and which we found in our study as well.

It is indeed unlikely that an adolescent would devote his or her career to a field of technology believed to be creating a hazard to society — interest is a very important driving force behind career choice (Sjöberg 1997) and positive interest is hard to combine with a high level of perceived risk.

**Experts and the Public**

Risk perception is rarely equal for experts and the public, even if they may be, at times, in rough agreement. In a frequently cited study, the US EPA compared experts’ rankings of important environmental risks with public risk perception (US Environmental Protection Agency 1987). They found little agreement between the two sets of rankings. A follow-up three years later gave virtually the same results (Roberts 1990). A set of French data give a very different picture, however. In a study in Bordeaux, experts on hygiene and safety rated risks and desired risk reductions (Barny, Brenot, Dos Santos and Pages 1990). They found extremely close rank order agreement with mean ratings of the same risks made by the public, although the level differed: experts gave lower risk ratings. This discrepancy raises the question which is right: the French or the US data? Perhaps the French experts were less qualified experts than the corresponding EPA experts. It seems unlikely that anyone can really be an expert on all the diverse risks studied in the French investigation. On the other hand, there are other studies showing convergence of expert and public opinion as well (e.g., Wyler, Masuda and Holmes 1968). Wyler et al. (1968) found that patients and doctors gave similar risk ratings of various illnesses. A study of experts on food risks in Sweden gave differences between their risk perception with regard to some hazards, but not all (Sjöberg, Oskarsson, Bruce and Darnerud 1997).

Another study carried out in Sweden (Sjöberg and Drottz-Sjöberg 1994) compared the risk perception of experts and the public with regard to nuclear power and nuclear waste. It provides a drastic illustration of the differences between experts and the public.

The experts were employed by the nuclear industry, regulatory authorities or universities and had college or graduate school education (with a few exceptions) (n=137). The data on the public were obtained from a random sample of the Swedish population, ages 18–65, response rate 62 per cent (n=1099). In both samples, respondents were asked to judge the risk to people in general from domestic nuclear power. The response distributions are shown in Figure 1.

The figure shows drastic differences in risk perception. Very few experts judged the risk to be larger than “very small”, while 65 percent of the public did so. A more specific question about nuclear waste was also asked. The subjects were asked if they regarded the problems regarding the final storage of nuclear waste as currently solved in a satisfactory manner. The response distributions are given in Figure 2.

There were very drastic differences between the public and the experts, as can be seen in Figure 2. Very few people from the public regarded the problems as solved, while an overwhelming majority of the experts did so. The extent of public distrust can be studied in Table 1, which is based on data from the same study.

The table shows that mistrust is very widely spread, in particular for politicians but also for experts and industry. Furthermore, trust is consistently, and moderately strongly, correlated with perceived risk. The table also shows that nuclear experts have a high level of trust, but that they also do not trust politicians, nor do they trust the experts who have denounced nuclear power.
Figure 1. Judgments of the perceived risk of domestic nuclear power to people in general. Data from experts and from the public.

Figure 2. Responses to a question whether the current solution of the problem of how to store nuclear waste is satisfactory. Data from experts and from the public.

Table 1. Percentage of respondents who stated that they had no trust, very little trust or rather little trust in various groups and agencies, with regard to management or risk assessment. The table also gives correlations between trust and an index of perceived nuclear waste risk, N=600.

<table>
<thead>
<tr>
<th>Group or agency</th>
<th>Percentage of public lacking trust</th>
<th>Percentage of experts lacking trust</th>
<th>Correlation trust-perceived nuclear waste risk</th>
<th>Percentage of public lacking trust</th>
<th>Percentage among experts lacking trust</th>
<th>Correlation trust-perceived nuclear waste risk</th>
</tr>
</thead>
<tbody>
<tr>
<td>Experts at government agencies</td>
<td>59</td>
<td>15</td>
<td>-0.28**</td>
<td>63</td>
<td>13</td>
<td>-0.34**</td>
</tr>
<tr>
<td>Experts at universities</td>
<td>35</td>
<td>20</td>
<td>-0.21**</td>
<td>37</td>
<td>19</td>
<td>-0.25**</td>
</tr>
<tr>
<td>Experts employed by the nuclear industry</td>
<td>37</td>
<td>8</td>
<td>-0.27**</td>
<td>48</td>
<td>19</td>
<td>-0.31**</td>
</tr>
<tr>
<td>Experts who have denounced nuclear power</td>
<td>45</td>
<td>78</td>
<td>0.21**</td>
<td>47</td>
<td>87</td>
<td>0.21**</td>
</tr>
<tr>
<td>Responsible politicians</td>
<td>93</td>
<td>82</td>
<td>-0.17**</td>
<td>91</td>
<td>84</td>
<td>-0.20**</td>
</tr>
<tr>
<td>Pertinent authorities</td>
<td>41</td>
<td>5</td>
<td>-0.28**</td>
<td>45</td>
<td>5</td>
<td>-0.34**</td>
</tr>
<tr>
<td>The nuclear industry</td>
<td>57</td>
<td>16</td>
<td>-0.27**</td>
<td>60</td>
<td>21</td>
<td>-0.34**</td>
</tr>
<tr>
<td>Personnel working with these tasks</td>
<td>42</td>
<td>11</td>
<td>-0.21**</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

**p < .01
Types of Expert Roles

In some cases, the public takes risks that experts discourage, such as risks of smoking, drinking, AIDS or high radon levels in homes. Some people do listen to warnings about such risks, of course, and some of them act accordingly, but most ignore them. They may be persuaded that there is a risk for others, but not for them. They tend to deny personal risks (Weinstein 1984). A good example is alcohol. Alcohol is a risk that people perceive that they can control. They see it as a big risk to others, small to themselves.

I propose a typology of expert roles: Protectors and Promoters. A Protector considers his or her role to be that of warning people about a risk that they do not know about or neglect to protect themselves from with sufficient vigor. Protectors wonder why people are so uninterested in their own safety and regrets that so little money is spent on saving lives. Protectors are found among experts on the following: many medical problems, fires, tornadoes, earthquakes, radon, ultra-violet radiation, and some economic problems.

Promoters, on the other hand, regret that people are too much concerned about risks and ask how they can be convinced that those risks are not so large and that they certainly are worth taking. Promoters are found in the fields of the following: nuclear power, pesticides, genetic engineering, and crime policy (at least in Sweden). An example of a Promoter is provided from a lecture delivered by Norman Rasmussen (1991). A few citations:

No matter whether you say something might happen the next century, next year, or next week, the response from the public will be 'That's just too often for me'. By the time you are down to 10^-4, you are in a region that is not understood. When you start comparing it with (common) ways people could lose their lives, they think you are trivializing it.

(We have) strong dislikes and paralyzing fears about any activity that entails risk. Projects are so costly and our systems for dealing with people so involved that in the end we reach agreements that are against logic. We spend and squander our resources to defend ourselves against phantom risks.

Experts on natural hazards tend to look differently at public risk perception. Bolt (1991), in a Protective mood, writes about the earthquake risk:

In terms of national welfare, it might be expected that the risk involved in earthquakes would give special force to the claims for funds and resources for earth scientists, engineers, planners and others involved in enhancing seismic safety. Seismological history tells otherwise. Risk reduction is characterized by bursts of activity and political support after damaging earthquakes, and decay curves that have a half-life of a year or so before public effort recedes.

The viewpoint of a Protector is also clear in this citation:

The review of Lawless of 45 major public alarms over technology found that in over 25 percent of the 45 study cases, the threat was not as great as that originally described by opponents of the technology, but in over half of the cases, the threat was probably greater than that admitted by the proponents. Still the problem was allowed to grow. Early warning signs were available but mostly ignored in 40 percent of the cases . . . (Lawless 1974, cited in Kates 1978, 87).

The conflict between Protectors and Promoters is often a theme in fiction or movies. Take the movie Jaws as an example. Here the Protector is a police officer who is concerned about the safety of the population in a beach resort town. Finding traces of a Big White on the shore he blows the whistle. The mayor of the town, however, is a Promoter of the tourist trade. To him the alarm is very misplaced because it threatens that trade. Hence he does not believe in the warnings, ridicules or even fires the police officer, etc, etc. Many other examples could be given. The story is nearly always the same. The whistle blower, or Protector, is ignored or harassed by Promoters who have large vested interests in some kind of business. A final disaster is then avoided or mitigated by the heroic deeds of the Protector who is finally recognized by everyone as having been right all the time.

At times, the distinction between Protectors and Promoters is rather subtle and it is not immediately clear whether the expert is a Promoter (and of what) or a Protector (and from what). Take Swedish AIDS policy as an example (cf. (Sjöberg 1991a)). It might be expected that AIDS is a simple case: it is something you would want to protect people from. However, other considerations enter the picture. It is true that it is desirable to protect people from AIDS, but politicians and administrators are also concerned with at least two other risks: the risk of prejudice and aggression against stigmatized groups such as those infected by the virus or homosexuals, and the risk that people somehow lose their interest in positive intimacy. The result is that the message becomes quite blurred: while AIDS is surely very dangerous and something one should try to protect oneself from, sex is still very positive and should be enjoyed much as before.

The end result is that the experts here seem to have partly adopted a role of Promoters (of positive intimacy), and that their protective concerns are salient not only when it comes
to AIDS but also with reference to social stigma of certain groups of people. It seems quite debatable whether such a stance is likely to lead to the adoption of an effective strategy of communication.

The conflict between Protectors and Promoters seems to mirror the basic structure of expert disagreement about risks. There are always at least some uncertainties in an empirical risk estimate and these can be used for developing an argument in favor of an increased or decreased risk estimate.

The stage is set, then, for ongoing disagreement and fierce debates, which seem unavoidable (Sjöberg 1980). Yet, this point is sometimes vehemently denied. Is the notion of expert disagreement merely an illusion of uninformed outsiders who do not realize that experts in fact agree on all important matters?

### Explaining the Difference Between Experts and the Public

What is the reason for the difference between experts and the public when it comes to level of perceived risk? One possible set of factors is background data: gender, education and perhaps age. Several additional possibilities can be mentioned:

- **Realism.** The public may in fact be misinformed and the experts may be making realistic risk assessments. But realism cannot be the whole story, since experts vary. They cannot all be right. In addition, risk assessment is not only a question of factual judgment; values enter necessarily.
- **Different risk definitions.** Experts pay more attention to probability, the public to consequences (Sjöberg 1999b).
- **Self-selection.** The differences may exist before scientists receive their professional training at college and graduate school, see Drottz-Sjöberg and Sjöberg (Drottz-Sjöberg and Sjöberg 1991).
- **Socialization of values and risk perception in professional training and work.** Conformity pressures and vested economic and career interests may play a role.
- **Perceived control and familiarity.** Experts directly involved in an area probably perceive that they have control over its risks, and long experience may have habituated them to these risks (familiarity).
- **Professional role.** Some experts have the role of protecting the public (e.g. physicians or fire fighters) while others are concerned also with the promotion of a certain technology.
- **General political ideology.** This is a powerful factor in risk perception in general. But the tremendous differences between experts and the public speak against a purely ideological explanation. It is unlikely that experts are so strongly atypical in their political attitudes, although this dimension may explain some of the differences among different groups.

- **Media contents,** in turn to be explained by their commercially and ideologically driven strategies.
- A primary question was if the low risk judgments by experts are a reflection of a **general** tendency to dismiss risks? Experts in one specific area need not judge risks in **other** areas as small.
- **Trust.** Experts probably trust industry, agencies and other experts more than the public does. Since trust is implicated as a determinant of perceived risk in the general public, it could also explain part of the variation between experts and the public.
- **Risk perception factors.** It is possible that experts perceive risks differently in a qualitative sense, not only with regard to level. This notion is discussed in detail elsewhere (Sjöberg 1999a).

### Why Mistrust Experts?

Whatever the reason, experts and the public disagree. In a situation such as this, it is likely that communication tends to break down (National Research Council 1989; Sjöberg 1980; Sjöberg 1991b; Stern and Fineberg 1996). Experts see the public as misinformed, badly educated and highly emotional (Cohen 1998; Fritzsche 1995) while the public suspects that experts know less than they claim and that they are corrupt due to their being hired by the industry or government. People trust independent experts much more than experts hired by the industry and at least in Western Europe such independence is perceived when it comes to experts who are associated with universities, or who have publicly warned about risks (whistle blowers). In a study of the nuclear waste risk we found that there was more confidence in dissident experts than in experts associated with state authorities or the nuclear industry (see Table 1).

But why are experts not trusted? There are many reasons. First, experts often disagree. Otway and von Winterfeldt (1992) cited a study of expert assessment of failure probability in a nuclear power plant. Different teams of experts were formed. The error probability estimates converged when the teams were informed about each others’ estimates and analyses, but the initial estimates varied by a factor of 1–50. Uncertainty ranges varied even more.

Second, today there is much more knowledge about risks, even small risks, than previously. This situation has its problems. One problem has to do with the fact that knowledge about the risks is incomplete. In many practical situations risks are hard to measure and estimate. Perhaps there is knowledge that risks are “small” but they cannot be specified more exactly. We do not know how small they are. Knowledge thus has the character that a risk is known to exist but its size cannot be specified. Because of this, there is
room for different opinions as to the size of the risk and much uncertainty. The public demands certainty from its scientists (often an unrealistic demand) and uncertainty is often confused with incompetence, hence a basis for mistrust.

Third, many risk assessments are based on animal experiments. Animals are exposed to large doses of a chemical, and the observed cancer risk is extrapolated downwards to the risk levels that exist for humans. This practice has been criticized on two grounds. First, it is uncertain to which extent one can generalize between species. Second, a linear extrapolation can overestimate the risk at small dose levels (Abelson 1990). Slovic and coworkers have provided interesting information about the varying viewpoints with regard to inference from animal studies, in investigations of the public and toxicologists (Gray and Graham 1993; Kraus, Malmfors and Slovic 1992; Kraus, Malmfors and Slovic 1993; Slovic and others 1995).

Fourth, there has been a trend of increasing mistrust during the last few decades (Putnam 1990). The reasons for this trend are not well understood and several theories have been proposed. Suffice it here to mention it as a phenomenon which may contribute to a widening of the gap between experts and the public.

**Common-Sense Knowledge and Causal Inference**

Several explanations of the public’s lack of trust are thus possible. In addition to the ones mentioned, others have been suggested, such as a neurotic fear, “radiophobia”. Drottz-Sjöberg and Persson (1993) discussed thoroughly the concept of radiophobia and they argued that it is misplaced. People perceive radiation risks which experts deny, yes, but this is a phenomenon which is not necessarily tied to phobic fear. Why, then, do people have these risk perceptions, following a nuclear accident? Is perceived personal risk in some way related to the experiences that people have?

To answer this question we must first consider the fact that most people are quite concerned about radiation even before there is an accident. Radiation is associated with cancer, it cannot be sensed and avoided and it is even associated with the horrible images of nuclear war.2 Accidents involving sizable radioactive fall-out therefore easily trigger fear. To alleviate such fear, people need to be informed about the levels of radiation that have actually been produced by the accident, and, if these levels are not high enough to be dangerous, they need to be informed about this fact. This would be a normal process of information, and it would tend to work if people trusted the government and its experts.

However, it is obvious that experts enjoy far from 100 percent trust from the public. The public has other notions and other beliefs. These beliefs are not completely irrational, on the contrary I shall argue that they are formed on a basis of experience which everybody uses. They can sometimes lead astray — and sometimes they serve us quite well.

I will briefly discuss the character of everyday knowledge and compare it to complete irrationality on the one hand, science on the other. The purpose of the discussion is to suggest an explanation for why people are convinced of a causal attribution of their state of health which is unacceptable to experts.

People “know” about their environment and its risks in several ways. They may just feel that something is risky, have an intuition about it, without being able to explain why they feel that way, or they may base their perceptions and thoughts on something they have experienced. It is the latter alternative I will discuss here.

Every adult person knows some things such as the following:
- we live on a large globe, a planet, which rotates around the sun
- water freezes to ice when the temperature is low enough
- all men are mortal
- a week has seven days
- most men strive for pleasure and try to avoid pain

These are quite different examples. The first two refer to the physical world, the third is a biological fact, the fourth a social convention and the fifth a psychological principle. Science does not deny these statements, of course, and it has even historically contributed at least one of them, the first. For how could you know that Earth is a globe, it certainly cannot be seen (unless you are an astronaut) as such. The answer, of course, is that you trust scientists when they make the assertion.

For the other cases you need not trust science to believe in them. These are things that you can find out for yourself, by talking to other people and by observing nature. Yet, no one denies that knowledge acquired this way is trustworthy, necessary and used by everybody.

Hence, there is perfectly good knowledge which is not scientific and which guides us in our everyday lives. Let us look a little further at a strategic aspect of such knowledge, i.e. causal attribution.

Science is superior to everyday life knowledge in two basic respects: it builds upon systematic empirical evidence and it organizes such evidence in cumulative theoretical structures, which are subjected to continuous testing. But there are no clear boundaries between science and everyday life knowledge, and the latter is clearly superior to other forms of beliefs, such as paranoiac delusions, phobias and magic, see Table 2.

Phobia is a reaction almost totally devoid of any rational basis and it is recognized as such by the phobic him or her-
self. Paranoiac delusions have a similar rigidity but they are believed by the paranoiac and they lend themselves to endless cognitive elaborations. Everyday knowledge can lead astray but it is connected with reality in a manner not common to phobic or paranoiac notions. Therefore, one should not quickly dismiss public notions phobic reactions. They may be incorrect because they are based on the insufficient evidence that we always have to base our common sense beliefs on, as soon as we are not dealing with phenomena in a scientific manner.

Michotte (1954) performed classical studies of perceived causality. A very close temporal contiguity in the order first A then B of two events compels us to perceive that B was caused by A. Our perceptual apparatus is tuned to the discovery of causes and it organizes our world view according to cause-effect relationships. We do not easily “see” randomness, or its consequences. If purely random events are presented we see systematic patterns. In addition, when asked to produce or simulate random patterns of symbols people usually fail and produce systematic deviations from randomness, e.g., they produce too few long runs of one symbol. This could be explained by the famous gambler's fallacy effect: people believe that the likelihood of change increases the longer they have been exposed to a series of repetitions of one event (Bar-Hillel and Wagenaar 1991).

Later work has been more concerned with inferred causality rather than directly perceived causality. Kahneman and Tversky (1974) have demonstrated that perception is affected by similarity and salience. If A and B are similar in some important manner and A preceded B, A may be regarded as the cause of B. If A is made salient by much media attention it is more likely to be regarded as the cause of events that followed it — especially if A is a very potent event, such as major technological disaster (Tversky and Kahneman 1973). Finally, people have a bias to perceive only one cause of an event, thereby greatly simplifying things, sometimes to the level of nonsense.

How common are certain illnesses or other problems? How can you judge if you do not have access to reliable statistics? One plausible strategy for making such judgments is to base it on cases you know about personally, have heard about or read about. However, even if an illness is quite rare, the chance is good that you may have heard about a few cases. If it is a serious disease with a possible connection to environmental pollution of some kind, it may be quite salient in the media. Hence, rare occurrences form the basis of a concept of general frequency and the fact that they are quite rare is almost impossible to infer from casual exposure to single cases among one’s acquaintances or in the media. Co-occurrences with environmental pollutants tend to be taken as a basis for causal attribution; people give most attention to positive co-occurrences and tend to forget about the three other possible cells of a four-field table (Smedslund 1963).

Hence, people do acquire knowledge in everyday life which is often quite correct, although not at all scientific. But this strategy may at times be very misleading, and it is hard for people to know when they should not “trust what they can see with their own eyes”.

In my view, all this constitutes a plausible explanation why some people, especially in the FSU, are so convinced that the Chernobyl accident has caused illness, regardless of whether the claims are true or not. For even if some of the claims are true, they could still hardly be substantiated by informal, spotwise impressions.

Data collected in 1992 in Novozybkov (Drottz-Sjöberg et al. 1993) illustrate the point. The subjects, 185 persons living in the area, rated each of 33 dangers on a 7-point scale, and they also rated change in those dangers since Chernobyl. Price increases topped the list, but it was otherwise dominated by nuclear and radiation dangers. Such common risks as smoking, traffic and alcohol came last.

The combination of mistrust, with its historical basis, and reliance on everyday knowledge has set the stage for the very difficult problems faced in the FSU.

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Table 2. Various knowledge modes characterized by degree of theoretical elaboration and empirical basis.

<table>
<thead>
<tr>
<th>Empirical basis</th>
<th>Low, or none</th>
<th>Medium</th>
<th>High</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low</td>
<td>Phobia</td>
<td>Mild delusions</td>
<td>Paranoic delusions, religion etc</td>
</tr>
<tr>
<td>Medium</td>
<td>Magic</td>
<td>Everyday knowledge</td>
<td>Science, theoretically dominated</td>
</tr>
<tr>
<td>High</td>
<td>Science, empirically dominated</td>
<td>Science, building theory on data</td>
<td>Science, theoretical and empirical</td>
</tr>
</tbody>
</table>
A Suggested Solution

Let me finish by making a concrete suggestion as to how credibility could be achieved in a community with a low level of trust in experts, authorities and media. The suggestion is based on the following premises (Shalpentok 1985):

1. People deeply distrust the government, industry and experts employed by the government and industry.
2. University or Academy researchers are not trusted much more, because there is a lack of a tradition of politically independent institutions of higher learning.
3. External experts may have a higher level of trust but when and if they join the local government in their evaluation of risks they will lose much of their credibility.
4. There is only low trust in domestic media.

These assumptions are supported by data collected in 1992 in the study cited above (Drottz-Sjöberg et al. 1993). All information sources were found to be trusted rather little, but especially national and local political bodies were mistrusted. Most trust was exhibited in foreign sources, especially foreign experts. It is not known if these results generalize to the Russian population as a whole, but I will assume that they do. It is also likely that most of these conditions will arise in the heated debate atmosphere in a local nuclear repository siting issue. Deep seated central values become involved, with the result of previously unheard of aggressions between people (Drottz-Sjöberg 1996), as was the case in the small Swedish community of Storuman, where a local referendum was held in 1995 about a repository siting.

Approaches to dealing with the most entrenched social and political risk conflicts have so far failed. People are not persuaded by risk comparisons (Sowby 1965), nor are they very responsive to the PR industry (Stauber and Rampton 1995) or risk communication (Renn 1992). The present emphasis is on participatory processes (North 1998), but it has yet to prove its value.

In this very difficult situation I suggest that it may be useful to consider the traditional office of ombudsman. An ombudsman is a representative of the people and should act in the interest of the people, and in no other capacity. An office of nuclear ombudsman could be made responsible for nuclear safety and authorized to inspect power plants and other facilities, to order improved safety programs and, in extreme cases of acute necessity, to order the shutdown, permanent or temporary, of nuclear power plants and other facilities. The person in charge of this office, the ombudsman, should not be appointed by the government because of the credibility problem. He or she should be elected directly by the people and be responsible only to them, not to the government or to industry.

The ombudsman concept is well known in Sweden and has served a useful role. It is a relatively simple way of empowering people. The usual democratic institutions have the drawback of being responsible for many issues — the ombudsman would only be responsible for the safety of nuclear facilities. More common ideas of participatory democracy and “stakeholders” are problematic because the interest groups formed tend to have a very limited and often unclear responsibility and no or little formal power. They also attract a very special group of people (Milbrath 1981) willing to devote a lot of their time to, most often, unpaid work. Many of those who remain passive and do not join the interest groups will still have strong opinions about the issues. For example, in the two Swedish local repository referenda voter turnout was very high (76 and 87 percent).

Maybe the ombudsman idea will remain a thought experiment since its realization would require a willingness to try a real shift of power in important risk questions. However, one could hope that such a shift of power would involve responsible decisions by the citizens. After all, that is the whole basis of democracy, and democracy is the least bad system of government, to use a cliche that happens to be true.

Endnotes

1. This is a study within CEC project RISKPERCOM (Contract FI4PCT950016), supported also by the Swedish Council for Planning and Coordination of Research (FRN), the Swedish Council for Humanistic and Social Science Research (HSFR), the Swedish Nuclear Power Inspectorate (SKI), and the Swedish Radiation Protection Institute (SSI).
2. Yet, ionizing radiation is seen in a positive light when used in medical applications (Sjöberg 1996).
3. The ombudsman suggested here would be elected directly by the people of the local community; current ombudsmen in Sweden (there are several) have been appointed by the Government and tend to be relatively tame.

References


Abstract

Industrial power is grounded in epistemological and ideological choices made during past centuries. The modern self has evolved to be consistent with these choices, so that the psychological concept of “intelligence” indicates the facility with which a relatively autonomous thinker can manipulate a world consisting mostly of ‘raw materials’. I explore the ways in which this concept legitimates and naturalises the exploitation of the natural world, and suggest that it also normalises a psychopathological personality configuration. I argue that an alternative conception of human abilities based in a recognition of and sensitivity to natural order and intelligence rather than in a conception of intelligence as a solely human property, is necessary if environmental, educational, and developmental theory and practice are to be consistent with the needs of the natural world.

Keywords: intelligence, nature, technology, personality, psychopathology

“Intelligence” and the Growth of Industrialism

The discipline whose task it is to explain and map the capabilities of the human mind is psychology; and psychology’s understanding of these abilities is constellation around the concept of “intelligence.” Apart from its direct effects in channelling our psychological understanding of how we interact with the world around us, this concept has also been widely used in education and business, where tests of “intelligence” often influence selection and promotion. More indirectly, psychological notions about what constitutes ‘intelligent’ behaviour pervade the wider fabric of society, affecting commonsense ideas about what constitutes mental ability, and lending certain styles of thought and action a higher status than others. At the same time, the concept of “intelligence” also reflects and encapsulates certain values and priorities within industrialism, so that the structure of industrialism appears as a seamless whole in which psychological concepts such as “intelligence” derive their validity and applications from their consistency with industrialist practices whilst simultaneously legitimating these practices and making them appear consistent with human biological capabilities. In this paper, I argue that the concept in its currently dominant form expresses a pathological orientation to the natural world; and that our constructive alignment with the natural order requires a wider understanding of human potentials. Throughout this paper, “intelligence” signifies the psychological concept of that name, while intelligence is intended to refer to a more open and undefined notion of human abilities.

Psychological understanding of abilities is not limited to those which are explicitly based on the traditional concept of “general intelligence,” and a number of researchers have over the past several decades argued that intelligence is better conceptualised in terms of a range of identifiable abilities, the number varying from 2 to 144. This, however, represents less of a departure from the ‘general intelligence’ approach than it might at first appear, since the abilities which are identified correlate positively with other abilities, and also with the central “g” factor which reflects this overall statistical communality. This statistical convergence towards a central factor is found even in models such as that of Howard Gardner (1983) which are not primarily derived from factor analyses of performance on IQ-style tests, as Messick (1992) has pointed out. By analogy, just as one can argue about whether an orange can best be conceptualised as a set of separately identifiable segments or as a larger whole, it becomes a matter of statistical taste whether one emphasises the partial distinctiveness of these correlated factors, or whether one interprets their statistical communality as reflecting the influence of a single underlying factor. Furthermore, as I argue later, even such approaches as Piaget’s which do not owe explicit allegiance to this unexplained statistical convergence nevertheless share environmentally crucial metatheoretical assumptions, and so remain firmly anchored within the ideological structure of industrialism.

“Intelligence,” as understood by psychometricians, is clearly an individual characteristic, and in this respect psychology incorporates a long philosophical tradition, exemplified by Kant, in which order and coherence are understood to be properties of the thinker who categorises and manipulates an otherwise chaotic and unintelligent world. In post-
Enlightenment Europe, the emergence of relatively clear boundaries between self and world and the fading of properties which could not easily be accommodated within this dissociative scheme established the individual as the focus of sentience and intelligence. Accordingly, a world which was previously experienced as embodying a mysterious and God-given order became a world of regular laws and spiritless matter, amenable to scientific understanding and control — the clay from which humans could mould their destiny. As Owen Barfield (1965) points out, the major turning point in the history of science occurred when thinkers such as Copernicus, Galileo, and Kepler began to believe that scientific hypotheses were not merely models of reality, but might actually be true. “Our collective representations,” says Barfield, “were born when men began to take the models, whether geometrical or mechanical, literally” (1965, 51). Thus began a subtle but profound change in which the assumption that order must ultimately be derived from a god-given natural realm was overtaken by the view that humans can impose on the world an order which is derived from the intellect. This increasing detachment of the intellect from the rest of the world is the basis of our construction of a “human” or “cultural” realm which often appears to stand in opposition to the natural world, and which possesses power over it. In its more recent, postmodern, incarnations, this paradigm not only proclaims our separateness from and ability to control nature; it even alleges that the natural world is a linguistically-constructed artefact of the way we order the world, so that, as Barry Barnes alleges, “natural order is always an ordering constructed by people and used to make sense of nature, never an ordering insisted upon by nature itself and imposed upon people by it” (1989, 202). This anthropocentric logic has a long history, and is, for example, reminiscent of Columbus’ insistence that his crew swear, upon pain of mutiny, that the shore upon which they had landed (the island today referred to as Cuba) was part of the mainland of the continent (Todorov 1984). But while Columbus, fortunately, could not in reality make Cuba part of the mainland, today technology has the power, to a considerable extent, to make nature into an extension of our internal “reality.” The concept of “intelligence” is located firmly within this tradition, perceiving order as something which is imposed on or abstracted from an ambiguous reality rather than something which we apprehend as a result of opening ourselves to an order which is beyond ourselves.

This constructed world, and the theories that constitute it, are in no absolute sense “wrong.” The unquestionable power of technology testifies to the accuracy of the scientific vision as well as its instrumental effectiveness in exploiting the world for economic gain. However, a paradigm may accurately portray certain aspects of the world whilst repressing, and so facilitating the physical destruction of, those other characteristics which are inconsistent with it. For example, Mount Rainier could quite “accurately” be described in terms of its geological composition, just as Beethoven’s 9th symphony can be described in terms of decibels, pitch, and duration; but in both cases something very important has been omitted. However, whereas the reduction of meaning would be obvious even to the tone-deaf when applied to the symphony, the reduction of the world to its scientific description becomes increasingly “natural” to those of us who have been trained to inhabit this world view since infancy, and so perceive “pests” and “carnivores” and discuss “biodiversity” and “intrinsic value” as if they were the unproblematic pieces which make up the jigsaw of our “environment.” Like a jigsaw, however, the pattern which emerges from the whole suggests shapes and embodies relations quite different to those of the pieces themselves; and while these “pieces” may be partly constructed by our technological language and vision, the overall picture is one which is elusive to consciousness. The danger of the technological vision, therefore, lies in its incompleteness, and in our blindness to this incompleteness, which allows us to map the perceptual and conceptual selectivity which it incorporates onto natural realities. As this technologically constructed monocultural world is physically realised, it becomes increasingly consistent with the style of “intelligence” envisaged by social scientists, so that statements such as that of Barnes, which we referred to above, attain a certain ironic truth-value. In the limit, there will be no inconsistency between this anthropocentrically ordered world and the style of “intelligence” which gave rise to it; and modernisation, in Ulrich Beck’s (1992, 10) words, will have “consumed and lost its other.”

Abstract Formalism

The incompleteness of this anthropocentric vision derives in part from its abstract nature; for grouping together items which share one or a few common properties is necessarily to ignore those properties which are unique to each individual thing. While non-industrial cultures often abstain from complex abstract schemes (Maccoby and Modiano, 1965), we tend to prefer the elegant consistency of the physical sciences to the untidiness, mystery, and openness to uniqueness which characterise less abstract world views, in a manner reminiscent of Descartes’ desire to create a “new world . . . somewhere in imaginary space” which embodied nature’s “established laws” (quoted by Shotter 1975, 76) — a preference which, as we will see, has certain pathological implications. The modern concept of time, for example, is an abstraction originating in the belief that God prefers regularity rather than the complexity and variation of the natural
world; and this metric is imposed on the variation of seasons and other natural cycles in rather the same way that a geographical system of co-ordinates is imposed on natural topology without regard for watersheds or other ecological characteristics. Such concepts are an essential precondition of our ability to manipulate the natural world, since they conceptually reconfigure it in a way that makes it amenable to technology. They are also the basis of our understanding of the world (which, as we noted above, we confuse with the world itself); and in this respect “intelligence” represents the overlap between the natural world and the industrialist order.

The power that this paradigm embodies is achieved at the price of a loss of contact with the world and the ontological insecurity which this implies — a point which, as we will see later, draws together psychological and environmental considerations. These problems are uncommon amongst societies in which groundedness in the natural world is given a higher priority than technological power, such as the Kunjen of Queensland, whose seasonal categories have been noted by Virginia Strang (1997, 180):

- **Arryul** = Fat Wallaby time / Cotton tree flowering time
- **Uy udnam** = Fat fish time / Udnam albar (fat fish after the Wet when the leaves come down / when there are many dragonflies . . .)
- **Albar** = When the leaves come down (after the Wet)
- **Uk-igay angan** = Tea tree and beefwood flowering time / crocodile egg time . . .
- **Uk iy gai ahn yan** = Flying fox time / Flying fox after Bloodwood fruit / *Inh-agnggoy arriyjanerr*, Flying fox, time for eating . . .

The Kunjen calendar, then, is not an abstract pattern that is imposed on the world from an external and autonomous realm of human cognition or scientific necessity, but rather directly reflects something about the structure of nature. In the industrialised world, however, higher status is often accorded to those who work with abstractions rather than with specific, concrete physical realities - the theoretician over the technician, for example. Goodnow (1968) has referred to our preference for a purely cognitive style of problem solving which does not require counting fingers or beads, and has suggested that this preference may be consistent with the demands of a stratified society where manual labour is the province of the “lower” classes.

However, the environmentally and psychologically problematic character of our Western worldview does not rest in abstraction per se, but in our illusory belief that the abstract model we subscribe to somehow reflects a more profound understanding of the world than a concrete familiarity with it. This is what Barfield (1965) refers to as an “idolatry” of the scientific world view — in other words, our mistaking an artificially constructed model for the reality of the world. While nonindustrialised cultures may sometimes invoke abstract representations of reality, these abstractions are invariably directly related to concrete aspects of the life-world, so that abstraction involves an elaboration of the world that already exists rather than an attempt to replace this world. For example, in Thomas Gladwin’s (1970) discussion of Puluwat navigators (who successfully sail from one small island to another across large stretches of ocean) the abstract concepts which these navigators use are clearly and directly related to aspects of the physical world such as the shape of waves, the direction of currents, the positions of stars, and the behaviour of wildlife. In contrast, the style of abstraction typical of the developed world is one that is distanced from the physical realities of the earth. For example, modern navigational equipment, such as radar, inertial guidance systems, and weather information transmitted by radio do not even require the modern captain to venture on deck, so that the abstract scheme employed, together with the technology which emerges from it, enables us to retreat from the world rather than engage with it. For the Puluwan navigator, abstract schemes are ways of enabling one to travel safely from one place to another, and in no sense adequately describe or substitute for the phenomenal world in which one must learn to live. That the techniques involved are not always entirely consistent with one another is therefore not a problem, since there is no confusion between “map” and “territory,” and so this inconsistency does not threaten the phenomenal integrity of the world itself. In contrast, the greater importance we attach to consistency and unambiguous definition rather than to openness to the multifaceted character of the natural order suggests that we march to a technological rather than a natural rhythm. In other words, the coherence we identify lies within our models of the world rather than in the world itself, and as a result, it is all too easy to slip into the “epistemic fallacy,” reducing nature to our cognitive appropriation of it (Collier 1994), and repressing those aspects of ourselves and of the world which cannot be contained within this elegant, instrumentally powerful, but profoundly incomplete “reality.”

While the technological world view generally portrays a world shorn of those qualities which imply its holistic nature, spiritual significance, or the interconnectedness of its parts, those characteristics which are necessary to the functioning of the technological/economic system — such as quantity, physical properties, or chemical composition — are emphasised. Take, for example, an item from the Wechsler Adult Intelligence Scale (Wechsler 1955): “Eight men can finish a job in six days. How many men will be needed to finish it in a half day?” Here, we are expected to convert the situation into a purely numerical one — i.e., 6x2x8=?. The physical
aspects of the situation (sweat; grime; the texture of the rock; the heat of the sun), the social aspects (what do the men say to each other? Are they labourers? Convicts? How do they share the work?), their relation to the work (Why are they digging this ditch? How do they feel about the project?) — this whole world is lost. All that is left is the equation \(6 \times 2 \times 8 = ?\). The multidimensionality of the situation has disappeared, and any reference to “nonessential” aspects would be regarded as indicating a lack of intelligence. There is no psychological test which measures the ability to locate oneself within a cultural or natural context, in contrast to the numerous tests which assess the ability to isolate “essential” elements of a situation from those which are “nonessential.” This ideological preference can be traced to the Cartesian divorce of rationality from other human faculties; for the mentality which can perceive a forest purely in terms of board-feet of lumber, or a lake as acre-feet of water is entirely consistent with Descartes’ (1950, 194) description of the earth “as if it were merely a machine in which there was nothing at all to consider except the figures and motions of its parts . . .” The ontological reduction which is implied by this viewpoint is thus the basis of a material reduction which results from its enactment: the reduction, for example, of complex fossil deposits to “fuel,” or of a forest ecosystem to “grazing land.” Such reduction is the basis of technological power.

**Ideology and Intellectual Development**

Just as ontogeny in some respects recapitulates phylogeny, so the historically developing dissociation between individual consciousness and the world is also echoed in the stages of individual development. Is it possible, then, to perceive in the development of “intelligence” from infancy to adulthood a movement from a contextualised, embedded form of representation towards one which is egoic and which dissociates self from world?

At first glance, exactly the opposite trend seems to occur. According to theorists such as Piaget, the child moves from an egocentric orientation towards a “decentered” view of the world. But on closer examination, it is not so much that the world of the infant is “egocentric,” but rather that the boundaries between the nascent infantile consciousness and the “outside” world are unclear. One can read the child development literature as a description of a process of negotiation, involving the child’s developing sense of self, the world “outside,” and the child’s “significant others” — a process which normally, within the industrialised world, results in the emergence of a self which is relatively autonomous, self-directing, and detached, and which seeks to control and exploit the world for its own ends. According to Piaget (1950, 7), “. . . every relation between a living being and its environment has this particular characteristic: the former, instead of submitting passively to the latter, modifies it by imposing on it certain structures of its own . . .”

In some ways, the child can be viewed as less egocentric than the adult, in that within the nascent infantile ego, intelligence, feeling, and subjectivity are not restricted to the self, but are properties shared by aspects of the outside world. For example, in the developmental jargon, (s)he may “impute life to inanimate objects.” However, as Barfield (1965, 67) points out, the doctrine of animism, according to which the fancy of “primitive man” had “peopled nature with spirits, [presupposes that] nature must first be devoid of spirit; but this caused the scholars no difficulty, because they never supposed the possibility of any other kind of nature.” Thus in certain respects, the “egocentricity” which is supposed to characterise infantile experience may in fact reflect the infant’s lack of conformity to an ideology which makes particularly assumptions about the human monopoly of subjectivity and intelligence — assumptions which historically and cross-culturally are far from universal (Padel 1992; Heelas and Lock 1981). Thus while it may be generally accurate to envisage the world of the infant gradually extending outwards to include, firstly, the infant’s own limbs, then objects touched, and finally the world beyond, there is nothing in this process which implies that individual subjectivity is necessarily developed in contradistinction to a world experienced “objectively.” On the contrary, even Piaget’s own data suggest that children, if they are permitted to, experience the world empathetically, as alive and enspirited; and as Paul Shepard suggests, it may be our socialisation into an often urban, manufactured environment which gradually teaches us to abandon the notion that the world is alive:

*The absence of numerous nonhuman lives, a variegated plant-studded soil, the nearness of storms, wind, the odors of plants, the fantastic variety of insect forms, the surprise of springs, the mystery of life hidden in water, and the round of seasons and migrations . . . builds in the child the sense that nonlivingness is the normal state of things . . . that the world . . . is not one which feels or thinks or communicates (1982, 102).*

Furthermore, the assumption that the industrialist representation of the world is a “decentered” one is extremely dubious. This representation, as we have noted above, is the product of historical processes whereby the world has come to be seen as material, passive, and lacking in spirituality and intelligence, by a detached observer who maintains a privileged position in relation to it. Edgerton (1976) and Romanynshyn (1989) have shown that the post-Renaissance thought which underpins technology is closely associated
with the development of linear perspective vision — a style of perception which explicitly distances the sentient, detached observer from a world which is viewed “objectively.” To the extent that such a representation is shared throughout the “developed” world, it cannot be described as “egocentric.” But equally, to term it “decentered” is to ignore its anthropocentrism, its traditionally masculine bias, and its embodiment of a historically developing divide between subjectivity and the world outside that subjectivity. If the industrialist system is recognised as a physically realised projection of that personality configuration which has evolved in the industrialised world, then its consistency with the intellect, which appears to testify to its “decentredness” and “rationality,” appears artefactual and inevitable. The order of nature is in many ways excluded by this system, its existence indicated only by environmental and psychological problems, and by the violence which marks its boundaries with industrialism.

It is hardly surprising that the central assumptions of Piaget’s theory — still today the most influential theory of intellectual development — should converge with those of the intelligence testing movement, given his involvement in the development of the Binet intelligence scales in the early years of the Twentieth Century. For example, Piaget perceives the growth of intelligence as involving a movement of thought away from the world, rather than an engagement with it, so that

*The whole development of mental activity from perception and habit to symbolic behaviour and formal thought is thus a function of [the] gradually increasing distance of interaction . . . [between thought and the world] (1950, 8-9).*

This process, according to Piaget, culminates in the stage of “formal operations,” which is normally reached during adolescence:

*With formal operations there is even more than reality involved, since the world of the possible becomes available for construction and since thought becomes free from the real world* (1950, 151) (my emphasis).

This declaration of intellectual independence from the world, implying the creation of a psychosocial realm separate from the natural order, can be seen as a defining characteristic of modern industrial society. As Susan Buck-Morss (1975) puts it:

*For Piaget, the first great cognitive leap is the prototypical experience of alienation. It is the ability of the child to divorce subject from object, hence to grasp the building block of . . . industrial production . . . With the attain-

ment of object permanency, the idea of an object . . . becomes a substitute for the thing itself, indeed . . . is granted greater cognitive value than the material object, and the child is capable through symbolic play of leaving reality unchanged (1975, 40).*

This developing schism between the intellectual and material worlds reflects Piaget’s adherence to a dualistic epistemology reminiscent of Kant’s prioritisation of abstract rationality over concrete particulars. The influence of this epistemology ensures that normative intellectual development is aligned with the requirements of capitalism, so that the detachment of the intellect from the material world, and its justification in terms of allegedly “universal” abilities and developmental trends has become, according to Buck-Morss, “the dominant cognitive structure with the emergence of Western capitalism” (1975, 39). This allows the dispassionate categorisation, reduction, and destruction of the natural world — processes which are both conceptual and, eventually, physical.

Thus thought, according to the Piagetian paradigm, abandons the phenomenal diversity of the natural order to coalesce around certain logical principles of addition, grouping, multiplication, and so on. These logical principles are presented as reflecting indwelling and inescapable physical and biological structures, and intellectual development is measured in terms of the extent to which a person “possesses” a relevant principle. The misleading character of this formulation lies not in what it claims, but what it omits; for while the natural world, as we saw earlier, can be described in these terms, its diversity and multidimensionality far exceeds the grasp of any single model. Consequently, a number of writers have questioned the nature of the relation between operational structures and the physical realities of the world. Garfield (1983, 187), for example, asks whether Piaget, “while thinking that he has told us something important about the child’s coming to understand reality . . . has [instead] informed us about certain logical categories or formal concepts which he has mapped on to the world of the child.” Garfield goes on to consider whether Piaget’s approach leans excessively towards idealism; there is a danger, he suggests, that “the world we construct is not a real world at all” (1983, 193).

But this may be to overstate the case; for whatever the source of the convergence between operational logic and the “laws” of the physical world, there can be no doubt that this convergence exists. The form of rationality jointly defined by economics, psychology, and other facets of the industrial system is a powerful and in some respects highly successful way of comprehending the world, and it would be naïve to suggest that it could simply be replaced by some “non-instru-
mental” form of rationality. What is often forgotten, however, is the partiality and historical specificity of the logical principles towards which the modern child tends to develop. As the part which social and cultural factors play in intellectual development becomes more widely recognised (Gellatly, Rogers and Sloboda 1989; Byrne and White 1988; Resnick et al. 1991), it is becoming increasingly clear that, in Gellatly’s (1989) words,

Individuals do not elaborate, or get greater access to, principles; rather, they learn accepted social practices. They discover what is the accepted way of proceeding in particular circumstances and, maybe, what principles to invoke as justification . . . (1989, 129).

That intellectual development is not merely the more-or-less successful discovery of universal principles is also indicated by cross-cultural work which indicates that human ability undergoes dramatic qualitative changes as we traverse cultural boundaries (Goodnow 1968). Viewed in cultural perspective, it is clear that the style of rationality demanded by “intelligence” tests is one which taps our willingness to isolate and manipulate those particular conceptual possibilities which are foregrounded by industrialism, and to suppress those alternative possibilities which suggest structures inconsistent with industrialism. To return to our “jigsaw” metaphor, “intelligence” tests focus on the shapes and intersections of the pieces, but ignore the more elusive forms which emerge when we allow these artificially produced shapes and intersections to give way to the overall picture. And while the individual shapes from which our understanding of nature is conceptually “constructed” may vary according to cultural context, the emerging “picture” portrayed by the complete puzzle will be independent of this conceptual diversity. According to this “jigsaw” metaphor, then, intellectual development in the industrialised world is a process of learning to recognise and manipulate the “pieces” whilst ignoring the overall picture represented by the complete puzzle — or “learning to see one thing by going blind to another,” as Aldo Leopold (1949, 168) put it.

What occurs, then, in the early years of life, is the movement away from an undeveloped form of consciousness in which the boundaries of self are diffuse, towards a self which is defined by its alienation from world and which imposes onto the world an elegant web of logical rules which are powerful in their generality but misleading in their incompleteness. These rules — summarised in Piaget’s nine “grouping structures” — form the basis of a relation to the world which is consensually accepted as “objective,” but which in fact represents a culturally specific and ideologically loaded vision which has potentially fateful consequences.

A distinction which is useful in understanding this process is that between “fluid” and “crystallised” intelligence. “Fluid” intelligence, or “intelligence A,” is defined as an innate potential, a capacity for development (Hebb 1949; Cattell 1971). This potential, as a result of experience, becomes transmuted into “intelligence B,” or “crystallised intelligence,” which is directly related to those forms of behaviour and cognition that are valued and practised within any particular culture. As a result of this developmental process, a flexible, undeveloped openness to alternatives, to order as it may present itself, implying a diversity of possible alignments, is replaced by a singular, static, abstract understanding which imposes a pre-ordained order on the world. “Fluid” intelligence is tapped by test items measuring the ability to perceive pattern in unfamiliar stimuli, or to rearrange elements of a figure in a meaningful way; while “crystallised” intelligence is measured by subtests such as “Information” (general knowledge), “Vocabulary,” and other measures of one’s acceptance of a culturally specific knowledge structure. It is not surprising that “fluid” intelligence declines after reaching a peak in the early teens, whereas “crystallised” intelligence has been found to increase into late middle age, reflecting the increasing allegiance to the consensual view of reality and the decreasing awareness of alternatives which accompanies our progress towards “maturity” in the industrialised world. The danger of this degree of cognitive specialisation is that while the individual can operate more and more powerfully within one particular conceptual scheme, the instrumental effectiveness of this scheme seduces us into forgetting that it embodies only one way of construing reality out of many possible ones. What is more, if this way of construing reality emphasises the imposition of cognitive categories on to an essentially passive world, then we will become increasingly blind to those patterns and processes that these categories overshadow. While the emergence of specific forms of “crystallised” intelligence reflecting the demands of a particular social and natural context may in some ways be adaptive to the individual, the long-term sedimentation of these forms into a rigidly accepted social “reality” which forgets its own roots and limitations can only damage our relation to the natural world. In psychoanalytic terms, the increasing allegiance to conscious, rational, literal forms of thought is inevitably accompanied by a corresponding repression of fluid, symbolic, metaphorical processes, which thereafter must exist as unconscious, inexpressible possibilities.

Nature’s structure is, in a healthy world, that of the unconscious, invoking multiple meanings, ambiguity, metaphor, and symbolism. As Gary Snyder modifies Thoreau’s famous dictum: “wildness is not just the preserva-
tion of the world, it is the world” (1990, 6). In psychological parlance, the (healthy) unconscious is nature. The technical order is a reduced version — a special case — of the natural order; just as consciousness is a special case of the unconscious. As Gregory Bateson and Mary Catherine Bateson (1987, 30) argue, “. . . metaphor is not just pretty poetry, [it] is the logic upon which the biological world has been built.” Animals, thus, communicate metaphorically, as is illustrated by one of Bateson’s examples:

. . . wolves . . . go out hunting and then come home and regurgitate their food to share with the puppies who weren’t along on the hunt. And the puppies can signal the adults to regurgitate. But eventually the adult wolves wean the babies from the regurgitated food by pressing down with their jaws on the backs of the babies’ necks . . . the previous year one of the junior males had succeeded in mounting a female. Up rushed the lead male — the alpha animal — but instead of mayhem all that happened was that the leader pressed the head of the junior male down to the ground in the same way once, twice, four times, and then walked off. The communication that occurred was metaphoric: “You puppy, you!” (1987, 28)

Bateson argues, more generally, that natural processes do not follow the laws of logic so much as symbolic relations such as syllogism. Take, for example, the syllogism:

Grass dies;
Men die;
Men are grass.

This expresses the metaphor “men are grass.” From a logical point of view, this is clearly “incorrect,” and indeed, it has been taken as diagnostic of schizophrenic thought disorder. Within a “logical” framework, men and grass are entirely distinct; humans are “separate” from the natural order; and the metaphoric relations that knit the world together are denied. But, as Bateson points out, to completely deny the validity of such syllogisms “would be silly because these syllogisms are the very stuff of which natural history is made” (1987, 27). Furthermore, they are, as Chapman and Chapman (1973, 182) have pointed out, “reality oriented and adaptive.” To say that “men are grass” is not just meaningless nonsense; it expresses something important about our mortality and our place within the natural community. Given this, it is hardly surprising that syllogistic reasoning has survival value. Take, for example, the syllogism:

Some fruit are berries;
Some fruit are poisonous;
Therefore:
Some berries are poisonous.

The conclusion “some berries are poisonous” is logically invalid, but is nevertheless quite likely to be correct. Denying such syllogisms any sort of validity may ensure one’s survival in a mathematics department, but heaven help the mathematician who gets lost in a wilderness area.

This is not to deny that abstraction has a place in a healthy understanding of the world, so long as there is a fluently articulated relation between the abstract representation and the concrete, phenomenal realm. Unfortunately, the style of abstraction developed in the industrialised world, as Margaret Donaldson (1978) has argued, is one in which an abstract representation is taken to be better than, and a replacement for, the phenomenal, concrete world. For example, take the well-known Piagetian task involving a string of wooden beads — mostly brown, a few white. The child is typically asked: “Are there more brown beads or wooden beads?” directly counterposing a perceptually salient class to a somewhat more abstract one. Success at this task requires that the child downplay the salience of the colour, prioritising the more abstract dimension of “woodenness.”

The separation from the world is even more obvious in other cases. Donaldson (1978) quotes an example, from Werner (1948), which is fairly typical of the sort of conversation an anthropologist might have had with an informant until quite recently. The native speaker was asked to translate into his language the sentence: “The white man shot six bears today.” “How can I do that?” said the Indian. “No one could shoot six bears in a day.” Such a reply is likely to be regarded as “unintelligent” by those who move easily within an abstract world only tenuously connected to a natural context which we are largely indifferent to.

This dissociation of intellect from the world, however, is often regarded by psychometricians as a desirable quality rather than a problem, in keeping with the preference for “pure” cognition which we noted above. Unfortunately (from the experimenter’s point of view), relatively uneducated people typically find it more difficult to marginalise their experiential knowledge of the world, and so tend to perform less well on measures of intellectual ability. For example, in Sylvia Scribner’s (1977) research with unschooled Vai people of Liberia, one of the problems used was: “All women who live in Monrovia are married. Kemu is not married. Does she live in Monrovia?” (493). Respondents “working from . . . the known fact that there are unmarried women in Monrovia . . . could arrive at an incorrect answer . . .” (493-494) because they abandoned the premise that “all women who live in Monrovia are married.” Scribner’s characterisation of such answers as “incorrect” seems to reflect the preference of many experimenters for an abstract, logical world that is only tenuously connected with knowledge gained through direct experience. She goes on to argue that her find-
ings represent “the strongest evidence to date that traditional people can and do engage in valid deductive reasoning . . . provided they put brackets about what they know to be true and confine their reasoning to the terms of the problems” (1977, 494). Amongst “uneducated” people, Scribner continues, “performance . . . is rarely free from the intrusion of real-world knowledge” (1977, 494). From an ecological viewpoint, however, it could be argued that such “intrusions of real-world knowledge” are essential in aligning conceptual functioning with material, social, and ecological realities; and that it is their absence rather than their presence that should be regarded as problematic.

Donaldson (1978) criticises this emphasis on abstract (“disembedded”) thought within education, and its separation from the everyday experiential realities lived by children, pointing out that younger children in particular will naturally try to contextualise problems which are presented as purely abstract. What is learned within this sort of educational context is not so much the ability to abstract, but rather allegiance to the principle of abstract formalism (Buck-Morss 1975): that is, the structuring of experience according to the separation of form from content. Thus education can be seen, in part, as a learning process in which the child is taught to exist comfortably within the detached world of abstraction. (S)he does not, of course, become oblivious to the phenomenal experience of the world. (S)he will still see, and react to, the colours of leaves and sky, the feel of wind and rain, and the sounds of river and animal, and the states of being which these may induce. However, these qualities, unlike physical attributes such as mass, quantity or length, will remain relatively unarticulated by the dominant systems of thought available within Western culture, and so will be experienced as relatively trivial — noticeable but ultimately insignificant aspects of our everyday lives.

For our purposes, however, the implications of this work go beyond education. It is a small step from the mentality which can ignore the context of the “six bears” type of problem to that which can comfortably perceive a forest simply as a quantity of lumber. And, incidentally, it is an equally small step to the classification of humans according to race or gender; for prejudices, whether racial, sexual, or ecological, are based on abstractions which implicitly deny individual variation, context, and the potential wholeness of human experiencing.

The Human Monopoly of Intelligence

We have seen that “intelligence” rests upon two basic processes — the separation of an intelligent, knowing self from the rest of the world, and the alignment of this self with an abstract model of the world which, owing to its necessarily partial and reduced character, omits important dimensions and characteristics of the world.

Such a situation is not in itself pathological so long as it reflects a temporary, provisional stance that is counterbalanced by other, more integrative ones. The problem arises when we mistake the separation of self from world and the abstractions which accompany it as unchangeable realities, together with the consequent confusion of scientific models with the reality they attempt to explain. Complementarily, this growing allegiance to an intellectual, rational conception of the world has led to a corresponding diminution in the perceived importance of arational elements of the human personality, such as emotion, intuition, or spirituality, together with the cultural, religious, and epistemological structures which could articulate them (e.g., Kleinman 1988, 50-52).

As this provisional epistemological stance hardened into a taken-for-granted assumptive world, those human faculties that were not perceived as useful faded from the psychological universe; and meaning frequently became synonymous with scientific meaning. In Robert Romanyshyn’s terms: “The shift is from the created order of nature to the creation of meaning established by the self in its withdrawal from the world” (1989, 80).

In reducing our relatedness to the earth, these repressive changes affect both partners to this relation, distorting the world “outside” the “individual” as well as individuality itself. Our denial of the natural order, in other words, is simultaneously a distortion of our own subjectivity, leading to the repression and denial of those attributes of nature that could challenge the ideologically-generated dissociation between self and world. Most famously, for example, Freud asserted that the id exists in conflict with the agent of culture within us, the superego — as well as, to a large extent, the ego. Thus the conflict between Western culture and the natural world resonates with an internal conflict, as Freud (1961) demonstrated in Civilisation and Its Discontents; and our socially-acquired intellectual faculties have been turned against our natural predispositions.

Freud recognises this quite explicitly, suggesting that “our intellect can function reliably only when it is removed from the influences of strong emotional impulses . . .” (1973a, 287). In this conflict between intellect and other aspects of our being, Freud was quite clear about his own loyalties: “Our best hope for the future is that the intellect — the scientific spirit, reason — may in the process of time establish a dictatorship in the mental life of man” (1973b, 171). Such accounts make clear that the operation of intelligence requires the repression of the non-intellectual aspects of
human personality; and so parallel to the ontological reduction of the external world by the scientific paradigm, there is a psychological reduction, so that arational modes of being remain repressed and unarticulated. This situation, in which a partial worldview based on conscious rationality interacts with a complementarily reduced world, cannot be seen as ecologically healthy.

Freud’s view of this conflict between intellect and arational aspects of selfhood portrays it as a battle between the advanced, sophisticated views of the civilised world and the blind, inarticulate desires of “primitive” nature, reflecting the assumptions of his time that the natural world is a simple, amorphous world largely devoid of structure or religious significance. However, since Freud’s day, and in response both to disquiet about the totalitarian claims of some scientists and to the growth of an ecological awareness within the scientific community itself, we have begun to acknowledge the incompleteness of this view, recognising that the world is not without its own, natural order. In the same vein, later psychodynamic writers such as Fairbairn (1952) have argued that the “instinctual” foundation of the human personality is more complex and intelligent than has hitherto been recognised, and that the fundamental instinctual drive is a relationship seeking one — in other words, one which seeks to locate the self within some structure of meaning larger than the ego. In short, nature “within” as well as “external” nature may be more “intelligent” and structured than we have been willing to recognise; and a healthy relation to the natural world may imply a resonance and an interaction between these structures, problematising the assumption of our separateness from the rest of nature.

Similarly, Eugene Gendlin has criticised the view that any non-egoic experience is necessarily unrealistic, regressive, and unorganised, arguing that,

The assumption that order is always something imposed began with Western science. Before that time, naturalistic observations were catalogued, and many kinds of order and pattern were found. Modern science imposes its mathematical grids and records only the results of its own operations. At the beginning it was a dramatic, much-discussed idea that one could ignore everything in nature, and substitute mathematical relations. But as that method succeeded more and more, it became acceptable to say that there really isn’t anything there but what we impose . . . (1987, 265-266).

In contrast, Gendlin argues that the body, and non-egoic experience in general, is complex, symbolic, and subtly structured. The loss of such experiencing, and the failure to recognise the order which it implies, leaves the self weakened and isolated from the world; for just as a disembodied intellect deprives us of our animal nature, so the same split renders our animality unintelligent. The natural order is only perceptible to us if we are genuinely in relation to the world. Thus while the type of “rational” consciousness which we have developed in the industrialised world tends to separate us from the world and from each other, non-egoic experience is often a relational mode, one which implies a continuity between a self which can interact with the world in ways which are spontaneously diverse, fluid, erotic, and creative, and a world which embodies a multiplicity of complementary structures and possibilities.

As an example of how the narrowing of our experience to fit the psychological concept of “intelligence” suppresses other possible forms of relation to the world, consider the well-known case of Clever Hans, the horse which appeared to be able to solve simple arithmetic problems, the answers to which he would communicate by tapping a hoof the appropriate number of times on the ground. It was eventually found that Clever Hans’ talents lay not in arithmetic, but in responding to subtle cues which were unintentionally given by its owner. In this case, the talents of Clever Hans were considered to have been disconfirmed, and the remarkable skills that the horse did unwittingly demonstrate were scarcely noticed. Such anthropocentric judgements implicitly define intelligence as an abstract ability which exists entirely within the detached mind of the individual; and other forms of intelligence which involve relation to or communication with something or someone outside the individual are discounted. In effect, this sort of definition prioritises those intelligent processes which occur within the individual, but denies the possibility of any intelligent structure which might transcend individuality. The world is thus made to appear structureless, lacking in intelligent form or purpose, and so fit only to be manipulated for human purposes. This is entirely consistent with Descartes’ invalidation of animal intelligence:

[While it] . . . is . . . a very remarkable fact that although there are many animals which exhibit more skill than we do in some of their actions, we at the same time observe that they do not manifest any at all in many others. Hence the fact that they do better than we do, does not prove that they are endowed with mind, for in this case they would have more than any of us, and would do better in all other things. It rather shows that they have none at all, and that it is nature which acts in them according to the disposition of their organs . . . (quoted in Wilson 1982, 184).

This tortuous line of reasoning can only be seen as a transparent ploy to maintain the distinction between the human “mind” and a “nature” which is defined as mindless — a distinction maintained by many contemporary animal
researchers. As Tim Ingold (1996, 26) has recently pointed out, for example, while the hunting and foraging behaviour of humans is usually viewed as the result of consciously formulated cognitive strategies, the often comparable and “eminently rational” strategies of non-human animals are generally considered to have been “worked out for them in advance, by the evolutionary force of natural selection.” However, this taken-for-granted discontinuity between the “animal” and “human” realms is beginning to come under fire. Beatrix Gardner, for example, has suggested that “the uses and misuses to which we put animals have to do with lines that we draw, differentiating ourselves from them” (1993). In a similar vein, the developmental psychologist Patricia Greenfield has indicated how important language is to the maintenance of an anthropocentric understanding of the world. She describes how her daughter combined words with things rather than with other words, so challenging the autonomy of an intellectual realm from which nonhuman animals are excluded:

“My findings] were very unpopular, and [were] very heavily criticised — I think, to a large extent because of the bias that words are “realler” than non-verbal elements. That is, if someone expresses something in a word, you know it was really there . . . Children can do something, and it’s called language . . . A chimpanzee does the same thing, and it’s not language . . . (1993).

Research on animal “intelligence” is, in many cases, not about identifying their similarities to us, but rather about confirming our uniqueness. It is a way of distancing them from us — setting them in a sort of mechanistic aspic, and constituting their roles within an anthropocentrically-constructed world. Just as this justifies the enslavement of nature outside the boundaries of the self, it also does violence to selfhood, since a world experienced as unintelligent is one which denies us the possibility of a relation with it, and so represses those relational capacities which the early object relations theorists first identified in the 1950’s as basic human needs. “It is impossible to gain any adequate conception of the nature of an individual organism if it is considered apart from its relationships to its natural objects,” Fairbairn suggested, “for it is only in its relationships to these objects that its true nature is displayed” (1952, 139).

If we see the world as containing its own forms of natural intelligence, then human capabilities must partly reside in our capacity and willingness to recognise and embody this broader intelligence. This implies a quite different attitude to the world than that required by technological power: an openness to structures and processes beyond the self, and a recognition that wisdom resides partly in our ability to live consistently with these structures and processes. An example of this attitude is given by Edmund Carpenter in his discussion of the Eskimo relation to their world. The Eskimo word “sila,” for example,

. . . means both thought and outside. In one sense, it refers to the world outside man, especially weather, elements, the natural order . . . But sila also refers to the state of the inner mind; “silaturpok,” has intelligence, shrewdness; “silaturpok,” prudent, thinks ahead . . . Thought, to the Eskimo, isn’t a product of mind, but the forces outside of man . . . Sila, goddess of the natural order, is also the goddess of thought. The successful hunter is her conscious self: he who obeys her laws, prospers. He who ignores her, suffers and dies (1973, 44-45).

Carpenter is describing a world in which intelligence, rather than being located within the minds of individuals, is a property of the world that the individual can learn to share in. If we are attentive to the structure of the world, then we can share in its intelligence, like Heidegger’s cabinetmaker who “makes himself answer and respond above all to the different kinds of wood and to the shapes slumbering within the wood” (1968, 14). This state of attunedness to the world, which is becoming increasingly rare as industrialisation spreads over the globe, is well expressed by the behaviour of the Eskimo carver:

. . . [holding] the unworked ivory lightly in his hand, turning it this way and that . . . whispers: “Who are you? Who hides there?” And then: “Ah, seal!” He rarely sets out to carve, say, a seal, but picks up the ivory, examines it to find its hidden form and . . . carves aimlessly until he sees it, humming and chanting as he works. Then he brings it out: Seal, hidden, emerges. It was always there: he did not create it, he released it; he helped it step forth . . . The Eskimo language has no real equivalent to our words ‘create’ or ‘make’, which presuppose imposition of the self (1973, 59).

This openness to the character of the world as it chooses to manifest itself is also a distinctive aspect of traditional Eskimo styles of perception. Carpenter notes that

With multiple perspective, the moving eye of the observer himself is drawn unconsciously into the scene. Similarly, Eskimo narrators shun a single perspective, preferring to describe an object from many angles . . . (1973, 137).

Thus the images and ideas which are generated are not so much the products of individual “intelligence,” but rather emerge as a result of the joint interaction of the individual and those natural and cultural structures which in part constitute individuality:
... when the task of artistic inspiration and creation is assigned to the unconscious, the images that result are corporate ones: they do not come from the depths of any private, individual unconscious; they come from individual dreams, but from dreams that also belong to the whole tribe. Nothing about them can be called private or individualistic. The dreamer looks inward, but his trip takes him directly to the collective unconscious, that storage system for the collective experience of the tribe. When he returns, he is often better able to handle functions of the mind too obscure for deliberate, conscious activity, and to do so lucidly, communicating easily with those who share these complex perceptions and ancient memories (1973, 180).

We are dealing here with a form of intelligence, and a relation to the natural world, very different from that which is dominant within industrial society. In contrast to the Eskimos’ “ecological” interpretation of intelligence, describing someone as “intelligent” on the basis of their having a high IQ score is to assess their success in separating themselves from their context and functioning as self-contained manipulators, a stance that clearly embodies the technological-commercial ideology of the “developed” world. Such “intelligence” reflects the facility with which one inhabits the schizoid fantasy world spawned by Descartes — a world of abstraction and mathematical purity, devoid of grime, mystery, untidiness, or poignancy. As Kummer and Goodall complain: “We almost completely lack an ecology of intelligence. No other dimension of behaviour has so systematically not been studied...” (1985, 203).

“Intelligence” as Psychopathology

Writers such as Cushman (1990) have pointed out that individual pathology dovetails, often unnoticed, with key characteristics of a society which feeds off that same pathology:

... the bounded, masterful self has slowly and unevenly emerged in Western history. This is a self that has specific psychological boundaries, an internal locus of control, and a wish to manipulate the external world for its own personal ends... our terrain has shaped a self that experiences a significant absence of community, tradition, and shared meaning... The post-World War 2 self thus yearns to acquire and consume as an unconscious way of compensating for what has been lost: It is empty (Cushman 1990, 600).

Individual pathology is much harder to recognise if it is consistent with a deep-seated cultural pathology than if it diverges from contemporary cultural assumptions; and in this respect, the insights of object relations theorists such as Guntrip (1980) that schizoid psychopathology is “more or less universal” in modern society are glimpses that the domination of the intellect is not simply a problem which is restricted to a few aberrant individuals, but rather is one which pervades our whole cultural context. Clearly, Western culture will perceive success in terms of abilities defined in accordance with the value system that Cushman (1990) identifies — that is, one which rewards the facility with which we can maintain “clear boundaries,” demonstrate an “internal locus of control,” and effectively “manipulate the external world.” The concept of “intelligence” formalises these “abilities” and disguises their ideological character by abstracting them from real-life situations — most obviously, in tests which involve the uncontextualised use of symbolic manipulation or memory, but also in those which are contextualised in such a fragmentary way as to offer only the appearance of a meaningful context. For example, comprehension items from the widely used Wechsler Adult Intelligence Scale (Wechsler 1955) such as “Why does land in the town cost more than land in the country?” convey a superficial impression of deriving from a morally and culturally cogent context, while maintaining their ideological presuppositions at a sufficient distance that they remain tacit and unaddressed. In this way, anthropocentric assumptions pose as mental “abilities,” and the selection of individuals by their “intelligence” is covertly a process of measuring ideological conformity.

The configuration of personality which embodies and complements these presuppositions has been explored by object relations theorists (e.g., Guntrip 1980; Fairbairn 1952), according to whom an insufficiently nurturant infantile environment causes the splitting off and repression of the “libidinal” (nurturant, loving, needy, creative) aspects of the ego, leaving the “central ego” as a mechanical, relatively unemotional, superficially well-adapted self, rather lacking in empathy, spontaneity, and passion. This “schizoid” personality structure embodies in an unconscious, chronic form Descartes’ allegiance to the intellect, and his corresponding rejection of sensory or emotional experience. In Guntrip’s terms:

Highly abstract philosophy seems unwittingly designed to prove Descartes’ dictum “Cogito, ergo sum,” “I think, therefore I am,” the perfect formula for the schizoid intellectual’s struggle to possess an ego. A natural human being would be more likely to start from “I feel, therefore I am” (1980, 65).

The schizoid character, which Guntrip sees as “virtually universal” within western culture, is the psychological embodiment of an abstract, rational system of thought in which the world is perceived in terms which are largely
mechanical, mathematical, and material. A mechanistic world view is profoundly consistent with a schizoid personality structure in which internal object relations are substituted for external object relations, and psychological and ideological reductions proceed hand in hand in a dialectic which systematically excludes otherness. The repression of arational qualities is the connection between a narrowly instrumental worldview and an impoverished emotional and spiritual life — a scenario that culminates in the devastation of the earth. As we shrink inwards, away from a world often experienced as hostile, damaged, and lacking in meaning, so the internalised feelings of rejection, anger, and fear which result from the disappointment of our integrative, relational needs unconsciously motivate us to control, order, and master the environment which we found so lacking. As a central component of this project to master and control, “intelligence” presents itself as a formalisation of apparently basic, unavoidable laws of relation between humanity and the natural world, concealing its defensive origins as a substitute for a healthier relation. Thus the schizoid personality structure, which results in part from the inevitable inability of the mother, in isolation, to satisfy the child’s need for meaningful relation, is one which can neither relate empathetically to the natural world nor transmit any meaning-laden view of that world to the following generation. Given this dramatic loss of meaning, what is left to us is to manipulate the world according to our perceived material and emotional neediness; and our “intelligence” indicates our potential success in this soulless project. As Ferenczi succinctly put it:

Pure intelligence is thus a product of dying, or at least of becoming mentally insensitive, and is therefore in principle madness, the symptoms of which can be made use of for practical purposes (1955, 246).

The idea that intelligence may be understood as characterising any well-functioning natural system, rather than being exclusively a property of the human brain, represents a fundamental challenge to the ideological basis of industrialism. Within an ecologically aware subjectivity, a concept that assesses one’s prowess at manipulating other parts of the world will have a definite but nevertheless limited use. Because the concept of “intelligence” implies an individualistic, competitive world consisting of individuals striving against each other, it conceals the extent to which individual humans might complement and resonate with other natural entities to jointly define structures and processes that transcend cognitively imposed categories. Conventionally, the exquisite balance between the behaviours and characteristics of the members of a natural community, rather than being seen as “intelligent,” tends to be viewed one-sidedly as the outcome of a vicious process of “natural selection,” so main-

Conclusion

The concept of “intelligence” encapsulates, naturalises, and legitimates a wide variety of commercial, technological, and educational practices within the industrialised world. However, I have suggested in this paper that although the abstract logical principles to which the concept refers undoubtedly have a foundation in physical reality, their selective nature, together with the denial of much of the phenomenal world by the vision which they underpin, indicates that “intelligence” is heavily saturated with ideological presuppositions which are destructive to the natural world when realised through technological power. In addition, this conception of human ability is based in the Enlightenment dissociation of self from world that is one of the root conditions of environmental destruction. The widespread acceptance of “intelligence” as the foremost indicator of human potential is symptomatic of a profound imbalance in our relationship with the world and, complementarily, of a pathological configuration of selfhood. If we are effectively to address the environmental problems facing us, we will need to reassess the character of our abilities, the exclusivity of the “rationality” which we use to comprehend it, and in particular, the priority which we give to the intellect over other forms of knowing.

Endnote

1. Email address: david.kidner@ntu.ac.uk
2. This is usually simply taken-for-granted, although occasionally explicitly stated, as in Sternberg (1985, 43).

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The Historian’s Dilemma, or Jonah and the Flatworm

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Abstract

Policy relevant research into human ecodynamics involves the study and management of historical systems. All too often this work is predicated on the historicist fallacy that history is like a motor car which clever drivers can steer to Utopia. This paper presents an historian’s view of human ecodynamics as a complex, irreversible, self-organising or synergetic system and tries to explain why historical systems are as they are and to prove that such systems cannot be predicted or driven at will. Two simple ecosystem models are presented which illustrate the strengths and potential value of the synergetic approach.

Keywords: human ecodynamics, self-organisation, synergetics, unpredictability, Jonah’s paradox, spatial pattern, multi-agent system, micro-simulation, overkill hypothesis

Introduction

The search for socially sustainable paths to environmentally sustainable futures is increasingly setting the research agenda in Europe (Liberatore and Sors 1997). This trend will continue as we enter the new millennium. More and more applied scientists will be employed to tell politicians how to change the course of history without disturbing the fabric of contemporary society. The grants will be competed for and support models will be built, either by those who understand historical processes, or by those who do not. Our collective survival may depend on the quality, wisdom and utility of these models.

This research will involve work on the interface of social and natural sciences. Human behaviour and cultural norms are powerful environmental forces and a new, applicable science of Human Ecodynamics1 is emerging ad hoc. A new, scientific approach to the management of historical systems will only be possible if we develop methods that can be reconciled with our best understanding of historical processes. Ironically, it is not the natural scientists, but the social scientists (particularly economists and political scientists) whose understanding of historical processes is weakest. As the new science of human ecodynamics emerges, it is becoming clear that the fundamental unpredictability of historical systems is being systematically ignored.

Historians (sensu lato) should do more than criticise from the sidelines while others work to manage global life-support systems. The task of the policy relevant scientist is to manage history and history, after all, is our particular area of competence. Yet very few historians become involved in this work, partly because of the ethical dilemma it creates and partly because politicians do not see the Humanities as applicable science. The social context in which policy relevant research takes place is such that the work tends to be predicated on historicist principles which, from our viewpoint, are absolutely untenable.

Two Types of Model, Two Types of Science

Pure scientists build process models as test-beds for theories about the world. The results of modelling exercises are articulated with data from experiments or systematic programmes of observation. Poor fit will result in the rejection or revision of the model. Applied scientists, on the other hand, build support models which they use as test-beds for policies. In support modelling, the model is also offered up to empirical data and may be rejected if goodness of fit is poor. However, the ultimate aim of the exercise is to use the model to generate scenarios corresponding to possible policy decisions.

It is easy to distinguish the work of the process modeller from that of a support modeller, one need only compare the sorts of models used by a theoretical ecologist with those used by political economists to forecast financial trends, for example. The classical support modelling approach is to derive a set of rules that correspond to our best understanding of the dynamic process under investigation. These are manipulated to characterise parameters which may be estimable from empirical data. The parameters are duly estimated and substituted into the equations. The dynamic system is initialised with data from the start of a known time series and a trajectory is simulated which may, or may not approximate the given time series.
If agreement is poor, the model may be redesigned. However, more often, the system will be aligned by readjusting the values of parameters to improve goodness of fit between the expected time series (that generated by the model) and the time series observed in the real world. A model which tracks the observed data reliably, despite small adjustments to the starting configuration and system parameters, is said to have been validated. Once this has been done, the support modeller will use the model to generate scenarios and to experiment with policy options.

Thus process modelling and support modelling use broadly similar methods but appeal to very different axioms. In particular, the process modeller need assume nothing more than that the model simulates a theory about the world. The support modeller, on the other hand, must assume that the model faithfully simulates the dynamic properties of the real world. This is often an unwarranted assumption, especially in the social and natural sciences.

The support modelling approach is particularly useful in the study of mechanical, electronic and semi-mechanical processes which we can predict and regulate very effectively within limits. Production lines, queues, communication and traffic networks, for example, can all be managed more or less effectively and these are precisely the systems where support modelling has the most to contribute. The weaknesses in the support modelling philosophy became clearer when the methods are applied to economic, ecological, evolutionary and sociological systems in which unpredictable and uncontrollable behaviour is to be expected.

Real socio-economic and biological processes are historical in nature. What will happen tomorrow is imperfectly determined and uncertain today. They call for stochastic models. That is, for models capable of generating a range of outcomes in an unpredictable way from a single state. Some of these outcomes may actually change the balance of future probabilities in a dramatic way leading to spontaneous self-organisation. For the sake of distinction, I will call these non-deterministic, stochastic rule systems historical or synergetic models and the processes they represent historical or synergetic processes (Haken 1978; Allen 1990; Sanders 1997).

My definition of self-organisation, events that change the balance of future probabilities in a dramatic way is consciously non-mathematical though it can be made precise enough to permit mathematicisation (Winder 1998 and in press) and the application of synergetic methods. The earliest scientific model of a self-organising system, the Darwin-Wallace theory of evolution, was undoubtedly controversial; the so-called evolution debates raged for decades after the publication of the Darwin-Wallace lecture and still rumble on in the contemporary popular science literature. Yet my impression is that evolution by natural selection is not merely a self-organising process in its own right (Allen and McGlade 1987) but that it has produced many organisms which are predisposed to search for behaviours likely to result in further self-organisation. Even relatively simple organisms seem to be ‘potent’ agents of self-organisation; their actions can nudge an ecosystem into seemingly improbable and yet sustainable configurations. Consider, for example, the flatworm.

Flatworms are wonderful experimental animals. They are scavengers, do not eat much, have rudimentary nervous systems. They can be chopped into little bits and each bit will grow a new worm. They have no segments and no body cavity (coelom). Rather surprisingly, they can learn. Biologists have developed Y-shaped tubes called choice chambers and have used rewards (meat) and stimuli (lamps) to train the worms to go to the light or to the dark. Flatworms seem to be predisposed to experimental behaviour and capable of privileging behaviours that facilitate survival. From an ecological viewpoint, the success of this strategy can sometimes be remarkable.

A choice chamber is not a large body of water and its net primary productivity is modest. Working from thermodynamic principles, one would guess that the probability of a flatworm subsisting in a choice chamber is very small. The flatworm is unaware of this and simply searches for behaviours that allow it to do so.

Of course the flatworm is not the only potent actor involved in this process. The presence of the human scientist is the key to the survival of the worm. Without the human, the flatworm has almost no chance of survival. Conventionally, we understand that the human is manipulating the worm but if we take a less anthropocentric viewpoint, the human and the flatworm are seen to be manipulating each other. The flatworm manipulates the human to get meat scraps and the human manipulates the flatworm to get data. It is remarkable enough that a flatworm can feed and reproduce in a bottle too small to support a viable aquatic ecosystem. When you realise that an 80 kg primate also meets its subsistence needs by fiddling around with a few of these bottles and writing learned papers, the ability of groups of potent actors to negotiate sustainability is hard to deny.

In human social systems, the effects of self-organisation are manifest everywhere. The biologist is sustained by taxes derived from the person who makes plastic whistles for Christmas crackers and the priest. The best archaeological evidence suggests that the Pleistocene ancestors of all these people were mobile hunters and gatherers; not a single insurance salesman among them. Human society has passed through so many self-organising events since the end of the Pleistocene that few of us are now capable of getting our own
food, clothes and shelter or, indeed, have any need of these skills.

The archaeological literature suggests that the adoption of a sedentary life style, an agricultural subsistence base and life in large conurbations led to increasing social stratification and craft specialisation. This historical narrative points to a series of critical self-organising events which changed the balance of future probabilities (sedentism, agriculture and conurbation). However, it cannot explain the precise detail of the trajectory that led to our present condition or the minor differences that distinguish one cultural group from another. Why did the Old World ‘discover’ the New before the New discovered the Old? Why do some communities require a bride price to be paid to the parents of a marriageable woman while another requires the parents to give her future husband a dowry? These questions have answers and each answer refers to seemingly random events that changed the balance of future probabilities. By understanding these events, we understand history.

As we study the past we find ourselves characterising trajectories that can be defined with (relative) certainty. This perspective may trick us into imagining some inexorable, deterministic sequence leading to the present; 

For the want of a nail, the shoe was lost;  
for the want of a shoe, the horse was lost;  
for the want of a horse the rider was lost;  
for the want of the rider the battle was lost;  
for the want of the battle the Kingdom was lost,  
and all for the want of a horse-shoe nail.

Anon.

Things seem different when we look to the future because we are forced to confront the indeterminacy of socio-natural systems, an indeterminacy characterised by a seemingly unbounded set of questions about future contingencies; what if a nail falls out of a horse’s shoe? The ways we look at past and future are so different that van der Leeuw (1989) distinguishes a priori from a posteriori perception and argues that we must learn the trick of using a priori perception in historical research to understand history “as it unrolls, in all its fullness”. This is undoubtedly true but for present purposes I am going to take the difference between the two modes of perception as given and turn my attention to the construction and negotiation of history.

The present is not static, as the anonymous wag put it, today is the tomorrow you worried about yesterday. While time passes, the uncertain future becomes a certain past and we humans fabricate a narrative to accommodate it. This narrative is a history. Humans seem predisposed to the construction of history and do it subconsciously. We can only overcome the tendency to turn the past into a neat, seamless story by a conscious effort of will. Consequently, natural and social scientists, whose business is to study histories, have two principal tasks. We must use inferential methods to find out as much about what actually happened in the past as possible. Our sources are never completely reliable and the information we get about the past is always incomplete and usually equivocal. The ‘detective work’ required for good palaeontological, archaeological or historical research is well understood. However, we have also to address the inherent complexity and unpredictability of historical systems, to remember that what actually happened need not have happened (Gould 1989; Popper 1936).

The better we do our detective work, the harder it is to shake off the impression that the past and the present are linked by an inexorable, deterministic chain. Formal mathematical models can help us to do this provided we choose modelling tools capable of representing the quasi-deterministic nature of synergetic processes. We need models which can underwrite self-organisation, irreversibility and unpredictability. These models can be used to investigate imperfectly characterised real trajectories and to make inferences about a class of trajectories which would also have been consistent with the given theory. This class should not only include the history that actually happened but also the set of histories which might have happened but did not.

The fact that today’s actions may change the balance of probabilities tomorrow sets up contingency relations between past events and present probabilities which give a direction to time’s arrow. Our survival and our ability to predict the future availability of essential resources is determined by the aggregate consequences of countless actions and reactions we can neither control nor predict with certainty. In such a world, humans cannot choose to have no ecological impact. Even the decision to do nothing may change the balance of future probabilities in an irreversible way.

The conventional support modelling approach ‘validates’ a model by ensuring goodness of fit between each simulated sequence and the observed time series. Often we only have one historical time series to work with (the history that really happened). Models that do not fit will be re-specified, adjusted or realigned until they do. In this way, support modellers remove the contingencies and tricky behaviours from a model before using it to predict the future behaviour of a contingent and tricky world.

This is the heart of the historian’s dilemma. We humans are each part of a complex, dynamic socio-natural system, full of potent actors (not all human) making more or less autonomous decisions at a micro-level that may result in spontaneous self-organisation at a macro-level. These decisions open some doors and close others. We pass through those doors into a new world which we must live in and
bequeath to the next generation. Not only is it evident that a support model can only simulate a theory about the world, it is also clear that, by validating their models with respect to one of a potentially unbounded set of possible histories, support modellers tend to privilege inferior theories. With historical systems, unwavering goodness of fit to any real time series may reasonably be said to invalidate a model.

So What About Jonah?

Those of us fortunate enough to live in a democracy get to vote for political leaders. Politicians get elected by promising that they will keep things good or make things better. The whole electoral process seems to be predicated on the historicist fallacy that history is like a motor car which clever drivers can steer to Utopia. Politicians need scientists to advise them but there are strong vested interests involved. Good science requires us to accept that history cannot be predicted and driven by scientists who say this are not usually among the favoured applicants. Yet the thesis that history is contingent and unpredictable is not merely plausible, it can be proven. Accordingly, I assert that either the course of history cannot be changed by individuals or the course of history cannot be predicted with absolute certainty. The proof is by reductio ad absurdum.

Suppose I have a model which predicts that candidate X will win the next election because of tactical voting. This can be a fairly sloppy sort of model, it does not need to predict exactly what every human being will do; it just has to determine what the most popular action will be. Suppose further that the theory on which I base my model is absolutely correct (the tactical voters really are going to put X into office) and that everyone knows I am a brilliant, indeed, omniscient modeller.

I don’t favour candidate X but, as one voter among many, cannot change the outcome of an election. I take out an advertisement in the newspaper and communicate my fears to the populus. You are a potential tactical voter. When you read my advert, you must decide how to respond. Your first question might be: is he right or wrong?

You know that I can predict the result of the election and that I am omniscient. It might seem logical to vote as if I were right. Unfortunately, you also know that I have shared my knowledge with many others. If enough of these electors change their voting behaviour, my prediction (reputation notwithstanding) will be wrong and you should vote accordingly. However, if enough people disregard me, I will be right and you should act as if this were so, . . .

This is very strange. As soon as I tell everyone what I know with absolute certainty, I generate an undecidable proposition. You have no basis to decide whether the assertion is true or false a priori despite the fact that you know I am omniscient. You simply have to resort to guesswork or wait and see how it all turns out. Of course, if I hadn’t taken out that advert, the truth of my prediction would be ensured, but then X would win the election and I would have failed to change the course of history.

This paradox has a very modern ring to it though it is actually an antique. It is there for all to see in the passage of Judaeo-Christian scripture called The book of Jonah. Jonah refused a direct instruction from God to prophesy the destruction of Nineveh. His grounds were that the iniquitous population would make reparation to God, who would forgive them and so falsify the prophecy. Jonah was so anxious to avoid false prophecy that he tried to hide from God. He ran away to sea where a storm and passing fish forced his hand. When he finally conveyed God’s message, he was annoyed to see his prophesy falsified. The people made reparation and Nineveh was not destroyed. Jonah’s paradox has been used to teach successive generations that we can most easily predict the course of history if we keep our insights to ourselves and can most easily change the course of history if we share them with others.

An Illustrative Example: the Overkill Hypothesis

Consider a hypothetical ecosystem in which each ‘predator’ is capable of consuming prey faster than prey can regenerate. Thus a herbivores corralled with just enough plant material to feed them for a short interval will eventually overgraze and be forced to find new food or move on. A carnivore which has access to just enough prey to keep it fed for a short interval will harvest those prey faster than they can regenerate and so on. If we create a set of patches, each of which has an initial colony of plants, herbivores and carnivores, allow migration to avoid predators and find available resources and constrain plant migration so that plants can only migrate at birth (i.e., as seeds) we can easily simulate an overkill ecosystem.

A deterministic model can be constructed, taking a recurrent death rate for all organisms of 0.1 with six patches each having a carrying capacity of 50 units of plant. Define 18 state variables to represent the expected population size of plants, herbivores and carnivores at each patch. For illustrative purposes, I present graphs of the total numbers of herbivores, plants and animals plotted against time in Figures 1, 2 and 3. Note that the carnivores seem effectively to restrict the herbivore population so severely that the plants run almost to the carrying capacity of the territory. As the sequence develops, herbivore and carnivore populations dwindle to extinction.
It is not difficult to understand why the deterministic model should run to extinction. The model assumes that species will migrate, breed and die at a rate perfectly determined by the given probabilities. Over successive iterations, all opportunities for growth are quickly exhausted. The result is a perfectly flat, even distribution of plants, herbivores and carnivores across the six patches. Eventually, the lack of food prevents carnivores from breeding, and carnivory eats up all the new-born herbivores. The two populations gradually collapse as natural mortality drag both to extinction. Figure 4 plots the size of the herbivore population in patch 1 against that in patch 2. Note the perfect linear relationship.
indicating a complete lack of spatial pattern in the model ecosystem.

Conventional wisdom has it that *nature abhors a vacuum*, an adage used to persuade us that any opportunity for growth, whether in a biological or an economic system, will be or should be exploited. This model ecosystem provides the perfect antithesis to that view because it is actually destroyed by the over-effective filling of vacuums. What we see in the model is that the carnivores, which are unhampered by predation quickly run to the carrying capacity set by the availability of their prey. When this point is reached their reproductive rate and that of their prey are both curtailed. Both populations are subject to the same recurrent death rate and so enter an exponential decline leaving the ground clear for the plant population to expand to the local carrying capacity. The resulting double extinction marks the centre of a deep basin of attraction into which all sequences will be drawn.

Now consider what happens if we treat each organism as a stochastic micro-model, migrating, breeding and dying in accordance with the given rules. Because each migration decision will be made stochastically, organisms will sometimes ‘make mistakes’. That is, will make decisions that generate a regular mismatch between the expected and observed values of state variables. These differences will result in some organisms one would expect to die, staying alive and some organisms one would expect to live dying. Each organism is a potent ecological actor, it is part of its own environment and of the environment of others. By breeding, migrating, feeding or dying it can change local birth and death rates and, with these, the course of history. It is possible that the net effect of all these stochastic decisions will be to create a propagator or sequence of propagators that underwrite resilience. Once again I can illustrate this by means of a simulation.

Take the same nominal six patches, each with a carrying capacity of 50 plants. Each plant can sustain one herbivore and each herbivore one carnivore with a recurrent death rate of 0.1. This time, every plant, herbivore and carnivore is represented by a distinct computer program, monitoring the distribution of plants, herbivores and carnivores and making stochastic decisions to breed, die or migrate in accordance with the appropriate probabilities. The aggregate behaviour of several hundred model organisms, all running simultaneously will give us the population sizes of plants, herbivores and carnivores in such an ecosystem (Figures 5, 6 and 7).

The first thing to note is that this trajectory is not deterministic. A different run would employ a different random number stream and so replicate runs from identical starting configurations can be expected to diverge. However, there is no measurement error on the observations which Figures 5 to

7 summarise. The process we are looking at is quasi-deterministic; unpredictable *a priori* but fully determined *a posteriori*. Of course, the rules for computing probabilities would be invariant between runs so we may reasonably expect the dynamics of replicate runs to be qualitatively similar, even though the trajectories will diverge.
The second and most obvious observation we can make is that the micro-simulation is jagged with peaks and troughs representing abrupt boom and bust events. Yet the model shows no sign of running to extinction. On the contrary, it seems remarkably resilient. The noise in the system generates a degree of spatial patterning among patches that maintains local vacuums or statistical refugia for small populations of animals and plants. Figure 8 illustrates this by plotting the number of herbivores in patch 1 against the corresponding number in patch 2. The perfect linear distribution of the macro-model (Figure 4) has been completely disrupted in the synergetic model. The pattern is a by-product of the stochastic, jerky time series, which is a more realistic representation of the hide-and-seek behaviour of resilient predator prey systems. It is resilient because the collective effect of the birth, death and migration decisions taken at the individual level actually alters the balance of probabilities. Stochastic noise generated by individual migration, birth and death 'decisions' continually bounce the system away from the deep basin of attraction into which the macro-model fell.

We should not abandon this simulation without considering empirical testability. As any good statistician can testify, the covariance structure obtained from a set of observables is often a valuable source of information about data structure. We can also compute covariances directly from the model's time series, thereby forging a link between system dynamics and static observables. The covariance data obtained from the micro simulation run are the following:

<table>
<thead>
<tr>
<th></th>
<th>Plant</th>
<th>Herbivore</th>
</tr>
</thead>
<tbody>
<tr>
<td>Carnivore</td>
<td>-73.2</td>
<td>215.7</td>
</tr>
<tr>
<td>Herbivore</td>
<td>-65.1</td>
<td></td>
</tr>
</tbody>
</table>

Note that the number of plants covaries negatively with that of herbivores and carnivores, the numbers of which are positively correlated with each other. This means that when plant populations are relatively small, herbivore and carnivore populations can be expected to be relatively large, and vice versa. In fact the herbivore and carnivore populations drive each other through boom and bust cycles with each either rising or falling slightly out of phase with the other. As herbivore populations rise, plants are overgrazed but recover as the herbivore population crashes and drags the carnivore population down with it. These statistical generalisations are important because they can be taken as the empirical signature of the model. We would not expect a real-world ecosystem to track the given time series, even if the theory were correct. However, we could reasonably expect carnivore and herbivore numbers to be positively correlated with each other and negatively correlated with plants in the real world. If this were not so, we consider the theory under investigation to have been refuted by the empirical evidence.
Conclusions

In the body of my paper I argued from anecdotal evidence that historical systems are quasi-deterministic. That is to say that they give the impression of being fully determined \textit{a posteriori} but are in fact indeterminate \textit{a priori}. Then I showed that, as long as human actors can use a predictive model to change the course of history, the deterministic hypothesis leads us to paradoxical conclusions: simple competitive games in which only one player can win and no player can lose, for example.

This line of argument, though familiar to many from Old testament scripture, is directly analogous to well-known theorems of computer science which have been used to establish the limits of computability and to the famous result of number theory known as Goedel’s incompleteness theorem. In the form presented here it proves that multi-agent systems are capable of generating outcomes which were absolutely unpredictable \textit{a priori} even though they may seem quite unsurprising \textit{a posteriori}.

At a superficial glance, my argument is primarily theoretical and the two computer simulations that followed it seem to have little direct connection to the main body of the text. However, they serve to demonstrate that the issue of unpredictability has profound practical implications for those engaged in the management of historical systems and that some of the methodological problems raised by unpredictability can be solved in practice.

The first thing we must note is that both simulation models represent overkill ecosystems, each of which has the same carrying capacity, the same starting configuration and calculates birth, death and migration probabilities in the same way. The principal difference between the two is that one has an implicit assumption of predictability that the other lacks.

The classical support modelling approach validates a model in terms of goodness of fit between a simulated trajectory and the history that really happened. A support modeller would have to build a deterministic model and then reject the overkill hypothesis for poor goodness of fit. The trajectory observed and that obtained by simulation were simply too different for the model to be supported. In practice, however, it was not the overkill hypothesis, but the implicit assumption of predictability that generated the unrealistic behaviour.

Every simulation model represents a theory about a social or natural system. The use of deterministic methods (differential equations in this case) to implement an overkill model has \textit{k}nock-on effects for the simulation itself. The classical support modelling approach, with its close attention to single trajectories can lead us to refute perfectly good theories because of the hidden assumptions we incorporate into our computer programs. Indeed, the support modelling paradigm almost obliges modellers to restrict their attention to demonstrably inferior theories.

My argument seems like a counsel of despair: scientists are damned if they assume predictability because their models will be suspect on theoretical grounds and damned if they assume unpredictability because their models can never be tested against the empirical evidence generated by observed time-series’. In fact, this is not necessarily so.

In the unpredictable case we can generate many time series, all consistent with the given theory, and use these to construct variance-covariance matrices. This is a well-established statistical technique and, by the Central Limit theorem of statistics, we may reasonably hope that these will provide stable fingerprints for given theories. Striking disparities between the variance-covariance fingerprints of multi-agent systems and those observed in real time-series data can reasonably be taken as grounds for empirical refutation of the underlying theory. Abandoning the assumption of predictability does not necessarily require us to abandon the scientific discipline of empirical testing.

In the predictable case, the overkill hypothesis drove the simulated ecosystem into a deep basin of attraction; a catastrophic extinction event in which predators had access to all populations of prey. The noisy time series and the dynamic spatial pattern generated by the hide and seek behaviour of a real ecosystem was replaced by a smooth, spatially amorphous collapse. In the unpredictable case, individual animals and plants failed to conform exactly to expectations: isolated pockets of prey and predators sometimes managed to survive in difficult circumstances and sometimes died in circumstances where survival would have been expected. Because each of these organisms was part of its own environment and that of others in the system, these local discrepancies between observed and expected behaviour actually changed the balance of future probabilities. Spatial pattern is generated thereby together with the characteristic jumpy trajectories so often observed in real ecosystems.

Unpredictability is not a problem for scientists to solve but a logically inescapable consequence of the way the world appears to be. As such, it provides an opportunity for scientific development. Both the life sciences and the social sciences have well established traditions of investigating static spatial patterns and dynamically evolving trajectories. However, building bridges between the static and the dynamic approach is notoriously difficult.

The evidence of these simple models is that, by building models of quasi-deterministic systems, scientists may see more clearly why socio-natural systems develop spatial pattern and how this spatial pattern is related to ecological resilience and to variance-covariance structure in time series data. The systematic study of self-organising or synergetic
systems may enable us to forge stronger links between the static and dynamic arms of these fields.

Endnote

1. The term was coined by Dr. James McGlade of the Institute of Archaeology at University College, London.

References


Abstract

Four ordinary least squares regression models were run for age-, race-, and sex-adjusted cancer mortality rates, standardized by the direct method. Digestive cancer, genital cancer, lymphatic and hematopoietic cancer, and urinary cancer rates were based on the average number of cancer related deaths for the period 1986 to 1994 and the 1990 size of population subgroups in 254 Texas counties. The four cancer rates were highly intercorrelated indicating that particular counties had high rates for many of the four cancer groups. Black proportion of population and urban county status had statistically significant influences on high cancer mortality rates in all of models. Median family income was inversely related to cancer mortality rates in all of the models, except that of urinary cancer. Contrary to expectations, Hispanic proportion of county population, level of manufacturing employment, accumulated pounds of toxic chemical wastes, and number of insecticide-treated acres had unimportant influences on cancer death rates. Foreign-born proportion of county population was associated with only digestive cancer mortality. Future research at the individual level in high death-rate counties is needed to better identify causal factors, and to improve variable measurement and model specification.

Keywords: cancer mortality rates, agricultural pesticides, industrial factors, Texas

Introduction

The ubiquity of pesticides and other toxic chemicals in our environment has caused much public concern about their effects on human health and safety (Szasz 1994; Andelman and Underhill 1987; Gordis 1988; Gots 1993). Since farm use of pesticides peaked around 850 million pounds in 1980, they have varied between 658 million pounds to 786 million pounds (US Environmental Protection Agency 1997). Very few pesticides have been tested for their toxicological effects on people, yet at least 70 among the almost 2,800 pesticide products that are registered for agricultural use have chemical agents which are known to cause cancer, birth defects, or neurological problems (Bullard and Wright 1993). In addition to these toxins, an estimated 1.4 billion tons of regulated hazardous chemical wastes are produced yearly by manufacturing companies in the United States, and 430 million tons of unregulated industrial wastes containing heavy metal and organic compounds are annually released into the environment (Gerrard 1994).

Because few chemicals in the national waste stream have well understood effects on humans, ecological and individual-level studies on the epidemiological effects of human exposure to chemical waste toxins have increased during the past two decades. Although many of these studies unveiled connections between toxic chemical exposure and the incidence of cancer (Blot and Fraumeni 1976; Goldman 1991; Gottlieb, Shear, and Seale 1982; Gould 1986; Lave 1972; L.J. Phillips 1992; Stockwell, Sorenson, Eckert, and Carreras 1993; Zimmerman 1995), their findings were uniquely limited because of their level of analysis. Ecological studies generally have a national or regional scope that does not provide any information about the patterns of exposure and mortality at the county level for particular states where there is high prevalence of cancer incidence and large volumes of carcinogens in chemical wastes. Individual-level studies, in the form of case-record and cohort designed research, are based on detailed health and medical history data of people selected from local or community geographical units. These studies,
especially the studies reviewed by Marsh and Caplan (1987), controlled confounding factors, such as tobacco, alcohol and drug consumption, and pregnancy, that ecological studies were unable to measure (Hogue and Brewster, 1988). Individual-level studies produce, however, findings that are location specific and cannot be generalized to larger geographical areas and populations.

In this study, an exploratory ecological design was employed to identify demographic, economic, and toxic chemical factors that might influence cancer mortality rates in Texas. Reasons for conducting an ecological study were the following: it was less costly than other epidemiological designs, it used secondary data which are readily available at the county level of analysis, it did not require a priori knowledge of an area’s morbidity and mortality patterns, and it provided a logical first step to identify specific counties with high incidences of cancer mortality in order to conduct future detailed individual-level studies (Morgenstern 1995, Szklo 1988). The study sought to answer three questions: (1) Do socio-economic characteristics of a county influence site-specific (i.e., in reference to the human body) rates of carcinogenic mortality? (2) Does the degree of county urbanness influence site-specific carcinogenic death rates? and (3) Do factors such as the application of agricultural pesticides and the volume of toxic chemical waste emissions influence site-specific rates of cancer mortality? The first two questions address characteristics (e.g. ethnic composition, median family income, etc.) that epidemiologists and others have often used individually or in combination as confounders of mortality rates (Morgenstern 1995). The third question regards industrial influences that researchers are giving increased scrutiny.

**Toxic Chemicals in Texas Counties**

Comprehensive data on pesticides and toxic chemicals in the environment have become available only recently. Regulated by the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA), agricultural pesticides include the following: herbicides, insecticides, fungicides, nematocides, and chemicals targeted to more specific pest eradication, such as araricides (spiders). Other classifications of chemicals include defoliants, desiccants, disinfectants, plant and insect growth regulators, and fumigants (Moses et al. 1993). Herbicides and insecticides are by far the most applied pesticides by volume.

The total volume of conventional pesticide usage (agricultural and non-agricultural) declined nationally from a high of 1,487 million pounds in 1979 to approximately 1,200 million pounds in 1995 (Aspelin 1997). Much of the decline resulted from increased government regulation and higher product costs. Within this overall downward trend, herbicide usage increased nationally from 41 percent to 46 percent of the total volume of pesticides applied. Insecticide usage declined, however, from 17 percent to 11 percent of the total national volume. The agricultural share of pesticide usage has been disproportionately high. It rose from 74 percent in 1979 to 79 percent in 1995. The combined herbicide and insecticide proportion of agricultural usage has varied in a small range from 62 percent (or 680 million pounds) in 1979 to 59 percent (or 552 million pounds) in 1995 (Aspelin 1997).

Indiscriminate killing of beneficial insects aside, the application of pesticides causes several problems that exacerbate human exposure potential. Application technologies involving open-system mixing, hand-held sprayers, field flagmen, and open-cockpit planes and tractors increase risks of splash (skin and eye contact) and inhalation exposure (Thomas and Ladewig 1993). Studies show also that 85 to 90 percent of applied pesticides is dispersed off-target to air, soil and water through drift, runoff, volatilization, and off-gassing (Moses et al. 1993). For example, the EPA reported in 1988 that 46 pesticides were detected in the groundwater of 26 states; 18 of these pesticides were at levels that exceeded health advisory levels (Kellogg, Maizel and Goss 1992). Texas ranked fifth nationally in the number of acres (6.4 million) which had a high risk of ground water contamination by pesticides (Kellogg, Maizel and Goss 1992). Because of high toxicity levels, biopersistence, and nonpoint pollution problems, the EPA has banned chlorinated hydrocarbons such as DDT, aldrin, dieldrin, and heptachlor, and decertified other chemicals such as arsenic acid (a desiccant) for agricultural use. Moses and his associates (1993) provide an exhaustive overview of research that addresses the health effects in particular populations exposed to pesticides. Most of the epidemiological research has focused, however, on farm owners/operators and ignored farm workers.

One of the most successful Congressional efforts to improve the identification and monitoring of industrial toxins in the national waste stream involved the passage of the 1986 Emergency Planning and Community Right-to-Know Act (EPCRA). It authorized the annual collection and provision to the public information about the presence and release of hazardous and toxic chemical wastes and mandated development of the Toxic Release Inventory (TRI). Since 1988, the first reliable year of TRI data collected by the Environmental Protection Agency (EPA), Texas has ranked annually either first or second in the total volume of toxic chemicals released by manufacturers in standard industrial codes 20 to 39 who participated in the TRI (US Environmental Protection Agency 1993, 1996).

Researchers have recently used the TRI to indicate sources and locations of potential exposure risk (Perlin, Setzer, Creason and Sexton 1995; Pollock and Vittas 1995; Ringquist 1997; Thomas, Kodamanchaly and Harveson...
TRI facilities (approximately 23,000 nationally) are much more numerous than other sources of toxic wastes, such as the 3,900 storage, treatment, and disposal facilities (STDF) monitored under the Resource Conservation and Recovery Act, and the 1,200 Superfund sites identified by the Comprehensive Environmental Response, Compensation and Liability Act (Gerrard 1994).

Texas’ approximate 1,200 TRI facilities reported 408 million pounds of toxic chemical releases, about 11 percent of the 1990 national volume. Petrochemical companies in the state accounted for most (57%) of these releases. Of the 250 toxic chemicals listed in the TRI prior to 1995, 121 chemicals were known carcinogens, based on criteria set forth in the Occupational Safety and Health Administration’s Hazard Communication Standards (US Environmental Protection Agency 1996). The total volume of all TRI chemical wastes declined in Texas from 310 million pounds in 1988 to 250 million pounds in 1994; carcinogenic releases declined from 44 million pounds to 24.6 million pounds in this period (Thomas and Harveson 1997). Fifty carcinogenic chemicals were released in Texas to air, injected into wells, placed in landfills, and emitted to water. In 1990, the greatest released volume (93 million pounds) of carcinogens included benzene, formaldehyde, lead, acrylonitrile, tetrachloroethylene, and 1,3-butadiene. TRI facilities are located predominately in metropolitan areas and in Texas Gulf Coast counties. These facilities have historically employed a large number of chemical and petroleum workers and have produced annually the largest volume carcinogenic releases (Thomas and Harveson 1997).

Empirical Evidence and Research Hypotheses

The percentage of cancer related deaths in Texas increased from 7 percent in 1935 to 23 percent in 1993, making cancer is the second leading cause of death (Texas Cancer Registry 1996). However, little is known about the relationship between cancer mortality and exposure to pesticides and toxic chemicals in the state (Napton and Day 1992; Thomas, Kodamanchaly and Harveson 1998). Much of this lack of knowledge is due to common problems of measurement inaccuracies that make exposure to toxic chemicals difficult to estimate, to coverage inconsistencies in secondary data (Anderton 1996; Zimmerman 1994), and to a comprehensive measurement of factors that differentially affect human susceptibility (Sexton et al. 1993).

Based upon empirical evidence reported in past studies, eight research hypotheses were tested for each of four site-specific groups of cancer: digestive, genital, lymphatic/hematopoietic and urinary cancers. These general groups facilitated the aggregation of incidences of cancer mortality to sufficiently calculate stable rates at the county level. Although these groups have been employed elsewhere (Stokes and Brace 1988), a drawback to their use is that individual cancers within each group have different etiologies and characteristics. Respiratory cancer was not included among the four groups because of unmeasured effects of tobacco-smoking behavior on lung cancer incidence.

\( H_1 \) Black percentage of population positively influences rates of cancer. At most ages, Blacks experience greater mortality rates than Whites for most causes of death (Goldman 1991; Hummer 1996; Sorlie, Backlund and Keller 1995). More than half of this racial difference in mortality is due to cardiovascular disease and cancer (Rogers 1992). Nationally, Black males experience higher rates of lung, esophagus, and prostate cancer than White males (Rios, Poje and Detels 1993; Rogers 1992). Among women, Blacks older than 15 years of age are 2.6 times more likely than Whites to die from cervical cancer (Centers for Disease Control 1990). Socioeconomic factors explain most of these differences in death rates according to Hummer (1996). Blacks with lower socio-economic status are less likely than whites to have health insurance, to receive preventative and follow-up treatment services, to be less knowledgeable about the signs of cancer and potential treatment, and to use tobacco. However, other research indicates that after statistical controls are applied for demographic factors, family size, and income, gaps in cancer mortality rates narrow between the two races (Rogers 1992). In Texas, Black males had higher cancer mortality rates in 1992 than Anglo and Hispanic males; the highest rates for all male racial groups were for prostate, lung, and colon cancers (Texas Cancer Registry 1998). Black females had rates second to those rates of Anglo females; the highest rates for all women were for breast, lung and colon cancers (Texas Cancer Registry 1998).

\( H_2 \) Hispanic percentage of population positively influences rates of cancer. Hispanics comprised 21 percent and 26 percent of the Texas population in 1980 and 1990, respectively. However, 39 of 254 Texas counties had more than 40 percent Hispanic population in 1980 and this number increased to 44 counties in 1990 (Murdock and Hoque 1992). Many of these counties, which are located in the western and southwestern areas, have large concentrations of Hispanics who are employed in agricultural and manufacturing jobs along the Rio Grande River. Federal laws and programs do not protect these workers against exposure to toxic chemicals (Goldman 1991; Rios, Poje and Detels 1993).

\( H_3 \) Foreign-born percentage of population positively influences rates of cancer. Texas ranked third in the number of foreign-born population (1.2 million), who entered the United States from 1980 to 1990 (Murdock and Hoque 1992). Limited available evidence indicates that foreign-born eth-
nicity is associated with specific cancers. In their national study of cancer mortality rates for White males in the period 1975 to 1980, Stokes and Brace (1988) found that foreign-born ethnicity produced the largest, most consistent, and positive influences on digestive, genital, urinary cancers. Foreign-born ethnicity was negatively related, however, to respiratory cancer mortality rates and had no influence on lymphatic cancer.

(H₄) Median family income negatively influences rates of cancer. Level of income is related to cancer mortality through experiences in individuals’ life course experiences. Such experiences include consumer nutrition, financial inability to change residences contiguous to hazardous sources (Mohai and Bryant 1992), to afford adequate health insurance, and to pursue timely medical treatment (Sorlie, Backlund and Keller 1995). Thus, low-income families have life styles and situations, mixed with limited resources, that potentially expose them to greater carcinogens and other environmental hazards (Bullard and Wright 1993). Scant empirical evidence indicates, however, that median family income is positively associated with only respiratory cancer mortality and is negatively related to genital cancer mortality (Stokes and Brace 1988). Other research shows it has positive influences on the rate for all cancers and on the breast cancer death rate (Goldman 1991).

(H₅) Urban county status positively influences rates of cancer. Although research has shown that urban and rural cancer trends are converging, urban rates still exceed rural rates, particularly for white females who live in central cities (Greenberg 1984). Densely populated areas with high concentrations of manufacturing facilities and employment produce more hazardous wastes than areas with fewer facilities, thereby increasing exposure risk (Pollock and Vittras 1995; Ringquist 1997), illness, and mortality (Glickman and Hersh 1995; Nieves and Nieves 1992; Stockwell, Sorenson, Eckert and Carreras 1993). In a New Jersey study of 194 municipalities, Najem and his associates (1985) observed a pattern of cancer mortality concentrated in cities located in the highly industrialized, densely populated northeastern part of the state.

(H₆) Level of manufacturing employment positively influences rates of cancer. Risks of exposure to carcinogens in the workplace are documented often (U.S. Environmental Protection Agency 1996). Some estimates of exposure risk vary from approximately 5 percent to over 25 percent of all cancer deaths (Swanson, Schwartz and Burrows 1988). For example, in the mid-1970s, the National Cancer Institute (NCI) prepared maps that revealed clusters of high incidences of cancer in the highly industrialized Northeast, the Southeast, and Gulf Coast regions (Mason 1975). In a follow-up study to the NCI report, Blot and Fraumeni (1976) found significantly high rates of lung cancer mortality in counties with paper, petrochemical, and transportation industries. Additionally, Pickle and Gottlieb (1980) found that the likelihood of pancreatic mortality increased about two-fold for workers employed by refining and paper manufacturing industries in Louisiana. In Hoover and Fraumeni’s (1975) geographical analysis of US cancer mortality from 1950 to 1969, they reported excess rates for bladder, lung, liver, and certain other cancers among residents in counties where chemical industries were most concentrated. More recently, Austin and Schnatter (1983) found a significant excess number of deaths due to brain cancer among White males over 55 years of age who were employees of a Texas chemical plant.

(H₇) Accumulated pounds of TRI carcinogens positively influences rates of cancer. By their very definition, chemical wastes reported to the TRI are hazardous to human health (US Environmental Protection Agency 1996). Toxic chemicals in these wastes bio-accumulate, bio-magnify, and bio-persist in varying degrees in the environment. In addition to cancers, they can cause genetic and chromosomal mutations, developmental, acute and chronic toxicities, and neurotoxicity (Geschwind et al. 1992; Stockwell, Sorenson, Eckert and Carreras 1993). Najem and others (1995) found a consistent and significant positive association between 8 of 12 cancers studied and the presence of disposal sites for toxic chemical waste.

(H₈) The number of pesticide treated acres positively influences rates of cancer. Many farms are exempted under the law because of their operational size. Consequently, an estimated high of 2.5 million employed farm workers are excluded from most occupational safety and health regulations and other protective labor laws (e.g., Fair Labor Standards Act, workers’ compensation and unemployment benefits, and social security benefits) (Goldman 1991; Rios, Poje and Detels 1993; US General Accounting Office 1992). This exclusion is estimated to have produced an annual death rate among farm workers that is five times greater than the national rate for all occupations combined (University of California Agricultural Health and Safety Center and the Western Consortium for Public Health 1992).

Ample evidence indicates that rates of leukemia, myeloma, stomach, pancreas, and prostate cancers are greater among farm workers who are exposed to pesticides than among the rest of the population (Goldman 1991; Moses et al. 1993). Some scientists found that herbicide use was positively related to the risk of non-Hodgkin’s lymphoma among farmers (Hoar et al. 1986) and to genital, lymphatic, digestive, and respiratory cancer mortality among rural males (Stokes and Brace 1988). They reported further that insecticide use positively influenced respiratory cancer mortality rates among rural males (Stokes and Brace 1988).
Methods

Regressor Variables

Data for this study were compiled from several sources. Four demographic variables were obtained from the US Bureau of the Census (1973, 1983, and 1993). The average Black percentage and average Hispanic percentage of a county population were calculated each by adding the respective percentages of total county population for the 1970, 1980 and 1990 census periods and dividing each of the totals by three. Average foreign-born percentage of the county population was the mean proportion of a total county population that was born of foreign background during each of the three census periods. This segment of the population was assumed to be primarily Hispanics who immigrated from Mexico, although Asian segments have increased since 1980 (Murdock and Hogue 1992). Median family income was obtained for each census year, summed, and averaged.7

To control for urban influence on cancer mortality, a measure of urbanness was constructed using the nine rural-urban influence codes prepared by Ghelfi and Parker (1995). For simplicity, counties were recoded as: (1) 1990 location in large metropolitan area with one million population or more, or location in small metropolitan area with fewer than one million population; (2) adjacency to a large metropolitan area with a city of 10,000 or more, adjacency to a large metropolitan area without a city of at least 10,000, adjacency to a small metropolitan area with a city of 10,000 or more, or adjacency to a small metropolitan area without a city of at least 10,000; (3) not adjacent to a metropolitan area and with a city of 10,000 or more population, or not adjacent to a metropolitan area and with a city of 2,500 to 9,999 population; and (4) not adjacent to a metropolitan area and with no city or a city with a population less than 2,500.

Potential exposure to carcinogens in the environment was crudely indicated by three industrial measures: level of manufacturing employment, volume of toxic chemical wastes released by manufacturing industries, and average numbers of agricultural acres treated with two types of pesticides. None of these measures assessed, however, actual exposure (i.e., amount, duration, vector, etc.) to chemical carcinogens or the health-related responses to exposure.

Because TRI data were not available before 1987, data on manufacturing employment were obtained from the US Bureau of the Census for the years 1970, 1975, 1980, 1985, and 1990. Level of manufacturing employment was measured as the five-period average of the number of persons employed in manufacturing industries with standard industrial codes (SICs) of 20 to 39, the same industries required to report to the TRI.

The volume of carcinogenic chemical releases was measured in dry pounds and standardized to a common list of 122 chemicals to maintain comparability for the TRI reporting years of 1988 to 1994, and to measure the potential accumulation of these known carcinogenic wastes. A limitation of this measure is that carcinogenic toxicities of waste chemicals are not all equal and they do not cause the same cancers (Stockwell, Sorenson, Eckert and Carreras 1993). Moreover, these chemicals represented less than one-half of the list of chemicals monitored by the EPA prior to 1995 to be hazardous in other ways.

Agricultural acreage data were obtained for four time periods (1974, 1978, 1982, and 1987) from the Census of Agriculture (US Bureau of the Census 1976, 1980, 1984, and 1992).8 Insecticide treated acres was the averaged number of acres to which herbicides were applied during the four agricultural census reporting periods. Insecticide treated acres were measured similarly. Use of these pesticide measures had some limitations. Pesticides and other agricultural chemicals such as fertilizers are often applied to the same acres. Consequently, acreage measures can be collinear and non-independent of one another. Data on the applied pounds of particular agricultural pesticides, though preferred, were unavailable at the county level. Furthermore, pesticides vary by toxicity and longevity in the environment. Number of treated acres is a crude measure at best of the environmental presence and hazard posed by these chemicals.

Response Variables

Carcinogenic mortality rates of four site-specific causes of death were computed for each county in 1990. Mortality data were provided for the years 1986 to 1994 by the National Center of Health Statistics (NCHS).9 Carcinogenic sites in humans were taken from the ninth edition of the International Classification of Diseases (ICDs) and combined according to the site groups identified by Greenberg (1984) and Stokes and Brace (1988). The four site groups appear in Table 1. Other site-specific cancers had too few numbers of deaths reported, particularly for rural counties, by NCHS to be useful in the analysis. Mortality rates based on small numbers of death are unreliable given the large standard errors they produce (Gots 1993; Greenberg 1984).

Rates were based on per 100,000 population. The standardization procedure was conducted in several steps. First, the numbers of death for the years of 1986 to 1994 were totaled and averaged for each county to stabilize severe fluctuations that might have occurred in the numbers of death from year to year (Morgenstern 1995; Shryock and Siegel 1976). Second, the expected number of age-, race-, and sex-adjusted deaths was calculated by carcinogenic cause of
Sizes of county subgroup populations that were reported in the 1990 US Census were used to adjust the rates. Age categories were defined as 0-14 years, 15-64 years, and 65 and older. Racial/ethnic categories were Anglo, Black, and Hispanic (Murdock and Hoque 1992). Other ethnic groups (i.e., Asians, American Indians, and other groups), which comprised 12.8 percent of the Texas population in 1990, were not included in the analysis (US Bureau of the Census 1993). Sex categories were male and female. Finally, the adjusted death rates were standardized using the direct method and the sizes of age, race, and sex subgroup populations in Texas (Shryock and Siegel 1976). Adjusted site-specific cancer mortality rates are reported in Figures 1 through 4.

Table 1. Major Groups of Cancer in an Ecological Study of Cancer Mortality in Texas

<table>
<thead>
<tr>
<th>Site Types of Cancer</th>
<th>ICD Codes*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Digestive</td>
<td>esophagus (150); stomach (151); small intestine, including duodenum (152); colon (153); hepatic and splenic flexures and traverse colon (153); rectum, rectosigmoid junction and anus (154); liver and intrahepatic bile ducts (155); gallbladder and extrahepatic bile ducts (156); pancreas (157); and peritoneum, retropertioneum, and other ill-defined sites within the digestive organs and peritoneum (158-159)</td>
</tr>
<tr>
<td>Genital</td>
<td>cervix uteri (180); other parts of the uterus (179, 181, 182); ovary and other uterin adnexa (183); other and unspecified female genital organs (184); prostate (185); testis (186); and penis and other male genital organs</td>
</tr>
<tr>
<td>Lymphatic</td>
<td>Hodgkin's disease (201); lymphosarcoma and reticulosarcoma (200); other malignant neoplasms of lymphoid and histiocytic tissue (202); leukemia and aleukemia (204-208); multiple myeloma and immunoproliferative neoplasms (203)</td>
</tr>
<tr>
<td>Urinary</td>
<td>bladder (188); kidney and other unspecified urinary organs (189)</td>
</tr>
</tbody>
</table>


Analytical Procedures

Bivariate correlation procedures were conducted initially, followed by ordinary least squares (OLS) regression analyses. The statistical significance of each bivariate correlation coefficient was determined for the hypothesis $\rho = 0$. Due to the parametric nature of the data, ordinary least squares regression analyses (OLS) were conducted to determine if any of the socio-economic and industrial characteristics of counties significantly influenced the variation in each of the four site-specific cancer mortality rates (SAS Institute, Inc. 1990). Values for the variance inflation factor (VIF > 10) and tolerance (TOL => 0) were computed to determine the occurrence of multicollinearity among the regressor variables (Hamilton 1992). The herbicide and insecticide variables...
were collinear (r = .849; TOLs < .3; VIFs > 3.9) in each of the cancer mortality models. Although herbicide-related correlation coefficients are reported in Table 2, the variable was deleted from subsequent analyses because its statistical associations with other variables were less than those associations by the insecticide variable.

Death rates tend to have non-normal univariate distributions. Consequently, magnitudes of the Cook’s D value and a plot of the residual errors against estimated mortality rates determined case influence (i.e., leverage conditions). Cook’s D measures the influence of the \(i\)th case on all estimated regression coefficients, or equivalently all \(n\) predicted cancer mortality rates.

Table 2. Simple Statistics and Bivariate Correlations of Socio-economic and Industrial Characteristics, and Site-Specific Cancer Mortality Rates for Texas Counties.

<table>
<thead>
<tr>
<th>Variables(^a)</th>
<th>BLK</th>
<th>HSP</th>
<th>FBN</th>
<th>INC</th>
<th>URB</th>
<th>MAN</th>
<th>TRI</th>
<th>INS</th>
<th>HER</th>
<th>DIG</th>
<th>GEN</th>
<th>LYM</th>
<th>URI</th>
</tr>
</thead>
<tbody>
<tr>
<td>BLK</td>
<td>1.00</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<td></td>
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</tr>
<tr>
<td>HSP</td>
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<td>1.00</td>
<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
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<tr>
<td>FBN</td>
<td>-.311‡</td>
<td>.756‡</td>
<td>1.00</td>
<td></td>
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<td></td>
<td></td>
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<tr>
<td>INC</td>
<td>.095</td>
<td>-.464‡</td>
<td>-.283‡</td>
<td>1.00</td>
<td></td>
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<td></td>
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<td></td>
<td></td>
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</tr>
<tr>
<td>URB</td>
<td>-.230‡</td>
<td>.016</td>
<td>-.111</td>
<td>-.491‡</td>
<td>1.00</td>
<td></td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>MAN</td>
<td>.159†</td>
<td>-.038</td>
<td>.104</td>
<td>.301‡</td>
<td>-.312‡</td>
<td>1.00</td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>TRI</td>
<td>.140*</td>
<td>-.031</td>
<td>.038</td>
<td>.317‡</td>
<td>-.264‡</td>
<td>.530‡</td>
<td>1.00</td>
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<td></td>
</tr>
<tr>
<td>INS</td>
<td>-.071</td>
<td>.211†</td>
<td>.185†</td>
<td>.028</td>
<td>-.193‡</td>
<td>.024</td>
<td>.083*</td>
<td>1.00</td>
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<tr>
<td>HER</td>
<td>-.059</td>
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<td>.027</td>
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<td>-.116</td>
<td>-.012</td>
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<tr>
<td>DIG</td>
<td>.416‡</td>
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<td>-.201†</td>
<td>.191†</td>
<td>-.428‡</td>
<td>.122*</td>
<td>.133*</td>
<td>.054</td>
<td>.039</td>
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<tr>
<td>GEN</td>
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<td>-.172‡</td>
<td>.198†</td>
<td>.474‡</td>
<td>.148*</td>
<td>.138*</td>
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<td>-.167†</td>
<td>.124*</td>
<td>-.371‡</td>
<td>.113</td>
<td>.105</td>
<td>.075</td>
<td>.082</td>
<td>.636‡</td>
<td>.757‡</td>
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</tr>
<tr>
<td>URI</td>
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<td>-.231†</td>
<td>-.184†</td>
<td>.165†</td>
<td>-.385‡</td>
<td>.116</td>
<td>.126*</td>
<td>.041</td>
<td>.038</td>
<td>.592‡</td>
<td>.690‡</td>
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<tr>
<td>Mean</td>
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<td>21.1</td>
<td>3.7</td>
<td>16.353</td>
<td>2.7</td>
<td>3.690</td>
<td>943,679</td>
<td>23,320</td>
<td>39,218</td>
<td>23.9</td>
<td>11.9</td>
<td>11.1</td>
<td>4.6</td>
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<tr>
<td>S.D.</td>
<td>8.9</td>
<td>22.2</td>
<td>4.2</td>
<td>3.334</td>
<td>1.0</td>
<td>16.786</td>
<td>4,654,950</td>
<td>35,915</td>
<td>45,098</td>
<td>19.4</td>
<td>9.5</td>
<td>10.6</td>
<td>4.4</td>
</tr>
</tbody>
</table>

\(^a\)BLK = average Black percentage of population, 1970-90; HSP = average Hispanic percentage of population; FBN = average percentage of population that is foreign-born population; INC = average median family income; URB = urban-rural status of a county in 1990; MAN = average employment in manufacturing; TRI = accumulated number of pounds of TRI carcinogenic chemicals, 1988-1994; INS = average number of acres of applied insecticides, 1972-87; HER = average number of acres of applied herbicides, 1972-87; DIG = digestive cancer death rate; GEN = genital cancer death rate; LYM = lymphatic/hematopoietic cancer death rate; URI = urinary cancer death rate. All death rates are per 100,000 for the period 1986-1994. Statistically significant for \(\rho = 0\); \(p < .05\) (*), \(p < .01\) (†), and \(p < .001\) (‡), \(N = 254\).
mortality rates. No values were observed greater than one (the absolute cutoff or elimination point), but 9 to 12 cases (i.e., counties) produced values greater than .0157 (i.e., 4/n, where \(n = 254\)) in the regression models. The latter threshold value is the size-adjusted cutoff point for unusually influential cases (Hamilton 1992). Often referred to as “outliers,” these cases were retained in the analysis for lack of a sufficient theoretical or mismeasurement reason to justify their elimination (Dietz, Frey and Kalof 1987).

A plot of each model’s residuals against the predicted mortality rates was conducted to verify OLS regression’s homoskedasticity assumption. In addition, the SPEC option in SAS (1990) was used to test if the residual errors were homoskedastic and independent of the regressor variables, and if each model was correctly specified (White 1980). Heteroskedastic variances of residuals lead to biased and inefficient standard error estimates and undermine the rationale for t- and F-tests (Dietz, Frey and Kalof 1987; Hamilton 1992). No condition of heteroskedasticity was detected in any of the models. The OLS regression was conducted using the following model:

\[
Y_i = \alpha + B_1 X_1 + B_2 X_2 + B_3 X_3 + B_4 X_4 + \ldots + B_8 X_8
\]

where: \(Y_i\) = age-, race-, and sex-adjusted death rates for
digestive, genital, lymphatic, respiratory, and urinary cancers
\(\alpha\) = y-intercept
\(X_1\) = average Black percentage of population (BLK)
\(X_2\) = average Hispanic percentage of population (HSP)
\(X_3\) = average percentage that is foreign-born population (FBN)
\(X_4\) = average median family income (INC)
\(X_5\) = urban-rural status of a county in 1990 (URB)
\(X_6\) = average employment in manufacturing (MAN)
\(X_7\) = accumulated number of pounds of TRI carcino
genic chemicals (TRI)
\(X_8\) = average number of acres of applied insecticides (INS)
\(B_i\) = unstandardized regression weight of each regressor variable

An important limitation of the model should be noted. The model ignores individual-level data that would include health histories and exposure vectors, doses, and durations which would affect when, where, and what cancers occur (Wagener, Selevan and Sexton 1995). The absence of these data from the analysis suggests that caution be exercised with the aggregate county-level measures used in this study and that causal inferences be avoided. Relationships among aggregate data used in ecological models can differ radically when observed at alternative levels of analysis, especially among individual level data (Morgenstern 1995).

**Results**

Table 2 presents the bivariate correlation coefficients. Discussion of the correlational findings is divided into three sections: associations among the regressor variables, associations among the cancer mortality death rates, and associations between the regressor and response variables. Relationships with the number of herbicide treated acres are reported for only this part of the analysis.

Three interesting patterns emerged among the intercorrelations of the regressor variables. A “metropolitan pattern” was indicated by Black proportion of a county population, which was mostly associated with urban county status and manufacturing employment. Small positive associations between this variable with manufacturing employment and volume of TRI releases were not statistically significant. Black proportion of the population was negatively correlated with Hispanic and foreign-born proportions of population, and negligibly correlated with acres treated with pesticides. These findings support demographic patterns in the state that show counties with large percentages of Black population generally do not have sizeable Hispanic populations, and vice versa (Murdock and Hogue 1992). An “agricultural pattern” was defined by large Hispanic and foreign-born proportions of a county population. Both variables were positively intercorrelated and positively associated with acres treated with pesticides. They were negatively associated with family income and only negligibly related to urban county status, manufacturing employment, and volume of carcinogenic TRI releases. Finally, a “toxic risk” pattern involved positive relationships between industrial measures (i.e., manufacturing employment and volume of carcinogenic TRI releases), between pesticide application measures (i.e., acres treated with insecticides and herbicides), and between urban county status and manufacturing employment measures.

Intercorrelations of cancer mortality rates had large, positive coefficients (.532 < r < .843), that were all statistically significant. The strongest associations involved genital cancer mortality rates with digestive and lymphatic cancers; the weakest associations were between urinary cancer mortality rates and the rates of lymphatic and digestive cancer mortality. The magnitude and statistical significance of these relationships were more than coincidental, indicating that cancer mortality could be highly clustered among a specific group of counties in the state. Indeed, a listing (not presented here) and examination of the top ten counties with the highest mor-
tality rates for each site-specific cancer shows that 8 particular counties were ranked in the top 10 counties for two or more cancers. Seven of these eight counties are located along the eastern border of the state. Two of the counties in that area were ranked in the top ten counties for all four cancers. A comparison of Figures 1 through 4 provides further evidence of which counties had cancer mortality rates that were consistently greater than one standard deviation above the mean rate of the state.

Characteristics of counties with high mortality rates can be derived from an examination of the correlations between the regressor and response variables. All site-specific cancer mortality rates exhibited similar patterns of associations with the regressor variables. Each rate was positively related to the Black proportion of a county population, median family income, and urban county status. Digestive and genital cancer mortality rates were positively associated also with manufacturing employment and volume of carcinogenic TRI releases.

Lymphatic/hematopoietic cancer mortality had statistically insignificant relationships with these two industrial variables. Urinary cancer mortality was positively associated with the volume of carcinogenic TRI releases. Contrary to expectations, mortality rates of all the site-specific cancers had statistically significant, negative coefficients with Hispanic and foreign-born proportions of a county population. Moreover, all had negligible associations with the number of acres treated with insecticides and herbicides.

OLS regression results are shown in Table 3. The models’ adjusted R Squares varied from .287 to .380. Unstandardized and standardized regression coefficients (b) are reported in each model. Attention is focused on the standardized coefficients because they are suited better than unstandardized coefficients for examining the comparative influences of regressor variables. In the digestive cancer mortality model, rates were most influenced by urban county status, followed by Black proportion of a county population. Foreign-born proportion of county population and median family income had notable negative influences at slightly higher significance levels (.05 < p < .10) on digestive cancer mortality rates and on digestive, genital, and lymphatic/hematopoietic cancer mortality rates, respectively. The regressors behaved similarly in the genital cancer mortality and lymphatic/hematopoietic cancer mortality models. However, foreign-born proportion of county population had less influence in these models and in the urinary cancer mortality model. Only Black proportion of a county population and urban county status had statistically significant relationships with urinary cancer mortality rates. Contrary to the research hypotheses, Hispanic proportion of county population and the industrial variables had negligible influences on cancer mortality rates.10


<table>
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<th>Lymphatic</th>
<th>Urinary</th>
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*Variables for ordinary least squares (OLS) regression analysis: BLK = average Black percentage of population, 1970-90; HSP = average Hispanic percentage of population; FBN = average percentage of population that was foreign-born population; INC = average median family income; URB = urban-rural status of a county in 1990; MAN = average employment in manufacturing; TRI = accumulated number of pounds of TRI carcinogenic chemicals, 1988-1994; HER = average number of acres of applied herbicides, 1972-87; DIG = digestive cancer death rate; GEN = genital cancer death rate; LYM = lymphatic/hematopoietic cancer death rate; URI = urinary cancer death rate. All death rates were per 100,000 for the period 1986-1994. B = parameter estimate and b = standardized coefficient; N = 254.
Discussion

This ecological study of cancer mortality rates showed that metropolitan counties and counties with large percentages of Blacks had the highest rates of digestive, genital, lymphatic and urinary cancer mortality in Texas. Moreover, median family income was inversely related to cancer mortality rates in all the models, except that of urinary cancer. These findings confirmed the research hypotheses and supported results of other studies. Contrary to expectations, Hispanic proportion of county population, level of manufacturing employment, accumulated pounds of toxic chemical wastes, and number of insecticide treated acres were unimportant influences on cancer death rates. Foreign-born proportion of county population was associated with only digestive cancer mortality. The lack of influence by these variables especially differed from the results obtained by Stokes and Brace (1988), who employed the same site-specific cancer groups, but focused on males in rural US counties. Additional unexpected findings were the high intercorrelations of the four cancer mortality rates. Comparisons of plotted rates in figures and of the rankings among counties with high rates clearly demonstrated that certain counties consistently had high rates for two or more site-specific cancers.

Interpretation of these results is cautiously made because of measurement constraints and the limitations of ecological studies. A twenty-year latency period was assumed for each of the site-specific cancers. Latency periods and etiologies vary for different cancers; for example, leukemia has a latency period of less than ten years. Also, genetic and physical susceptibilities of individuals, toxic properties of chemicals, and vectors and exposure dosages vary greatly, affecting the onset of morbidity and mortality. Such variation introduces many confounding factors that can influence cancer-related illness and death and that are often poorly or not measured in research.

Another constraint was the use of broad categories of toxic chemicals. Only two classes of agrochemicals (i.e., herbicides and pesticides) were examined here with no attention to specific active chemicals in these products, to other agrochemicals (e.g., fungicides, rodenticides, and nematocides), and to non-agricultural applications of these products. Direct measures of these chemicals and their pounds of applications were not available at the county-level. Similarly, no distinctions were made regarding types of employment in manufacturing industries. The measurement of manufacturing employment needs to be refined to identify specific high-risk jobs by industry and to determine who holds these jobs and their job history. Further, no distinctions were made among particular toxic chemicals in the TRI, their methods of release (i.e., into the air, water, etc.) as potential exposure vectors, volumes of toxic waste transferred away from manufacturing facilities and import locations, and the interactive combinations of carcinogenic chemicals in the environment. In short, the presence of toxic chemicals in the workplace and environment was understated and crudely measured for Texas counties. Consequently, findings of no influence by the number of insecticide-treated acres, level of manufacturing employment, and pounds of TRI carcinogens on cancer mortality rates should not be used to minimize the importance of these factors to cancer mortality. Rather, better-refined measures should be developed at the county and other levels of analysis to more accurately and reliably convey the presence of chemical hazards and their impact on human health and safety.

Finally, because of its ecological design, this study could not measure causal connections among people who were exposed to toxic chemicals in the environment and workplace and those people who died of cancer. Although some findings agreed with those reported elsewhere, many did not. Statistically significant and insignificant relationships identified at the county-level could drastically change when measured at the individual level and in the presence of other measured factors. Therefore, consideration of policy implications of the study’s findings would be premature and tenuous at best. Attention should be given in future individual-level research to Texas counties where multiple high cancer mortality rates exist and where large concentrations of Black population live in urban areas. Though less than definitive, the relationships demonstrated by statistically significant variables in the OLS models suggest contentious, inequitable cancer risks may exist for residents of these counties. That research should address also the sociological and psychological factors related to human susceptibility to cancer. (Thomas, Kodamanchaly and Harveson 1998).

Endnotes

1. This research contributes to the project “Industrial Organization and Environmental Quality: Toxic Chemicals and Human Exposure Risks in Texas Counties (H-8571),” funded by the US Department of Agriculture and the Texas Agricultural Experiment Station. We thank Don Renchie, Extension Specialist with the Texas Agricultural Extension Service for providing pesticide-use information and Jeff Jordan with the State Data Center for his programming assistance. Correspondence should be addressed to John K. Thomas, Department of Rural Sociology, Texas A&M University, College Station, TX 77843-2125. E-mail address: jthomas@rsocsun.tamu.edu.

2. Only a few hundred of commercial chemicals are actively regulated for unreasonable risks (Wagener 1994), are deemed to be hazardous by the Resource Conservation and Recovery Act (RCRA), or are
monitored by the Environmental Protection Agency’s (EPA) Toxic Release Inventory (TRI). Gerrard (1994) estimated that the total annual US waste production amounted to 10.8 billion tons, of which 79.6 percent are oil and natural gas production wastes.

3. The limitations of ecological studies are well noted by March and Caplan (1987) and Morgenstern (1995). Some of the limitations are lack of control of confounding factors and their effects on the observed exposure-outcome relationship, migration changes in the population at risk prior to and during the study period, and the potential of multicollinearity and higher correlations among predictor variables than would occur at the individual level. While these problems can not be ignored, their effects can be marshalled by: (1) use of as many risk factors as possible in an ecological regression model, (2) use of data grouped into the smallest geographic units of analysis as possible, subject to the constraints of intergroups migration and unstable rate estimation, and (3) determination of how groups were formed and use of all factors thought to influence the grouping process.

4. Major nonagricultural uses of pesticides include, for example, structural pest control in homes and other buildings; turf and lawn maintenance; rights-of-way maintenance on highways, power transmission lines, railroads; water treatment; and public health efforts to control rodents and mosquitoes. They represented collectively 26 percent (or 301 million pounds) of the U.S. total pesticide consumption in 1979 and 21 percent (or 202 million pounds) in 1995 (Aspelin 1995). Nonagricultural pesticide use and exposure at the county level was not measured in this study.

5. Manufacturing facilities in the SIC codes of 20 to 39 are: food products; tobacco; textile mill products; apparel; lumber and wood products; furniture and fixtures; paper and paper products; printing and publishing; chemicals; petroleum refining; rubber and plastics; leather; stone, clay, glass, and concrete products; primary metals; fabricated metal products; and miscellaneous manufacturing industries. Facilities in these industries must also have the equivalent of ten or more full-time employees and meet the established thresholds for manufacturing, processing, or other use of chemicals listed by EPCRA. Thresholds for manufacturing and processing are currently 25,000 pounds for each listed chemical; the threshold for other uses is 10,000 pounds (US Environmental Protection Agency 1996).

6. TRI listed chemicals are reported also if they are “transferred” to other locations, which are geographically or physically separate from the manufacturing source of the wastes. Transfer may be for recycling, energy recovery, treatment, or disposal. The volume of transferred chemicals were not included in this study. Moreover, the release vector (i.e., air emission, release to water, land storage, and underground injection to wells) was not examined. The first two types of releases would have the greatest potential implications for human exposure.

7. Proportion of population equal to and less than the 1990 poverty threshold (e.g., $13,359 for a family of four) was omitted from the analysis because of high multicollinearity with per capita income. Multicollinearity was determined by the magnitude of each variable’s variance inflation value (Myers 1990).

8. Albrecht and Murdock (1990) point out that the definition of a “farm” changed nine times between 1850 and 1982. The 1982 definition describes a farm as any place from which $1,000 or more of agricultural products are sold, or normally would have been sold, during the census year. This variation of definitions complicates the comparison of data from the censuses.

9. The NCHS stopped reporting mortality data for counties with less than 100,000 people after 1989. It may provide these data, however, in response to special requests at a cost for each year of data requested.

10. Results of OLS models with the variable “average number of herbicide treated acres” were very similar to the results obtained with the insecticide measure.

References


Abstract

This work aims to describe certain landscape ecology concepts applied to the possibility of environmental restoration and reinstatement, starting from recent studies carried out on land that once underwent Roman centuration. We considered an area containing an old quarry, subsequently converted into a rubbish dump, and applied certain concepts of ecology scale, hierarchy and metastability that, together with traditional investigations, were able to provide a thorough description of the conditions of prior territorial development and helpful indications of future potential uses. This experience has shown that the application of centuriation could still be beneficial for the territory concerned, revaluing the advantages of early biological agriculture (archaic cultivation, etc.) and its produce as a means for restoring deteriorated situations (conversion of rubbish dumps, reinstatement of forgotten land-marks and road-ways, etc.), for renewing traditional rural tourism (traditional local cuisine, historical handicrafts, etc.), and ultimately for proposing prestigious cultural schemes (an open museum).

Keywords: cultural landscape, roman centuriation, venetian territory, restoration, rural land, waste disposal, open museum

Introduction

Ancient works are not merely for archeological observation they are elements of continuity; their walls and construction, like the land on which they stand, are entirely tangible, especially in the cities of Italy and the rest of Europe. As Carlo Cattaneo (Italian economist, historian and statesman of 19th century) put it so well, they are an enormous store of human labor (Rossi 1981).

Historical events have threatened to erase these memories, and those that survive can only be interpreted where this “labor” was most concentrated, as in the case of the Roman centuriation of the Veneto and Po valley regions. This great work of architecture and engineering has become a primary feature of the territory, a monument strong enough to survive the wars, agricultural development, industrial and social change of the intervening centuries.

Essential Historical Features of the Venetian Plains

The agricultural landscape that characterizes most of the Venetian plains, from the Po river to the foothills of the Alps, from the Mincio river to the Isonzo, still has an orderly layout, with a regular division of cultivated “ager centuriatus” fields, country roads, drainage ditches and long stretches of vineyards and orchards.

It is impossible to understand the overall layout of the current agricultural landscape without clear idea of the extensive work done in this area during Roman times. This work, known as “centuriation,” consisted of dividing the land along two main axes, nearly always based on important roads or watercourses, which crossed each other at right angles. The geometrical regularity of the grid was secured by dividing lines, or “limites,” named according to their orientation: the “Cardo Maximus,” oriented mainly N-S, and the
“Decumanus Maximus,” which ran in an E-W direction. The various “centuria” obtained from this initial division were defined by a network of secondary cardines and decumans that created a grid of square plots with sides measuring 20 actus (2.52 ha). Each of the centuria could be further divided by “limites intercisis” and even inner “interlimites.” These divisions were used to establish boundaries between the “sortes,” i.e., plots of land that were allotted to colonists who farmed them using advanced agricultural methods. All such surveying operations were called “limitatio” and the result a “centuriatio.”

The Venetian plains offered vast, flat expanses of fertile and workable alluvial soil, abundantly irrigated by mountain streams and springs. Such terrain made possible the application of land surveying methods on a vast scale, which probably served initially to consolidate the defensive and offensive settlements in the territory, but subsequently provided the foundations for an orderly, intensive exploitation of the land.

This exploitation was certainly encouraged by the Veneto’s favorable geographical location, which made the Veneto area an essential and almost unique link between the northern Alpine regions, the valley of the Danube, Bavaria and the Germanic regions, and the Etruscan and Atestine cultures, with their Oriental and Greek influences through sea traffic in the Adriatic (Rosada 1984). Thus, over the course of a few centuries, there occurred a Romanization of what was then called Venetia, and was the progressive implementation of a logistic strategy that led to the weaving of a dense fabric of roadways, forming part of what later became the “Great Roman Roads.” In most cases, these were laid down along more ancient routes established by the Paleo-Veneti but modified to take advantage of environmental features (Bosio 1984). They included the “Postumia” from Genoa to Aquileia and the Annia between Adria and Aquileia, the latter passing through the cities of Padua and Altino. The presence of these roads was one reason for the creation of a number of agri, or farmlands, still detectable in the Venetian plains, that were created not only for defensive purposes (the presence of permanent colonists ensuring that the roads remained open), but also for purely economic reasons, to ensure a higher productivity of the land (for example the agri between Brenta and the Piave).

At this point, it is essential to mention other Roman agri that were developed in the Veneto, e.g., the centuriations of Julia Concordia and Atestina, created for political and social reasons during the civil wars (around 40 BC), and the Camposampiero plots north of Padua and the nearby areas in Altino and Treviso. The former is still the best instance of Roman agricultural division enduring for centuries, to the extent that more recent urban planning systems have exactly repeated the ancient grid. Although there are no specific historical references to the latter, they can be dated to the time of land apportionment for economic and land registry purposes, and the land reclamation and agricultural development begun under the new administration at the end of the Republic and the beginning of the Empire (Bosio 1984). From this brief outline highlighting the essential historical background of the Veneto, it becomes clear that this area was able, over the centuries, to maintain the configuration it had acquired in Roman times.

**Evolution in the Veneto Landscape in the Early Industrial Period**

Around 1870, socio-economic conditions in the Veneto were determined almost entirely by farming. The national market had yet to be created and developed. When it was annexed to the Kingdom of Italy (1866), the region was suddenly separated from the Austrian economic context that had made Lombardy and the Veneto the granary of the Empire, and became part of a new context that demanded its adaptation to a single, competitive market.

It was silk-making that, towards the end of the 19th century, first imposed a separation between manufacturing and farming, leading to the birth of a genuine industry (Amadi and Dal Carlo 1991). Other production sectors developed in parallel with silk-making, e.g., the brick and tile industry that was located mainly alongside alluvial clay deposits. The brick industry triggered a long period of quarrying in all the farm lands near towns where brick clay was easily extracted. The signs are still evident in the area today, in the numerous quarries that have either been abandoned or converted into landfills.

**Restoring the Environment**

The numerous opportunities for re-using this land made derelict by industrial use include building projects, the development of recreational activities, farming, restoring the local territorial features, and so on. There are already some interesting cases of land restoration schemes in the Veneto entailing conversion to industrial-scale farming or the development of new activities. But there is no known experience of schemes for restoring an area’s original topographical characteristics, which in many areas of the Venetian plains would mean returning to the conditions of the Roman centuriation. The project described in this paper proposes to do exactly that.
Reading the Signs of Centuriation in a Sample Territory

An interesting case study concerns an exhausted clay quarry located within the ancient Roman grid of Altino, which stretches as far as Robegano, now a small village in the province of Venice. The study involved an area of the grid between cardines III and IV east and decumans II and III south.

The oldest available document on the area is a “Robegano parchment” from the 16th century that clearly shows the signs of centuriation with the orthogonal pattern typical of the “limitatio” apparently unchanged. Indeed, decuman III is recognizable, together with a set of roads and “limites” that appear virtually the same in the 16th-century map and in all subsequent maps up until the Austrian-Italian land registry (Bortolato 1994).

One of the most clearly evident elements is the cardo III east in the Altino “ager,” the agricultural territory of a municipium (town). Other elements also recur in the maps examined, such as country paths, ditches, territorial divisions, characteristic bends, rows of trees: all unmistakable evidence of the ancient Roman divisions, supported by small archeological findings. The frequent presence of drains or ditches, almost always flanked by trees and hedges, confirms the typical water distribution patterns of ancient Rome (Figure 1).

Subsequent inspections to measure the “limites” and “sortes” have confirmed the presence of the land allotments. The quarry (known to local residents as the Sant’Elena quarry after the name of a nearby village) is divided into three areas: a triangle of approximately 6,500 m² consisting of a single stretch of water with reeds and water plants; a second, trapezoidal area, measuring approximately 27,500 m² and comprising bodies of water alternating with dry land, all covered with thick reeds and shrubs; and a third, rectangular area consisting of two ponds fed by rainfall and local streams. The lay of the land has been changed by the quarrying work, with depressions that can differ in depth by up to 4 meters. Swamps and pools have formed in the deepest areas (Finco 1994).

Project Objectives

For the restoration of the Sant’Elena quarry there were potentially three types of project option to consider. The first involved restoring the natural landscape to the way it had been before it became derelict, making it a part of the surrounding environment once again. Operations of this kind include all those naturalistic reclamation schemes designed merely to restore the environment to conditions that are as natural as possible. This includes plantation, reforestation and the restoration or creation of self-supporting natural ponds. Such operations involve reclamation, earth moving and planting, and the total absence of any interference or further human intervention (Boca and Oneto 1989). This is the case, for example, of nature reserves for protecting the local fauna and flora and providing space for undisturbed animal habitat. It would be unsuitable for the case in point because the quarry is relatively small in size and lies within a heavily populated area. This type of solution generally produces highly satisfactory results if it is implemented in mountain areas, or in sufficiently large tracts of land with little human interference, well away from urban settlements and roads with heavy traffic (W.W.F. Delegazione Veneto 1994): conditions that are hard to find in the Veneto.

Another solution might be the creation of an area of spontaneous natural marshland, a solution often adopted for abandoned quarries in low-lying areas. This type of solution usually leads to the creation of an area of woodland that is inaccessible to the community and inadequate both in monetary terms (since it cannot be exploited economically in any way) and in aesthetic-naturalistic terms, because it is resettled by pioneering and ruderal species. This solution is only considered suitable when the spontaneous return of plant growth and animal life is already well underway, whereas in our case the return of a spontaneous plant life had only just begun.

The second category of feasible actions involves putting the area to a new use to satisfy specific requests advanced by
the community. This type of project includes nearly all productive forms of re-use, such as farms, plantations or fish nurseries (Boca and Oneto 1989). Measure of this type nearly always entail earth-moving operations, bringing in soil from other areas, which means high costs and a considerable amount of work. In our case, the local authorities did not have sufficient economic resources for such filling and grading operations.

The third type of measure for abandoned quarries involves exploiting them as landfills for processing waste or "controlled dumping." Areas set aside for this purpose have to be carefully examined from a geotechnical and hydro-geological standpoint, to verify compatibility with the subsoil and the safety of this type of operation. This involves technical analyses to examine the nature of the subsoil (geomorphological conditions), the position of any water courses, the features of surface water drainage (hydrogeological conditions), and so on.

This last type of measure is often proposed since it helps to solve the important problem of the disposal of many waste products, such as building industry scrap, solid urban waste, industrial sludge, etc. It generally gives rise to a site that remains sterile, however, or at best (if good agricultural soil is added) to a site suitable for industrial farming. In the case of the Sant' Elena quarry, the surrounding territory is not suited to industrial farming, so the site would necessarily have become sterile. Moreover, past experience of each of the above described categories of intervention has shown that, without adequate financial resources, plans to restore these sites invariably remain on paper. It is therefore essential to propose a measure that is self-supporting in financial terms and that can restore to the site its cultural and historical significance; i.e., in our case a partial reconstruction of the Roman centuriation. The only way to cover the cost is to plan a partial filling of the quarry with waste materials (from the building sector and biological sludge), charging a price for their disposal.

The aim is therefore two-fold: to achieve a "philological" recovery of the pre-industrial agricultural nature of the land (a sort of "open museum") and to finance the work by means of income both from the initial waste disposal activities and from subsequent farming activities, using resources coming from the marketing of farm produce and the activities of the open museum.

So the final decision was to restore the top soil to farming activities, i.e., to the pre-industrial conditions existing since its centuriation. This choice was also supported by the fact that centuriation was a typical feature of cultivated land and that town-planning regulations generally identify abandoned quarries as "E" zones destined for agricultural use. The combination of these two objectives (agricultural and historical restoration) would promote "historical farming" of the area, involving products typical of Roman times, many of which had lost much of their popularity but are now enjoying a comeback as large segments of the population seek more "natural" foods.

This could be a starting point for the creation of a territorial museum, with a partial reconstruction of the landscape based on the typical pattern of centuriation (Figures 2 and 3), reinforcing the most significant lines and distinctive markings where necessary. The result must be a valid grid system (Figure 4), a site of cultural and historical interest, and an additional tourist attraction.

Figure 2. Layout of partial reconstruction of the Roman centuriation grid.

Figure 3. Aerial view of partial reconstruction of the Roman centuriated landscape.
The idea for an operation of this type of project stems from similar experiences abroad services. In many countries — such as the United States, Switzerland, Denmark and France — there has been a trend in recent years towards creating so-called “open-air museums” or “historical sites.” These consist in a perfect reconstruction of tracts of land with buildings, trees and other elements, all belonging to the same historical period (Shafernich 1983). Such schemes are developed on the basis of in-depth historical and scientific research by experts and scholars. The dimensions imposed by centuriation seem to be ideal for organic farming methods, and different kinds of hedging can also be adopted. The resulting grid is ideal for satisfying agricultural and social needs by facilitating both human and environmental communications (Caravello and Giacomin 1993).

**Economic Feasibility**

An economic evaluation of a project of this type requires complete information on the waste materials to be deposited at the landfill, the cost of their transportation, current legal standards for converting the quarry into a landfill, implementation of subsequent landscaping, sowing crops for farming, etc. Essentially, we have to consider the estimated cost of converting the quarry into a landfill and the subsequent cost of converting it into farmland. In the case of the old Sant’Elena quarry, chosen because most of the above mentioned information was readily available, an estimate was developed (using the income capitalization approach to value) by analyzing and capitalizing the potential future income (discounting income expectancies to a present worth estimate). The estimate took the following into account:

- the land had previously been used as a quarry;
- the quarry was exhausted about ten years ago;
- local authorities would only permit the land to be used for farming or as a poplar tree plantation, subject to permission being obtained for the dumping of non-polluting materials (building site scrap or mineralized biological sludge);
- any such conversion into a landfill would have to be completed within 4 years of obtaining permission to proceed;
- after completing the landfiling and after creating a layer of fertile top soil, the area can be used mainly for farming along “historical” lines (separate, non-specialized, perennial crops).

On the basis of these hypotheses, the situation can be configured in the context of the estimated temporary and permanent incomes (income approach to valuation). In fact:

- after a series of conversion works, the quarry will be used for dumping materials, subject to the payment by third parties of a tariff for use of the landfill;
- after the three years that it will take to fill the quarry, the cost of creating the layer of top soil to make the area suitable for “historical” farming must be covered using the above source of income;
- once the area has been converted into farmland, it will be used permanently for cultivating “historical crops.”

The situation is summed up in the following diagram (Figure 5).

Figure 5. Outline of the context of temporary and permanent sources of income.

<table>
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</table>

- $R_1 =$ annual income from waste disposal
- $K_0 =$ cost of creating the landfill
- $K_1 =$ cost of adapting the land for farming
- $V_0 =$ value of “historical farming produce”

In the case of the Sant’Elena quarry, the initial income capital (present value of the stream of cash returns) derives from using the quarry for the disposal of a total of 53,000 m$^3$ of waste, ash and biological sludge, corresponding to a value of Lit. 7,643,000,000, in three years. The value of the farming activities (“historical crops” having the same value as 4.7 hectares of vineyard) discounted at today’s rates (present worth, discounted at a given rate of interest) was estimated to be Lit. 157,774,000. The estimated cost of the conversion...
works and management of the landfill, including the cost of its initial setup, amounted to Lit. 2,445,843,000.

As illustrated in Table 1, the net profits from the landfill operation would also suffice to cover the cost of planting and the conversion work to create the open museum.

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<thead>
<tr>
<th>Table 1. Income/costs comparison from the landfill operation</th>
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<tr>
<td>Income from waste disposal operations</td>
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<tr>
<td>Current value of farming activities</td>
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<tr>
<td>Cost of creating and managing landfill</td>
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<tr>
<td>Residual income</td>
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**Discussion**

In our opinion, this type of experience could become a valid model for projects in our territory. Since, in our case, the historical period is remote, certain elements may not be entirely reliable and it may not be possible to reconstruct the whole grid. A territorial museum could nonetheless offer positive input for a variety of schemes related to the restoration of the centuriation (e.g., cuisine), which could be combined to create a valid starting point for a new type of tourism (agritourism, cultural tours, gadgets, etc.).

It is worth emphasizing the economic aspect of this proposal, which is one of the primary conditions for its feasibility. This restoration scheme is not only justified by technical aspects relating to the physical and natural features of the area; it can also represent a considerable source of income (Table 1), both initially (exploiting the space for landfilling) and later on, when the area becomes an attraction in the region and inspires a chain of projects and events that are bound to be more profitable for the community than an agricultural or environmental restoration scheme pure and simple.

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**Endnote**

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Landscapes Lost and Gained: On Changes in Semiotic Resources

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Abstract

There are many symbolic values in a landscape, symbols that vary greatly between people who live in, and those who visit that landscape. These are the semiotic resources of the landscape. They change over time, and change in the mind of a person during his/her lifetime. This paper deals with these changes: how “inner landscapes” are lost and gained over time. Landscapes are reflections of cultural identities, rather than of the natural environment. The physical environment is transformed into landscapes, and cultural groups transform it through the use of different symbols, symbols that bestow different meanings on the same physical objects. Finally, this paper discusses the loss of landscapes — by “fading out” or being “battled down.”

Keywords: inner landscapes, semiotic resources, landscaping, mindscaping, landscape persistence

Prologue

Looking out over the landscape from my office window, I see the birch trees turning yellow in late September. Soon the leaves will fall, and the first snow will change the landscape into its winter variation. Spring, with its snow melt, is many months away. These are some obvious changes in the physical landscape over the year. But there are many symbolic values in that landscape, symbols that vary greatly between people who live in, and those who visit, that landscape. These are the semiotic resources of the landscape, which change over time and in the mind during a person’s lifetime. This paper deals with these changes: how “inner landscapes” are gained and lost over time.

Introduction: What’s in a Landscape?

“Landscape is an important national resource . . . an outstanding natural and cultural inheritance which is widely appreciated for its aesthetic beauty and its important contribution to regional identity and sense of place. Although it is subject to evolution and change, the landscape is recognized as a resource of value to future generations.” (Dept. of Transport, London 1993, quoted in Morris and Therivel 1995, 78.) (italics added here and in the rest of the paper)

“The vast majority of landscape is cultural, rather than natural heritage, and its national, regional or local identification depends very much on the values and associations of residents and visitors. It is appropriate, therefore, to consider “cultural heritage,” both as formally designated, and in terms of popular recognition, as an integral element in landscape evaluation and assessment” (Morris and Therivel 1995, 78).

The above quotations, taken from a text on Environmental Impact Assessment, shows clearly that in dealing with environmental preservation “The Landscape” is the physical feature, the panorama you see from a vantage point. But identity and sense of place, as well as values and associations, are also recognized. After mentioning the physical features and the human impacts, such as land use and buildings, the British Countryside Commission also lists aesthetic factors, including texture, color, sound and smell, and associations, particularly historical and cultural. The latter would include literature, painting and music.

The English word “landscape” implies both a physical scene and its pictorial representation. The early form of the word, landscape, recorded in the 8th century as meaning an area, developed into landscape in the 17th century, when it referred to both an area and a painting thereof (Keisteri 1990, 33). The latter meaning entered the language through the usage of English artists, who applied the term to Dutch landscape paintings. The word in Dutch at that time, landschap, meant the everyday surroundings in which farmers lived, and the English equivalent, in the form of landskip, a picture of such surroundings, a rural scene. Thus the word “landscape” in its very early meaning, denotes the manner in which an environment is observed (Keisteri 1990, 33), but also shows a clear connection to the cultural landscape associated with human activities.
The contemporary geographical concept of landscape is illustrated and discussed by Keisteri in her “multi-level model for the concept of landscape” (Keisteri 1990, 46-52). She includes three “viewpoints”: a) the material landscape, or area, as seen by a human observer, b) the experience of landscape aroused in the human mind by the area, and c), the underlying processes at work in shaping that landscape. She studies the changes in the cultural landscapes in several villages in southern Finland and Peru. Her landscapes are visible areas as perceived by the human observer, the mental experience of those areas, and the underlying processes giving rise to both, i.e., natural and human processes, with all the interaction between these two.

Seeing landscapes as semiotic resources, resources with symbolic functions, is the basic principle for discussing lost and gained landscapes. Understanding symbolic systems is essential in order to understand relationships between human societies, nature, and the environment. Semiotics, the study of signs and sign systems, is an analytic tool of critical theory used to interpret cultural creations (Hopkins 1998, 68). Viewed from a semiotic perspective, culture is the constant process of producing meanings. Cultural landscapes, such as a terraced rice field or an English park, are creations that may be interpreted semiotically, i.e., as a collection of signs or as a text. “Signification” is the process whereby “something” comes to stand for “something else”: a social process whereby objects taken as signs are given meaning (Hopkins 1998, 68).

Socio-semiotics studies both signs and social contexts: the connection between ideologically charged sign systems and the material culture of everyday life. “Ideology” is any system of values, beliefs and norms that facilitates the interests and dominion of a particular group, class or society. Hopkins (1998, 69) presents a study of symbolic landscapes, or countrysides, where he finds that the tourism industry operates with a sign system that advances its own ideology of consumption by trying to persuade people to buy commodities: “tourist places.” The codes and myths identified in tourist slogans convey images that combine to create place myths of a symbolic landscape. Hopkins summarizes by commenting on the value of being “rural.” A landscape described as “rural” in the tourist propaganda represents some place other than urban, some time other than the present, some experience other than normal (Hopkins 1998, 78). Because the “rural” is both a commodified sign and a consumable symbolic place, Hopkins finds it possible to speak of the “post-rural.” This term refers to both the aestheticization and the symbolization of the material countryside into a “postmodern good” by virtue of its commodified sign value (Hopkins 1998, 77). Today in a post-rural, post-modern time, the old, gray, and disintegrating windmills of last century, symbolize very different values than in the agricultural landscape of last century Sweden. They represent something of the “good old days,” that in reality were not so great, and are compared with the post-modern, white and sleek wind turbines that “distort” the landscape.

The sociological approach to landscape is also well illustrated by the environmental sociologists Greider and Garkovich (1994). They too see landscapes as “the symbolic environments created by human acts of conferring meaning to nature” (Greider and Garkovich 1994, 1), of giving the environment definition and form from a particular angle of vision and through a special filter of values and beliefs. Every landscape is a symbolic environment. They regard the landscape as a reflection of cultural identities, which are human, rather than natural. A central point in their discussion is that the physical environment is transformed into landscapes, and that cultural groups transform it through the use of different symbols, symbols that bestow different meanings on the same physical objects. “Every river is more than just one river, every rock is more than just one rock” (Greider and Garkovich 1994, 1).

A structured, but also complicated, approach to the relationship between human beings and the landscape is presented by Bladh (1995). On one side he places the physical, material landscape, the one we can see with our eyes. That is the landscape we are tied to for our living; it contains the plants and animals, as well as soil and water. On the other side, but tied to the first, he places what he calls “the meaningful aspect of the world” (Bladh 1995, 43). There we find the institutional landscape, i.e., how social relations and institutional regulations shape an abstract landscape that determines who owns what, what we can do, and what we must do in the landscape. This “landscape” is what often transforms the physical landscape into an arena for conflict.

Bladh translates the “meaningful landscape” into a semiotic landscape, a landscape shaped by the complicated interrelation between perceptions, actions and experiences related to language, and culture. Between the two latter landscapes and the material landscape, Bladh places what he calls the landscape of action. This is the cultural landscape, a mirror of man’s actions upon the physical surface, a constantly changing reflection of actions and non-actions (Bladh 1995, 41-44).

On Cognitive Landscapes and “Landscaping”

Even when we are not actively viewing, hearing, or smelling an environment, a landscape, we can still experience it mentally. The mental representation or cognition of the layout of a familiar landscape is termed a cognitive map, and the way of thinking about and organizing the layout is called environmental cognition. Without a cognitive map, telling us how things are tied together, we would have to search for
locations and roads in a haphazard manner, in order to find our way to a place in the landscape. The more experience we have with an area, and the more mobile we are within it, the more thorough our cognitive maps are likely to be. So the major factor determining cognitive maps is familiarity.

According to Bruun, a cognitive landscape is “a more or less coherent, geographically grounded frame, through which we interpret the meaning of objects and events that can be connected to a specific area” (Bruun 1996, 8). He adds that cognitive landscapes have an emotive charge that allows us to organize them into elements that we like and elements that we dislike.

An excellent literary presentation of cognitive maps appears in Brody’s “Maps and Dreams,” which describes “a journey into the lives and lands of the Beaver Indians, hunters of the Canadian sub-arctic” (Brody 1988). The book contains maps that the Indians drew to demonstrate the tenacity of a hunting and trapping economy in collision with the dreams and plans of White people. The Indians on two reserves mapped their land by marking every place they had hunted, fished, trapped, picked berries, and camped. The total area of landuse shows where these activities had been carried out within living memory. These landuse maps are examples of Indian cognitive landscapes, “inner maps” that represent the very important knowledge of where things are during the year cycle. Knowledge of the land makes the difference between life and death, without much room for errors of judgment. The beavers must have their dams where they are in the cognitive landscape; the caribou must pass along the valley as they have for centuries. In sum, cognitive maps are mental representations of spatial relationships in the landscape, and the more familiar we are with an area, the more accurate and thorough our cognitive landscapes will be.

A related but different process can be called landscaping. Krog (1995) calls the process by which environmental interpretations are formed “landscaping,” defined as “man’s process of creating meaning in interaction with his environment” (quoted in Bruun). Landscaping in this sense is above all discovery of the landscape and involvement therein. It “gives rise to emotive bonds to the landscape, as well as silent knowledge about it, the landscape acquires meaning” (Bruun 1996, 3). This “inner landscaping” has very little to do with the planning that landscape architects do.

Good examples of landscaping can be found in “A Few Acres of Snow — Literary and Artistic Images of Canada” (Simpson-Housley and Norcliffe 1992). In the essay on Hugh MacLennon, Peepre-Bordessa writes that: “he gave them landscapes they could step into, with a recognition of being home at last” (Peepre-Bordessa 1992, 19). She explains how artists in control of their language can effectively replicate in words a scene they have observed, how they can project a literary image of the landscape — enabling readers to become part of that landscape:

“Experiencing these landscapes, Canadians could come to a better understanding of themselves and the land that had bred them: a landscape of the mind was written into being” (Peepre-Bordessa 1992, 22).

Landscaping is thus a process that creates meaning in the landscapes and helps us to fill our cognitive landscapes with details, with areas we like, topophilia, and some that we dislike, topophobia.

To Whom It Belongs

The Norwegian philosopher Jakob Meloe has somewhere said: “A landscape belongs to those who belong to it.” The highly influential, but also controversial, German philosopher, Martin Heidegger often wrote about the nature and people of the Schwarzwald, where he had a secluded hideout. The people he meets there, the rural, “real” peasants are very down-to-earth. The people in this landscape do not contemplate and observe the landscape they work in; they live in it and they belong to it.

Finland is one of very few nations so far to have selected “locations,” or areas, as “National landscapes.” In Finland the idea of “national landscapes” goes back to the literature and art of the Romantic movement of the early 19th century, reflecting the political and social events of that time. Having been a Swedish province, Finland had become an autonomous part of the Russian empire in 1809. In the atmosphere generated by Finnish nationalist literature and painting, there also gradually developed “the landscape” regarded as a national asset. The landscapes selected as national, represent “the finest natural and cultural resources of various regions . . . The national landscapes have tremendous symbolic value . . . They are a resource and a source of inspiration for upholding our cultural heritage” (Ministry of the Environment, National Landscapes 1993).

To whom, then, does the landscape in national parks in the USA belong? The land in national parks belongs to the American people, but how about the landscape in them? Commercial moviemakers planning to film in US national parks may in the future have to pay location fees for the use of the scenery, according to the National Park Service. Testifying in 1998 before the Subcommittee on Parks, Historic Preservation and Recreation, Deputy Director of Conservation Policy, Al Eisenberg noted a 10-page National Park Service list of major films and commercials produced in national parks (NPCA, 1998). National parks, while providing a backdrop for numerous commercials and films, including most recently “Star Wars,” “Forrest Gump” and “The...
and Louise,” gain almost nothing from their “scenic stardom,” according to the National Parks and Conservation Association. Production companies can tie up roads and cause the closure of portions of parks for days or weeks during a production, and thereby prevent visitors from enjoying the landscape they in principle own. Utah’s Arches National Park alone has averaged 52 filmmakers a year for the last five years of the 1990s. Monument Valley, on the border between Arizona and Utah, is considered The Most Filmed Landscape in the world, starting with John Ford’s “Stagecoach,” including “Easy Rider,” and lately “Forrest Gump.” Heidegger’s and Meloe’s landscapes are rural, cultural landscapes, with people using, and belonging to, the areas through the forestry and agriculture by which they make their living. But to whom does a recreational landscape belong?

Three factors are involved in basic economic theory: scarce resources, human wants, and the problem of choice. The first traditionally classifies resources into natural, labor, and capital resources. In dealing with landscapes, natural resources, i.e., land areas, are of central interest.

When the basic needs — food, shelter and clothing — are met, other increasingly non-essential human wants arise: those associated with the luxury goods and services that are a feature of affluent society. If there is an unlimited supply of resources, every individual can have as many goods and services as he/she wishes. There is no allocation problem, and therefore, by definition, no economic problem. What about a desire to use the mountains in winter for skiing in an undisturbed environment, or to walk along a path in Denali National Park in Alaska without seeing any other human being for two weeks? Those landscapes are scarce. Some groups have these wants, but as the resources are scarce, there is a problem of choice. With a given budget, consumers may maximize their satisfaction by the choice they make within that budget. That is on the personal level. The founder of modern economics, Adam Smith, talks in his “Wealth of Nations” of “an invisible hand” that allocates resources so as to maximize the satisfaction, or economic welfare, of society as a whole. There is an obvious conflict here.

To take a concrete example: if a wilderness area, used only by a few hikers, is opened up for “heavier” use by allowing roads to be built, the solitude-lovers lose the landscape they used for recreation. A larger group may use the same area for mountain-bikes, snowmobiles, and possibly even four-wheel-drive vehicles. That would in theory give a higher satisfaction to society. This is exactly the crucial problem in the on-going debate in Sweden over who should decide how the mountains can be used for recreation.

Snowmobiles in Sweden have, with some restrictions, free access to public as well as privately owned land, as long as it is snow-covered. Because of the rapid increase in the number of snowmobiles, and a greater awareness of their detrimental effect upon the environment and other recreation-seekers, a government committee has suggested the establishment, or enlargement, of restricted areas, in which recreational snowmobiling is, or will be, either forbidden or allowed only on certain trails. The proposal has met with firm political opposition, especially in communities along the mountain range. It is fair to say that snowmobiling has become an important part of the country rural-side lifestyle in interior northern Sweden. Many people in the North regard the central government’s attempt to restrict the use of snowmobiles as just another imposition in an alleged long history of exploitation and negligence of the region.

Different notions of proper landuse is the root of the debate over the need and right to impose restrictions in the landscape. The Swedish belief in free access to the land finds expression in the traditional Public Access Right (“Every Man’s Basic Rights”), which allows access to private and public property for hiking, picking wild berries and mushroom, and even a few nights of wild camping, as long as no damage occurs. The basic principle is that the mountains are open to everyone. Snowmobiles sharing the area with people opposed to this activity naturally leads to a dispute over land use. We can define this conflict as an “open-access tragedy-of-the-commons type” of environmental problem, or a commons-type natural resource problem. The snowmobilers are free to use the land; they pay no fee to the landowners, but the third party involved, the silence-loving skiers, are not free to choose not to hear the activity. In Norway the sanctity of the rights of the third party, i.e., skiers and wildlife, is given the highest priority.

Those who have come to the mountains to get away from a stressful and noisy environment, and are looking for a silent world, have lost all, or at least an important part, of their “inner” winter mountain landscape. In nature, creating and emitting sound has always been a method for demonstrating presence or for staking out a territory. An obvious problem related to snowmobile activity in a recreational landscape is the noise from the machines. This can be considered an environmental intrusion. “Development” often generates visual and psychological, as well as sonic impacts. Intrusion indices have been used to measure these impacts, but sonic impact indices for intrusion into the mountain landscape have so far not been developed. The question would be: how much noise can we stand within a specific landscape?

If you are tenting by a mountain lake, and every morning you are awakened by planes coming in for landing, bringing in people who have not had to walk in for five days with heavy backpacks, it does take away a part, if not all, of the pleasure of being in the mountain wilderness. By comparison, snowmobiles are nowadays part of the reindeer herding in Scandinavia,
and a skier will be more willing to accept that activity, with its noise, if she/he is aware of that. Reindeer herding is also, especially by urban people, regarded as a positive way of life, close to nature in principle. In this case the noise almost belongs to the landscape, even if you do not like it.

Who, then, has the power, and who has the right, of dominion over a territory, a landscape in the mountains? Is there a social hierarchy in here, or a struggle between center and periphery? The majority of residents in the northernmost communities no doubt feel that a minority, and particularly the people living in towns along the coast of the Bothnian Gulf and in the Stockholm-area, are trying to impose their views, and thereby their landscape, upon the local residents.

In the conflict between skiers and snowmobilers, the winners seem to be the snowmobilers. Their landscape is winning out over that of the non-motorized skiers, who are the losers. And rightly so, many would argue. The local people should have more power in planning for a sustainable society. If they need snowmobiles in order to live and work in the harsh environment of the subarctic Norrland, the local people should be able to do so, within limits. But there is, and will for a long time be, a conflict here.

A similar issue, on sounds and noise in the landscape, has risen in the American west. “All is not Quiet on the Western Front,” cries the National Parks and Conservation Association in May of 1998 (NPCA 1998):

“Natural quiet — and natural sounds — are part of the environment and the enjoyment of our national parks. But the opportunity to find peace and quiet is increasingly threatened. The intrusive noise of commercial flightseeing aircraft has been a major problem at the Grand Canyon and the Hawaii national parks for years. With the continued growth of tourism throughout the West, the air tour industry will push further into parks such as Bryce, Zion, Canyonlands and Arches, places where visitors can still enjoy the sounds — as well as the sights — of nature. Places where you can still hear the steps of a deer — or your own steps — click across the sandstone, and listen to the cry of a hawk echo off a canyon wall.”

The Association argues that action by Congress and the Parks Administration is needed to effectively protect the parks from unchecked expansion by the air tour industry. The case is in some respects similar to the snowmobile issue in Sweden, but also very different. A small but powerful group in society has so far been able to “deprive” another, larger group — the ones visiting on foot — of the “privilege” of not having to listen to unnatural sounds in a majestic landscape.

### On Design and Designation of Landscapes

The word “design” comes from Latin and means literary “de-sign,” i.e., take away the sign or the meaning. “Designare” was in old Rome the act of breaking the seal on a document, i.e., when the content, the message, was exposed (Ramirez 1993, 6). It implies, in other words, letting the true message come out. In Spanish “designio” means intention or purpose. To design, then, is really the mental intention of trying to show, to explain, the true meaning or content of something. When somebody is designing something, the intention is to explain the inner meaning of the thing — a painting or a house — to people who do not have the ability to do so by themselves.

The 18th Century Italian Giambattista Vico formulated a theory about “factual verum” (the true is the made) that contains the idea that people only understand what they themselves have made; the rest only God knows (Vico 1989). We talk about “trees” and “tables” and know very well what we mean. To talk about landscapes is different. According to the theory, as a general rule we understand only those features of the landscape that are man-made, i.e., parts of the “cultural” landscape. We understand what is meant by a “church” — a dominating structure with some characteristic, vertical lines — and we know how a bridge connects places for transportation.

But how about a “natural” landscape — a wilderness area in Alaska? For ecologists “wilderness” symbolizes a natural environment with its entire ecosystem functions, its animals and plants, and adequate, sustainable biodiversity. Most people do not understand how “things” work in this habitat, but that might be one of the best features of the wilderness; we like to be in an environment that we still do not understand completely but can admire. Some might say: “God created this environment,” or God “designed” the wilderness. It is not for us to understand; we can not design nature.” As soon as we let roads penetrate into a wilderness, or build a log cabin there, we put our footprints into virgin areas, and some of the wilderness is gone. In our life we spend a great deal of time designing and giving form, i.e., giving meaning to things and features around us by interpreting and handling symbolic, i.e., semiotic, resources. Wilderness is one such resource, and it is important to remember that this resource is in principle non-renewable. Can we also design, or designate (same root), a natural landscape? Let us take as an example trying to designate a silent wilderness in northern Sweden.

One possibility for solving at least partly the problem of conflict between “snowmobile lovers” and their adversaries would be to create sound-disturbance-free areas in the mountains. The Swedes have so called “K-designated” — “K” as
in “kultur” (culture) — buildings and parts of the built environment. In developing a “soundscape,” i.e., planning to zone towards that goal, some areas could be “S-designated.” “S” would stand for Silence and indicate that silence must be preserved, not only for the benefit of humans, but also for the wildlife. A Swedish government committee proposal for adding another 3,000 sq. km. of “protected” areas will try to locate them in remote places, far from roads, and in areas currently not much frequented even by non-motorized recreationists. A few “S-designated areas” could be established within these protected regions along the mountains. This would establish silent wilderness areas, where recreationists, on foot or skies, would be allowed to roam around, and where wildlife would be better protected, but where the economic activity of reindeer herding would be possible as before (including herding by snowmobiles). Since they would not be located in the most highly frequented areas close to good fishing, establishing these designated areas would not infringe much upon the freedom of local inhabitants in the mountain communities. But they would have to be large enough to ensure the wilderness experience that more and more people are looking for in the crowded, growing urban areas of Europe. Designating some areas as silent wilderness can be seen as restoring a resource to the landscape: a landscape that was lost. We add silence to the elements that had remained, but at the same time the areas are lost for roving groups of snowmobilers. Will they receive compensation in some form?

We must, however, be careful with words that have their root in “sign.” As mentioned earlier, “signification” is the process of giving meaning to phenomena taken as signs. Should it then also be possible to “de-signify” a landscape, i.e. mentally to remove some parts of the landscape and thereby make it poorer?

**In Dialog with a Landscape**

If a shift takes place in our post- or late-modern society, a movement back towards a more local identity, what will that mean for “our” landscapes in the future? If we are in a sense moving back to our old “home” landscape, a landscape that has changed in several respects, what is left of that old, “inner” landscape? If we become increasingly attached to a new landscape, can we “take over” symbols of that old landscape? Movement out from the cities to the countryside, and rural “gentrification,” will bring urban values into a rural environment. Although this movement to a rural setting is perhaps most widespread in England, the process will expand in many countries. Thanks to the rationalization of agriculture, large parts of the pre-industrial agricultural landscape have, returned to a semi-wild state. This “nature” has in northern Sweden become the Countryside” in a new sense. The strange division between work and leisure has also, for a large portion of the Swedish population, led to double residence: one near work in the urban environment, and one recreational, cottage-like residence. During the weekends, Easter and summer holidays, hundreds of thousands of Swedes live in a countryside setting that used to be a production-landscape, a landscape dominated by agriculture, forestry and fishing. Very little of the workforce in Sweden today, less than 5%, is engaged in agriculture.

“The Fairy landscape,” with its friendly or fearsome trolls, the “Magic Landscape” of the old days, is replaced by a recreational or “Leisure Landscape.” Ties to productive nature, demanding hard work but also offering potatoes and bread, are weakened and replaced by ties to a landscape that is non-productive in that it does not produce anything directly related to sustenance. Can we understand this new-old landscape: a landscape with a multitude of symbols, legible to people who have lived all their lives in it? Can we establish a dialogue with the old landscape? “Dialogue” comes from the Greek “dia logos,” meaning through the word, through conversation. But the true meaning of “dia logos” is to establish a deep contact and understanding of what something is all about (Ramirez 1993, 28). Can we then, in the true meaning, have a dialogue with a landscape? Just looking at a forested landscape, with patches of cultivated fields, in late fall, is not a dialogue. Surveying an urban landscape, seeing the physical structures, gives only a visual impression. We cannot understand how a city functions if we have not lived in one, and had a dia logos- contact. In classical languages, there is a similar difference between structure and function. The Latin word “civitas” referred to activities within an urban area, while “urbs” referred to the buildings and streets, i.e., the physical landscape.

In the “Gant World” of clothing, the “background landscapes” for presenting a fall collection of sweaters and shirts are certain landscapes in the USA: New England, Montana, the Californian coast. In the 1997 catalog, the landscape is Norman Rockwell’s Vermont, in soft shadows. What semiotic resources are gained for, or reintroduced, into the New England landscape? Norman Rockwell was the painter of the “American Dream.” The Glencheck Blazer, the Riding Coat, New Haven Oxford shirts — symbols are plentiful — belong to a landscape of class, of urban gentry and leisure activities: fishing, golfing, sailing and riding. Most Americans might understand the symbolic value of Rockwell’s New England, but on Europeans, who by now constitute an important market for the company, these life-style landscape resources are wasted. Europeans have not had, and will not in the foreseeable future have, a “dialog” with the fall colors, white churches, and covered bridges of Vermont.
On Landscape Changes and Persistence

In landscape ecology, which basically defines a landscape as a heterogeneous land area, composed of a cluster of interacting ecosystems, i.e. the visual landscape, an important consideration is that of stability and change. A landscape is said to be stable if a) the long-term variability of its parameters can be represented by a horizontal line, and b) the amplitude and degree of periodicity of oscillations around the line are characterizable (Forman and Godron 1986, 431). This denotes variation curves in a graphical illustration of ecosystems with tendencies, amplitudes and rhythms. Instability means in this context that small environmental change is sufficient to throw the system out of kilter. Persistence, a measure of stability, refers to the time period during which a certain characteristic of a landscape continues to be present, while resistance is the ability of a system to withstand or resist variation. Resilience, on the other hand, is the ability to bounce back, or return, after having to change. Let us try to use the terms change and persistence dealing with “inner” landscapes and semiotic resources.

Landscapes have multiple meanings, and these again are symbolic reflections of how cultural groups define themselves (Greider and Garkovitch, 1994). Change in the landscape can challenge cultural expression, and thus have socio-cultural impacts.

“Ranchers, farmers, entrepreneurs, and natives (in the American North-West) have constructed different symbolic meanings for the land, thereby creating different landscapes. This leads to different attitudes towards potential changes in their landscape and to different human consequences of environmental change” (Greider and Garkovitch, 1994, 12).

We can assume that the natives, Indians and Inuits, try to have persistence in their landscape, while farmers and other “newcomers” are changing their landscape, i.e., introducing their own symbols. Naturally, symbols and their meaning, i.e., the semiotic resources — change over time, but some have a degree of persistence that gives them long-time continuity. Greider and Garkovitch (1994) maintain that durable traditional symbols provide people with an interpretative framework — a familiar context — within which they can construct the meanings of new technologies and other changes. Brody, in studying the Beaver Indians in northern British Columbia, provides evidence that this is true:

“They adopted many items of new technology, including guns, steal traps and horse tack, and they developed a flexible, mixed economic system. They now regard many of these innovations as elements of traditional life — proof that the Indians have not been passive in the face of change” (Brody, 1988, 247).

So, faced with extensive intrusion by white hunters, farmers, and gas- and-oil exploration crews, their landscape has not changed totally. There is persistence over a long time in the “Beaver Landscape.” The Indians have not had sufficient resistance to withstand the changes, but the important semiotic resources are still there: the hunting, trapping and berry-picking landscape of theirs.

“Rather, the meanings were negotiated within the context of the structure of beliefs used by these people to define themselves as subsistence hunters within their landscape” (Greider and Garkovitch, 1994, 7).

Although the physical landscape has changed through the introduction of seismic lines and forestry clear-cuts, the symbolic resources for one group living there are almost unchanged. That is a stable, persistent “inner landscape.”

Appropriating a Landscape — or “Eadem mutata resurgo?”

In architectural psychology the individual appropriates his/her environment in the sense of taking over, incorporating the “space.” Järnegren, Liedholm and Sandin (1981) argue that individuals, from their position in the cultural and social structure of a society, assimilate or appropriate different parts of the environment, and they also “dedicate” different values and symbols to the environment. To appropriate the environment, the space, means recognizing and learning to know that space in a more than cognitive sense. It also implies getting involved, and at the same time identifying oneself. But to live in a changing society also means that one experiences a continuing modification of subjective reality. This is a dynamic process, involving both a replenishment and a modification of the individual’s value system. The appropriated becomes a part of the individual.

There is also a movement in the opposite direction. Appropriation also means investing something of oneself in the space. A person’s basic resources, knowledge and values, have co-evolved, developed, in close relation with his or her socio-cultural reality, and they determine the possibilities for appropriation of the environment (op cit. 39). People “charge” their space, i.e. the environment in a limited sense, symbolically, and for people within the same culture that space becomes readable, communicative, and comprehensible, because it is charged by people with the same value system. Jones proclaims that the landscape is a mirror of human values. Values are not intrinsic to the landscape; values lie within people or groups of people (Jones 1993, 20).
An important aspect of this appropriation process — and this applies also in dealing with landscapes — is the question to what extent the individual is tied to a socio-cultural context. It has been proposed that appropriating is possible only within a specific society and within a specific social class. “Socio-geographic space is a codified space, a space that has been institutionalized and organized according to models, norms, and value scales” (de Lauwe, in Sandström 1979, 12). Can a person who does not stay very long in any one “space,” who moves through several landscapes, still appropriate these landscapes, or can only one landscape at a time be appropriated? The “Place Identity” concept proposed by Proshansky denies the possibility of alternative identity places, while the “Place Ici” concept of Moles accepts it (Sandström 1979, 10). Some of us spend a few weeks of the year at a summer cottage, or we sail through the same archipelago every summer and the cattle herding nomad of East Africa wanders back and forth between two basic locations in space, depending on the season. These alternative environments along the route are “perceived” and “absorbed,” but not appropriated in the true sense (Sandström, 1979, 10).

If we “belong” to one landscape by appropriation, how easily can we change that tie? Proshansky (1979), in a paper called “The Appropriation and Misappropriation of Space,” states that appropriation is a process over time, and with a certain continuity. He emphasizes that, over time individuals and groups, change their norms and values, and therefore must repeatedly conquer their environment, their landscape. A landscape could then be misappropriated if a) the person has changed his/her values and norms enough not to “fit” the landscape, or b) the landscape has changed so much that his/her the norms and values are not valid any more. Most of us believe that since “beauty is in the eye of the beholder,” we experience a landscape in our own way, it belongs only to us. There is, however, a high degree of consensus about scenic quality in the landscape. From the time of Plato and Aristotle until the beginning of the 18th century, aesthetic quality was believed to be objective. The Romantic Movement led to the modern view that aesthetic quality is a subjective matter. At the same time, “Scenic quality assessments” (SQA) made by landscape architects show that, at least in the Western world, “[All] people love views of mountains, rivers, lakes, houses set among trees, dramatic urban skylines —” (Turner 1998, 58). It is accepted that taste in scenery has changed with tastes in the arts. “We now love deep forests, mountains and rocky coasts, which used to be viewed with horror” (Turner 1998, 61). This would mean that during any period in our history most people like the same features in the landscape, but with any change in “common taste,” some features will be replaced by others as the most desirable ingredients in “a good landscape.” It is important here to remember that the concept of aesthetics has its origin in the Greek aisthetikos, i.e., perception by the senses (Keisteri 1990, 47). This means observations by all senses, not only the visual impression of a landscape. The original aesthetics of a landscape would then include the noise from a highway in the background as well as the smell of a newly manured field in the visible foreground. Whether or not we like those impressions is a matter of personal taste. We usually think only of the degree of beauty of a landscape scene, a much more limited aspect. To this should be added the fact, that what you do not accept, you can not appropriate. A landscape might be lost in the sense that we are unable to appropriate it, at least for some time — or even forever.

![Figure 1](image.png)

Figure 1. Development in Monument Valley — a misappropriated landscape?

The sententious Latin phrase “eadem mutata resurgo” can be translated “though transformed, I will rise again unchanged.” This motto, inscribed on the tomb of the Swiss mathematician Jacob Bernoulli (1654-1705) in Basel, could also pertain to landscape appropriation. If a landscape changes in certain aspects, and is hence misappropriated by some, the landscape, with its new semiotic resources, can be re-appropriated nonetheless by people with other values.

**On Losing Landscapes**

While we all belong to at least one landscape, and thereby give that landscape a set of semiotic resources, Arnesen
Arnesen considers it conceivable that landscapes fading out are more of a tragedy, because fading out implies a process where society has not managed to focus on the loss of certain types of landscapes (Arnesen 1996, 3). He believes that “fading out” undermines the identity and culture of whole groups in a society, ultimately affecting the cultural assets of a whole nation. He also considers the loss of semiotic resources a cause of alienation in a society. Arnesen considers it conceivable that a nation may fade out vital parts of its landscape through a morbid focus on certain esoteric landscapes with an alleged value, and leave the rest to “the wolf” . . .

We could even speak of a coup d’etat when it comes to landscapes” (Arnesen 1996, 3).

He takes the example of Norway, where, according to him, protection of remote mountain areas has almost archetypal status. Other regions are pushed aside, or into the background. “Winners take it all!” The landscape that, according to Arnesen, is “fading out,” is the coastal cultural landscape, the fishing villages along the deep fjords with high mountains as a background: the type of landscape that until recently was, in most respects, “The Norwegian Landscape.” The coastal landscape is disappearing mainly because of changes in mode of transport. Transportation has switched from sea-based to land-based. Construction of roads, bridges, and tunnels, has severely affected coastal communications. The “leisure landscape” is taking over the old fishing landscape; environmental protection policy in Norway is turning its back on the coast and is retreating to the remote mountain wilderness.

The British-Norwegian landscape geographer Michael Jones, who has done extensive research on the management and preservation of cultural landscapes, maintains that landscapes incorporate, or symbolize, ideas of beauty, historical association, and local or national identity (Jones 1993, 19). A good example is found in another “losing” landscape, that of summer farms in Hedmark county in southeastern Norway, presented by Daugstad (1992). Summer farms, normally in mountainous areas, have been a vital part of traditional agriculture in Norway (and also in some central parts of Sweden). This has involved an extensive use of “utmark” areas, i.e., outlying areas, used for summer grazing, hay production, forestry, and hunting, and has created a characteristic type of landscape, considered another significant part of Norwegian culture and national identity. The traditional use of these areas has dramatically declined and changed during recent decades. At the same time, the significance of these areas is increasing. The landscape of these mountain summer farms has been created, and can only be maintained, by traditional farming activities. How can this landscape be preserved? Should it be preserved, and if so, why? If it is not kept “open” by cattle and man, it will revert to forest and bush, and thus be lost. Many in the country do not like to lose the landscape. They want to preserve at least parts of it in some conservation areas, or as national parks and monuments. But every landscape, natural as well as cultural, changes over time, so why should this landscape be preserved as it was around the turn of the century?

Here the term “amenity value” should be used. Amenity has to do with pleasure and agreeableness, and every landscape has value for non-economic, or amenity activities (Jones 1993, 23). People may seek in the landscape an experience of nature, of history, or “only” an aesthetic experience. These experiences cannot be bought or sold on the market and, in the terminology of welfare economics, the landscape is in this respect a free good. As such it requires protection by the authorities, or philanthropic landowners, if it is to be available to the general public (op. cit). The former summer farm areas apparently have a high amenity value.

Arnesen asks whether there is a metaphor for the “typical” Norwegian landscape today? He makes the interesting observation that the national-romantic era of landscape painting during last century was fundamental in creating a “National Landscape” in Norway (as also in Finland). He “blames” the current concentration on preserving “wild,” uninhabitable mountain areas on the painters who made it their mission to discover the unknown and original, the “basic” Norway. They showed the land in great panoramas, depicting it as mostly high mountains and narrow fjords. These romantic painters were highly successful in introducing symbolic values, new semiotic resources, into the Norwegian nation.

If indeed one landscape must lose when another is winning, is there an optimal landscape in the semiotic sense? The Swedish mountains for instance: when does that landscape contain the maximum semiotic resource? At least two questions could be considered here. Is there a Pareto-optimal landscape, and can the amount of resources contained be calculated, e.g., from the number of satisfied users? The Pareto-optimal landscape would, according to economic theory, be the “most effective landscape”: in this case as far as resource use is concerned. That would mean that any improvement anywhere, anyhow, would have a cost, would entail a loss, in the form of a reduction or impairment somewhere else.

In the previous example from Sweden, the people using snowmobiles are increasing in number; their “landscape” is winning out over that of the non-motorized skiers. More snowmobiles, and faster machines, are taking over larger ter-
ritories, at the cost of less satisfaction and loss of undisturbed areas for skiers. One could argue that the maximum number of satisfied landscape-users would indicate the Pareto-optimal semiotic mountain landscape. But is the semiotic landscape value greater for an underground iron-ore miner in Kiruna in northernmost Sweden, who spends most of his spare time fishing on lakes he can only reach by snowmobile, than for a government bureaucrat from Stockholm, who usually spends one week at Easter skiing all by himself in the same landscape, enjoying the absolute absence of other people and noise?

Here we apparently also have a case of “interference” with the general economic theory of public goods. Environmental economists use the principle that natural systems are multifunctional assets in the sense that the environment provides humans with a wide range of economically valuable functions and services. One type of service is a set of natural goods, including amenity resources, such as “natural” landscapes. A landscape can also be considered a public good. Public goods generally have the characteristics of joint consumption and non-exclusion. This means that when the good is consumed by one person, the amount available for consumption by another person does not diminish. Accordingly, one person’s “use” of the landscape for recreation should not inflict upon the other person’s “consumption” of the same landscape for recreation. This does not hold true in the case of the skier and the snowmobiles, but the principle of non-exclusion means that one person can not prevent another from consuming the common resource, the landscape being a public good. So the conflict is apparent. The snowmobile introduced new groups of people to the Swedish mountain environment, people that earlier had not “used” the mountains, either because they had no desire to do so, nor any tradition of getting out into the wilderness, or because they lacked the physical ability to do so. Some would argue that, with good planning, new semiotic resources can be introduced, and we can thereby prevent the loss of landscapes.

Must there always be losers? Or can new semiotic landscapes be added to old ones, metaphorically one atop the other, or one inside the other, as “new” landscapes appear? Jones argues that a landscape can have several amenity values simultaneously, and they need not be mutually exclusive (Jones 1993, 24). He differentiates between four types of amenity value: a) intrinsic ecological value b) scientific and educational value c) aesthetic and recreational value and d) identity value. One example of the first type is maintenance of biodiversity. People enjoy wildlife for its own sake. Protected landscapes (scientific value) can preserve traditional forms of land use (e.g., a summer farm area in Norway). Landscape beauty and local history, embodied in the features of a farming landscape, add aesthetic and recreational values, while historical landscapes are part of our heritage and thus add identity value (Jones 1993, 25).

It can be argued that a landscape can lose some of its amenity value without being totally “lost.” I have also maintained that a landscape can lose some of its physical features, e.g. by forest clear-cutting or when old agricultural fields revert back to bush, and thus be lost for large groups in society. In a study of Idaho’s “Vanishing Wild Lands,” The Wilderness Society finds that the continuing health and diversity of Idaho’s economy are tied to the increasing number of economic activities that are “landscape oriented”: activities that are supported and enhanced by both the natural landscape and the wildlife and recreation associated with that landscape. According to a government study, Idaho’s wild lands may be the most visually intact, unmodified areas in the contiguous United States. The Society affirms the view that unspoiled scenic beauty contributes greatly to the quality of people’s recreational experiences and to the quality of life that attract new residents and businesses to the region. The study also states that the economic benefits of roadless areas, as measured by their “existence value,” far exceed the value of timber and livestock forage on federal land in the Columbia Basin (in the western US). The existence of unroaded areas currently accounts for 47% of the economic value that federal lands in the basin provide to society, while recreational use, timber, and range land provide 41%, 11%, and less than 1% respectively. The existence or “passive use” value of unroaded areas in central Idaho was estimated to be

Figure 2. Can there be a Pareto-optimal landscape?
nearly $100 per acre (Anderson 1997).

Another process is the change in value systems among the “users” of the same landscape. An important question in this respect is: how fast can the change in values be, without the landscape being lost? Jones argues that scientific value is best preserved by a very slow change, or none at all, while aesthetic and identity values can tolerate some degree of slow change (Anderson 1997, 27). As a basic rule, the speed of change is critical. Whether this applies to the opposite movement as well, the gaining of new landscapes, is a matter to be investigated. As a final example of a landscape lost, let us consider the change introduced in the rural cattle grazing landscape at Altamont Pass, among the rolling hills east of San Francisco Bay. When the family on the farm in the picture below (this is a true case) moved out from the big city in the mid-1980s as “urban refugees,” they wanted to get away from it all, to have a good life in the valley as cattle ranchers, with no intrusion from the world outside. Some years later, in 1988, they had wind turbines on all the hillcrests around them; a totally new skyline had appeared. The change in the landscape was very fast. They had no time for value changes, and, if we use other terminology, they had not yet appropriated the new semiotic resource. It takes time to love a new wind turbine landscape, even if the method of producing energy from a renewable resource is highly favored by the new settlers. This is a classic “NIMBY” case (NIMBY meaning “Not In My Back Yard”): a good way to produce electricity, but it spoils my landscape!

References


The Impact of Training in Participatory Research on the Behavior of School Children: An Experiment in Yucatan

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Abstract

This paper emphasizes the role of Participatory Research (PR) in the socialization and resocialization processes, in which individuals’ behavior towards the environment is acquired. We studied PR in the childhood socialization process by teaching it in an elementary school in a rural community in Yucatán, México. An experimental (E) group; and a control (C) group were studied. Only the former received PR methodology instruction, though both were tested before and after the PR course to evaluate the children’s concepts of PR, and to identify and measure behavioral changes. The results show that the E group increased in its ability to identify PR characteristics and steps after the PR course. It also exhibited an improvement in skills, and its frequency, manner, and speed of participation were significantly higher than in the C group. Results suggest that E group children effectively modified their school behavior.

Keywords: life-long education, socialization, resocialization, rural, México

Participatory Research and Human Ecology

It has been observed recently (World Bank 1992; WHO 1992; Frazier 1997) that continuing global environmental degradation has negative consequences for health, economic productivity and the use, handling and preservation of natural resources. The study of such consequences, and the elaboration of measures to mitigate or even reverse them, belongs to the realm of human ecology. One of our main challenges as human ecologists is to produce scientific knowledge on the interrelations between human biological status, human sociocultural systems and the biotic and abiotic environment in which humans and sociocultural systems develop. The positive impact of this knowledge is reinforced when applied within a participatory framework involving the people living in an ecosystem in the use of preservation methodologies and technologies for that ecosystem.

Participatory Research (PR) was originally created in Latin America as a theoretical-methodological response to the wide-spread poverty in the region. It involves people in the transformation of their reality through investigation, self-education, and action (Schutter 1981; Schutter and Yopo 1982; Yopo 1982, 1985; Schmelkes 1986; Barquera 1986; Dijk and Durón 1986). PR methodology was applied at a community level in the present study, which is part of a series (Batllori 1992a, 1992b; Castillo and Viga 1994; Castillo, Dickinson, Viga and Lendenchy 1995, Castillo, Viga, Dickinson, Lendenchy, Hoil and Ortega 1997; Viga and Dickinson 1996; Ortega, Hoil, Lendenchy and Santana 1997; Cox 1997; Dickinson, Viga, Arguelles, Gongora and Castillo 1998) generated by a human ecology project conducted in the Yucatán Peninsula between 1990 and 1996 (Ortega and Dickinson 1991; Dickinson and Ortega 1994).

Socialization, Resocialization, and Cultural Changes

The democratic and conscious participation of individuals and groups in the use, conservation and restoration of natural resources is one of the main necessities for the survival of modern civilization (The Ecologist 1995). In the face of accelerated global environmental degradation, cultural survival depends not only on an individual’s access to power and wealth, but also on his/her ability to improve his/her well-being, regardless of sex, ethnicity, religion or political preference.

For people to be involved in the improvement of their environment, it is imperative to provide them with the tools to identify, analyze and solve environmental problems. PR is just such a tool, and has been successfully applied in social psychology (Castro 1993; Rodriguez 1994; Goncalves 1997), popular education (Martinic, Tapia, Pascal and Grossi w/d; Pliego 1995; Sampieri 1992; Theesz 1995), rural development (Berlanga 1991), and natural resources use management (Batllori 1992a, 1992b; Mauch 1997). It is also clearly useful in applied human ecology, that is to say the modification
of interactions between sociocultural and ecological (i.e. the biotic and abiotic environment) systems, and human biology.

Human ecologists can use PR in advancing changes in cultures with their own theoretical and practical behavioral rules, symbols, valutative and affective dispositions, communication mechanisms and means of knowledge transmission between social groups. This is accomplished through its use in the socialization and/or resocialization processes, from which people learn cultural rules and communication mechanisms (Krotz 1984). Socialization, which occurs during the childhood years, is the process through which individuals learn the culture of their society, acquiring ways of acting, thinking and feeling, assuming its norms and values, developing abilities and adopting beliefs, symbols and attitudes that allow them to form part of that society. Resocialization occurs throughout an individual’s life, allowing experimentation with changes and observable modifications in lifestyle, rhythm and type of daily activities, and in habits, routines and life perception. Through the resocialization process, the individual can adapt to changes for which s/he was not prepared during childhood socialization.

Cultural survival depends on an individual’s understanding of the need for appropriate knowledge, attitudes, and values, and how s/he acts to preserve natural resources and the biotic and abiotic environment. Such understanding is built mainly through the socialization process, and to a lesser extent through the resocialization process (Krotz 1984).

Cultural change is defined as the influence of social impulses on human behavior, which subsequently become part of value sets that vary among different societies (Ruch and Zimbardo 1975). This is possible if in the scholastic socialization process students acquire new attitudes towards nature, based on different knowledge and value sets. However, this assumes access to formal education, which is limited in developing countries, particularly in rural areas. Given this, alternatives are needed that provide rural populations with the methodological means to identify, analyze and act to solve environmental problems.

Two such alternatives are life-long education and PR. Life-long education is a complete and coherent process, in which the individual, irrespective of age, is the primary focus, and in which participation and autonomy are basic characteristics (Castrejón and Gutiérrez 1974). PR is an alternative to life-long education (Krotz 1984; Ruch and Zimbardo, 1975) — an alternative that plays an important role in enriching the socialization and resocialization processes. It also fosters interaction between communities and their environment, and between groups and individuals (Castillo, Viga, Dickinson, Lendechi, Hoil and Ortega 1997).

**Participatory Research: Philosophy and Theory**

PR is a theoretical and practical school of thought that seeks to generate the knowledge needed to involve communities in the analysis and transformation of their reality (Schmelkes 1986; Dijk and Durón 1986). Based on the seminal work of Freire (1978a, 1978b), PR has become an alternative for social change, especially in developing countries. The main objective of PR (Barquera 1986, 55) is for groups or communities to become researchers, producing knowledge that explains their social reality, and then designing an analytical base from which to transform and modify that reality. This transformation or modification positively affects individual, familial, community and environmental well-being. Theoretical characteristics of PR include the search for articulation between theory and practice, the strengthening of popular organization and the motivation to participate, and the establishment of a logical and systematic process linked to everyday, working class life (Dijk and Durón 1986, 25-26).

Methodologically, PR is a process of discovery, production and the practical application of knowledge, which incorporates participants’ wisdom, values and cultural richness, and responds to the concrete needs of a group, social sector, or community. For more information about PR methodology see Schutter (1981), Yopo (1982), Schutter and Yopo (1982), Dijk and Durón (1986), and Schmelkes (1986).

**Agents, Steps and Phases of Participatory Research**

A community group implements the PR process by using strategies to identify communal problems among relevant community issues, and producing possible solutions that improve the well-being of community and family. The PR process can be implemented using diverse strategies that allow for problem identification and solution generation, in spite of lack of community interest.

The PR process requires a key group of “facilitators,” who are community members interested in working for the benefit of the community. They facilitate communication between the PR group and the community for problem analysis and PR application. Additionally, they identify, diagnose and rank community problems, in order to work towards resolution of those considered most important or urgent.

PR uses a three-step approach of 1) identify, 2) analyze, and 3) act. The first step, “identify,” involves conceptualizing the problem, identifying its dimensions and describing its general elements, using the facilitators’ and community’s experience and knowledge of the problem to be resolved.
A PR process has seven stages: 1) convocation, in which the community is invited to join the facilitators; 2) training of the facilitators in PR methodology; 3) problem diagnosis and ranking, in which the most important problems for the community are specified and ranked, one being selected for resolution; 4) analysis and action, in which the previous stage is implemented; 5) evaluation of the difficulties and achievements of the process, such as didactic material use, attendance, participation, motivation, and the group’s interest in continued PR methodology application; 6) celebration, in which achievements are celebrated; and finally, 7) continuation of this process, beginning with stage four.

An example of PR process implementation is The Port, a small, rural Yucatecan community in which the PR group received scientific study results, including data on the community’s members and environment, generated as part of the previously mentioned human ecology project (Ortega and Dickinson 1991; Dickinson and Ortega 1994). Based on these results, this PR working group created a Community Health Program to be applied at the community, family and individual levels.

Once the program was in place, it was decided to use PR to resolve problems that affected community health, specifically environmental contamination. Once environmental contamination was identified as the problem, outdoor defecation was singled out as one of the principal contaminating agents, due to its severe and adverse health effects. After acquiring information on more efficient waste disposal methods, different kinds of toilets were analyzed. Among these was a “double dry” toilet, which has two chambers used alternately for receiving feces, which then biochemically degrades into inoffensive and non-contaminating organic material. The PR group members seriously considered this toilet as it appeared suitable to local environmental conditions. However, some members were indecisive, and yet others opposed construction of this type of toilet, doubting that the feces really degraded. In lieu of these doubts, the group decided to acquire more information by visiting the rural, Yucatecan community of San Bernardo, where use of the “double dry” toilet is common. Doubting group members were shown the toilet’s efficacy, the group consequently accepting it as a valid possibility.

At this time, the Ministry of Health proposed the construction of another kind of toilet to The Port municipal authorities. In contrast to the “double dry,” this type of toilet requires large quantities of water, a sewer and seemed inadequate for local environmental conditions, which include a shallow water table, scarce water supply and large flood-susceptible areas. The PR group did not reject a priori either of the two options, but analyzed them, to the point of requesting assistance from experts in the state capitol. In the end, they decided to construct a “double dry” toilet, and test it in local conditions. During the test period, the hurricanes Opal and Roxanne (1995) caused severe flooding in The Port, effecting the toilet’s functioning. In response, the PR group members analyzed this problem and identified the modifications required for the toilet to function correctly in local conditions.

Life-long Education, Participatory Research and Children

It has been said that education in the future should include all social classes, especially those that have been excluded from enjoying social wealth. It should be addressed to all age groups, and be given in a holistic and non-specialized way, outside the traditional educational institutions. Achieving this goal would allow for transformation of a society into an “educative city,” attaining the total fulfillment of individuals’ abilities and the drawing forth of a population’s creative potential (Faure, Herrara, Razzak, Lopes, Petrovski and Rahnema 1983).

Education for a population’s development should be integral and perennial. “It’s no longer a matter of independently acquiring fixed knowledge, but of preparing oneself to develop a learning in constant evolution throughout one’s life, and of ‘learning to be’ (Faure et al. 1983, 16). This is the aim of life-long education, which is understood as a process aimed at individual, social and professional development throughout one’s life. It is a measure toward improving the quality of life in each of these aspects, as well as in their totality, and is based in humanistic values such as the spiritual renewal of human beings, equality, democracy, peace and liberty. In pursing this aim, life-long education establishes objectives at both community and individual levels, the latter objective emphasizing the education of individuals to enable them to make responsible decisions, care for the environment and improve upon their successes.
Two aspects are especially vital in life-long education. The first is the ability of learning to learn. This is developed by including aspects such as self-teaching, self-evaluation, flexibility in learning styles, and the evaluation of new developments in education technology. Second is motivation, required if individuals are to attain the goal of learning throughout their lives, an element essential to this type of education. To engender this motivation, educational content should transcend disciplinary division, be concrete and directly related to the individuals reality.

As mentioned, the philosophy, values and ends of PR are focused towards bettering people’s low quality of life by providing the means with which to identify, analyze and act to solve the problems which surround them. Given that this is attained through generation of knowledge about their realities, and taking into account that a vital part of life-long education is that individuals learn to learn throughout their lives, it is clear that PR is a form of life-long education.

As education begins with children, the present study was designed to investigate if PR application could modify behavior in a primary school classroom in rural Yucatán, México. Its design was rooted in the six-year study of Castillo et al. (1997) of PR application in rural communities in which they conclude that this methodology generates new resocialization processes. For young children, who often accompany their mothers to PR meetings, it has served as a part of the socialization process as they acquire knowledge, abilities, attitudes and values that will be useful throughout their lives (Viga, Dickinson and Castillo 1995). The present study intended to test PR methodology in a formal educational (i.e. scholastic socialization) environment, ideally providing results that would allow the extension of its use into schools. Towards these ends, a PR course was designed, taught and evaluated, the results being presented in this report.

Methods and Techniques

Two groups were studied, an experimental (E) and a control (C), each with 30 children of both sexes, from eight to 14 years old, and in the 4th, 5th, and 6th grades of elementary school. The E group was in a town designated for this study as The Port, and the C group was in the town of Telchac Puerto, both coastal, rural communities in the state of Yucatán, México.

Given the lower number of children in each grade at The Port school, all individuals in these grades were included in the E group. In the Telchac Puerto school, each grade had two groups, that is, two groups of 4th graders, two groups of 5th graders, and two groups of 6th graders. In order to reduce the number of videos filmed, and achieve parity among children within a given grade group during the pre- and post-tests, only one group from each Telchac Puerto grade was included in the study. Then, every child in the E group was matched to a counterpart in the C group of the same sex and grade.

The E group received a 40-hour-long course on PR methodology, designed and taught by two of the authors (DV and PC) in 20, two-hour sessions, twice per week, from April to June 1997. During the project period, the C group engaged in normal school activities unrelated to the present study, with no PR intervention save for pre- and post-testing. In both groups, these pre- and post-course tests were given to identify and measure cognitive variables such as PR research and participation, identification of PR stages, and the ability to prioritize activities, as well as behavioral variables such as participation frequency, type, speed and character, classroom chatting, and homework speed and completion. These variables were selected to elucidate the effects of the PR course on the E group’s knowledge, attitudes, skills and values. All evaluation items were tested for clearness and accuracy before use.

The course was designed to furnish knowledge and skills basic to PR, such as the definition, basic process, characteristics, and central concepts of PR, group work, and PR application. The course was divided into four units: the first two involved explanation of concepts such as research, participation and process, as well as basic investigation steps; the third addressed the importance, advantages and benefits of teamwork; and the last addressed application of PR methodology in areas such as school, the classroom, the household, and the community. Education psychology principles such as group techniques and dynamics were applied (Woolfolk 1996) to sensitize the children to the presented themes, practice, reinforcement and concept application (Marins, Trevisan and Chanona 1988).

The curriculum was designed taking into account the sociocultural context and age of the children in the course. Sessions began with application of a group dynamic related to course content, followed by a group discussion, theme exposition by the teacher, individual or group work, and a workbook-supported integrating activity. A special workbook and didactic material were created to make the course more attractive to the children.

During the study phases, both groups were filmed on video in two-hour-long sessions in order to identify and measure changes in the children’s general and group behavior in the classroom, as well as their skills and attitudes toward participation and work. The E group was filmed during the pretest, the PR course, and post-test, and the C group only during the testing phases. Filmed aspects include the children’s behavior and habitual attitudes towards their classmates and teacher, and the ways class materials and the classroom itself were used.
Using previously elaborated criteria, session films were observed and the following variables recorded: the kind (voluntary, suggested or requested), frequency, character (effusive, cheerful, discouraged, apathetic), speed, energy, and correctness of student participation; homework quantity, quality and speed; individual behavior during group work (active vs. passive); attention span; classroom chatting; attitude toward criticism; and action characteristics. Additionally, an ad hoc questionnaire was used to measure the following variables: attitudes about learning; knowledge of concepts such as research, participation, process, group, and PR; willingness to learn and to participate; and homework completion.

The measured cognitive variables address PR knowledge acquisition, PR step identification (to see, to analyze and to act), and ranking activity. Given the complexity of the PR knowledge acquisition category, it was divided into the two variables of “research” and “participation” to ease measurement. These were measured using a separate set of characteristics for each. For the “research” variable these characteristics included the following: the utility of PR in producing knowledge; that PR allows necessary investigation; that it has an established sequence; and that it is a permanent and systematic process that allows the joining of theory and practice. For the “participation” variable the characteristics were the following: that PR promotes participation; that it trains individuals and groups in problem identification and comprehension; that it engenders validation of the public’s knowledge; and that it constitutes a way of learning distinct from formal schooling.

Continuous variables such as knowledge of concepts like investigation, participation and PR process, as well as willingness to learn and participate, were evaluated on a standardized scale of 1 to 10. Behavioral variables such as participation frequency, type and speed were treated categorically and recorded using specific scales for each.

The behavioral variables were statistically treated using a chi-square test. A student’s t test was applied to the continuous variables, though only after the Kolmogorov-Smirnov test was utilized to verify variable distribution normality. Only variables with normal distribution were used for this study. Finally, a paired student’s t test was used to compare student performance in each community, and an independent sample student’s t was used to compare the pre- and post-test results for the E and C groups.

### Results

The study results show that the PR course taught in the E group significantly improved their school behavior as a whole when compared to the C group. The variables with significant post-test differences mainly relate to participation in classroom activities and homework completion as reported by the children. The most significant results for the children’s PR knowledge are shown in Table 1, and those for classroom behavior categories in Table 2.

<table>
<thead>
<tr>
<th>Table 1. Descriptive statistics and student’s t test results for cognitive variables in pre-test and post-test, by group.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>VARIABLE</strong></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>Research in PR</td>
</tr>
<tr>
<td>Participation in PR</td>
</tr>
<tr>
<td>Identification of PR steps</td>
</tr>
<tr>
<td>Ordering activities skill</td>
</tr>
</tbody>
</table>

PR = Participatory Research; n.s. = Not significant; *p<0.05; **p<0.01; ***p<0.001

<table>
<thead>
<tr>
<th>Table 2. Behavioral variables, children from experimental and control groups, pre- and post-test chi-squared evaluation.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>VARIABLE</strong></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>Frequency of participation</td>
</tr>
<tr>
<td>Kind of participation</td>
</tr>
<tr>
<td>Speed of participation</td>
</tr>
<tr>
<td>Character of participation</td>
</tr>
<tr>
<td>Chatting in the classroom</td>
</tr>
<tr>
<td>Fulfillment of homework</td>
</tr>
<tr>
<td>Speed of homework</td>
</tr>
</tbody>
</table>

df = degrees of freedom; n.s. = non significant; *=p<0.05; **=p<0.01; ***=p<0.001
The results suggest that the PR course was successful as the post-test showed that the E group children acquired important basic knowledge about PR methodology. Not surprising given the 40 hours of PR instruction they had received. No such change was noted for the C group, there being no increase in the understanding of these concepts between the pre- and post-tests. The E group’s knowledge of PR (i.e. identification of PR characteristic 1) increased from a pre-test 3.37 (on a 1-10 scale), to a post-test 6.7, with a high significance level for the student’s t test (***(p<0.001). They had similar post-test results for PR characteristic (2), lower, but still significant, results for PR step identification (to identify, to analyze and to act), and showed no significant change in activity ordering skills. The descriptive statistics and student’s t test results for the cognitive variables for PR characteristics 1 and 2 identification, identification of PR steps, and activity ordering skills are provided in Table 1.

There were no statistically significant differences in the pre-test between the E and C groups, for frequency, kind, speed, and character of classroom participation (Table 2), though there were clear differences noted after the post-test. The E group exhibited a pre- to post-test increase in high and middle participation, from 0% in both, to 6.7 and 26.7%, respectively, as well as a decline in absence of participation from 66.7% to 10%. In contrast, for the C group lack of participation decreased from 43.3% to 3.3%, low participation increased from and 56.7% to 70%, and high and middle participation were not present.

Participation frequency also increased for the E group after the PR course, with 33.3% of the children placed in “regular” and “high” brackets, while the entire C group placed in the “none” and “few” participation brackets. Before the pre-test, class participation for children in both groups was mainly “obligatory or suggested” (23.4%) and “voluntary” (13.3%). After the course, speedy and glad participation increased in the E group from 16.7% to 70% and from 30% to 83.3%, respectively.

The C group children exhibited a pre- to post-test decrease in obliged participation from 90% to 50%, and an increase in suggested participation from 6.7% to 23.3%. Determination of the kind of participation for a high percentage of the C group cases (26.7%) was not possible in the post-test.

In the E group, middle speed participation decreased between pre- and post-tests from 70% to 30%, and high participation increased from 16.7% to 30%. Similar changes were noted in the C group. Differences in participation frequency and speed are highly significant (p<0.001), due mainly to an increase in high speed participation in the E group.

The main pre- to post-test difference in kind of participation is an increase in cheerful participation (from 30 to 83.3%) in the E group; this resulting in highly significant (p<0.001) post-test differences between the E and C groups. Although the post-test evaluation difference in chatting was not statistically significant (but near the significant level p=0.067), the E group children were quiet more frequently (36.7% vs. 66.7%) after the post-test, a fact that suggests the course was an efficient way to increase the students’ attention span.

Homework fulfillment results were unexpected in that the E group’s completion of all homework fell from a pre-test 80% to a post-test 50%, while the C group experienced a slight increase, from 80 to 83.3%.

For homework completion speed as reported by the children, there were significant differences (p<0.001) between E and C groups in both the pre- and post-test evaluations. In the C group, half of the children reported high speed in both pre and post-tests, while in the E group only 26.7% said the same in the pre-test and 20% in the post-test. This may be interpreted as an increase in the attention and care paid by the E group children to homework.

**Discussion**

During the literature review, no studies similar to the present one were located; in fact, there was a conspicuous absence in the literature of reports on PR application in the classroom. The principal areas of PR application identified include: adult education (Hall 1982; Lacayo 1982; Vio Grossi 1982; Abud 1999; Pynch 1998); popular education (Rodríguez 1982; Kantún 1995), basic education (Cabañas, Gonzalez and Zapata 1995; Cabrera, Cabrera and Mendez 1995; Burgos and Muñoz 1997; Fernández 1998; Gamboa 1998; Torres 1998; Valle 1998); community health (Rodríguez 1982); community social psychology (Castro 1993; Zambrano 1993; Almeida 1994; Argüelles 1998); productivity (Wit and Gianotten 1982; Greenwood, Gonzalez, Canton, Galparisororo, Goiricelaya, Legarreta and Salaberria 1991; Anderson and Rietbergen 1994); social promotion (Escobar 1980; Cadena 1982; Lima 1982; Schutter and Yopo 1982; Castillo, Reyes and Cortés 1994; Goncalves 1997); and child rights (Pérez 1996).

One of the merits of the present study is that it establishes an interchange between a traditional PR application, groups of adults trying to resolve diverse collective problems in an informal atmosphere, and an untraditional application, 6-12 year old children in the formal atmosphere of an elementary school. The first application aims, explicitly or not, at adult education, or resocialization, whereas the second begins or enforces basic socialization processes. Taking this interchange into account, our intent with this quasi-experimental study, rare in the traditional PR application environ-
ment, is to show how the methodology functions, what changes occur, through what means and processes they occur, and its theoretical and, above all practical, significance in this untraditional setting. This is done in an attempt to provide a better understanding of the methodology’s functioning to people using PR in traditional circumstances, and thus provide tools with which to obtain better results.

The intent is also to show that PR is a life-long educational experience that can begin at ages of early socialization, that is, in elementary school. In other words, children can be socialized to use PR as a tool in resocialization processes throughout their lives, acquiring skills that allow them to be more flexible in the face of change and confront it with greater analytical ability.

The study results exhibit important changes in the E group’s classroom conduct, principally in guided activity participation, and in homework speed and completion. The significance levels for variables such as PR knowledge, participation frequency, participation speed and participation character show these changes to be connected to the specific course content, techniques and procedures related to PR.

The higher participation frequency suggests greater group identification, and acceptance and attainment of the group’s goals, which stimulate greater interpersonal understanding and exchange of opinion; all of which nourish the group in the long run. This interpretation is reinforced by the greater frequency in the “high” participation speed category, which suggests that the children know the methodology, like being in groups, and are motivated to act. This willingness to participate is important as it indicates motivation is individual, and depends to a lesser degree on external agents. This voluntary participation is always better than that suggested or induced.

In the kind of participation category, there was a notable decrease in discouraged participation and a complementary increase in cheerful participation. This can be interpreted as evidence that PR is capable of motivating children to participate in cheerful ways, which can be seen as a motivation, or strong reinforcement, whose effects are deeper and longer-lasting (Reynolds 1973; Cofer and Appley 1979) than the effects of weaker reinforcement might be. This is vital, as it has been shown for life-long education (Faure et al. 1983; Schmelkes 1986; Dijk and Durón 1986; Freire 1978a, 1978b; Barquera 1986), and now for PR, that motivation is a basic requirement if an individual is to attain the goal of learning throughout his/her life, and if this constant learning is to allow transformation of his/her reality.

Similar changes were expected in homework fulfillment, it being hoped that modifications in school behavior would include increases in homework speed and fulfillment. However, our results were contrary to these expectations, with both homework speed and fulfillment decreasing. This we interpret as the E group children perceiving homework, once they had taken the PR course, as an activity lacking interest, and for which they received inadequate reinforcement from their teachers. The E group’s decrease in homework speed may be explained hypothetically as an effect of the children who turned in homework dedicating more care and attention to it. However, it must be emphasized that this interpretation is speculative because even though it is based in statistically significant changes in the E group attributable to the PR course, the experiment design did not control for these two variables of school behavior as reported by the children.

**Conclusions**

The results reported in this study on the effects of the knowledge of PR methodology on children’s classroom behavior are tentative and partial, but significant. Children participated more frequently, quickly and spontaneously, their attention span increased and classroom chatting diminished. All these characteristics improve children’s learning and ease the socialization process. PR methodology also makes it fun for children to learn. This supports PR theory as it demonstrates that the use of PR methodology promotes one of the basic principles of PR theory: participation.

As shown in the post-test, changes in the children’s answers about homework fulfillment indicate they were more conscious of their responsibilities. This increased conscientiousness also promotes respect for one another and allows common goals to be reached using participatory organization. This finding should be interpreted as evidence that the socialization processes promoted by PR are based mainly on the values of participation, teamwork, responsibility and caring about oneself, others, one’s family, one’s community and the environment in which one lives.

Some might attribute the changes reported here to the newness of our presence in the school and our way of working. However, the course was given over two and a half months, long enough for newness to wear off. A more likely explanation is that the significant changes obtained are attributable to the course itself, and not only to its novelty, as exposure of student groups to a systematic training process is known to produce changes in knowledge, skills, attitudes and values (Woolfolk 1996).

As mentioned, participation is essential to preserving, recovering, and restoring the commons (The Ecologist 1995). In particular, it is extremely important to empower children in these tasks by providing them with methodological tools, as they will be in charge of the commons in a future that will likely face even greater environmental problems.
According to our results, PR is a useful methodological tool for permanently enriching the socialization process, and could be useful in programs reinforcing high participation levels in group work. This is increasingly important as participation is relevant in the design and implementation of socioeconomic development programs for peasant communities in developing countries (Rosales 1997). Also, the socialization process is one of the main ways children learn the cultural behavioral rules and communication mechanisms necessary to fulfill the roles assigned them throughout their lives (Krotz 1984).

If human ecologists can understand and incorporate the socialization processes of several cultures, they can reinforce ecological awareness as a social impulse in the fomenting of cultural changes oriented toward more compatible relationships between society and the environment. PR methodology serves this goal as it allows the individual to understand the importance of appropriate and relevant knowledge, attitudes, and values in solving a given problem. Within human ecology, this methodology can be used to aid individuals and groups in acting to preserve natural resources and the biotic and abiotic environment. It can also initiate significant changes and increase a culture’s understanding of the need for natural resources preservation, especially in populations with low education levels and poor socioeconomic conditions.

Teaching of PR methodology in the early years of life can immeasurably aid the purposes of human ecology. Once children learn it during the socialization process, it can be used outside of school in solving problems of inappropriate environmental practices and their consequences for human health and productivity. These socialization processes are closely linked to new behavior toward the environment, human well-being, and the relationship between society and nature, and therefore, to the core of human ecology.

The present study contributes to the advancement of human ecology by more deeply exploring life-long education processes. It also emphasizes the vital role participation plays in these processes by aiding in a better understanding of the conception, uses, and management of natural resources, as well as in planning for their preservation.

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References


Endnote

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Environmental Policy and Rural Industrial Development in China

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Abstract

China’s environmental policy emphasizes the use of economic instruments. By levying a fee for discharges, the government hopes to internalize environmental costs associated with production and consumption. This policy has been working relatively well in the urban areas, but faces a grave challenge in the rural areas where there has been a development of rural industries on a massive scale since the late 1970s. Polluting industries scattered in villages pose a major threat to the rural environment. The dispersedness of rural industries and the insufficiency of environmental monitoring have become major obstacles for the implementation of environmental legislation. Based on a field study in Qinshan town in eastern China’s Zhejiang province, this study discusses limitations in the implementation of China’s environmental laws in combating industrial pollution in the rural areas.

Keywords: rural industrial pollution, policy, implementation

Introduction

The spread of polluting industries in rural areas can have a profound impact on the rural environment. The lack of centralized treatment for industrial wastes means that industrial pollutants can spread and stay in the rural ecosystem, causing serious damage to agriculture and the lives of rural people. Since the Industrial Revolution, most industries have typically developed in urban areas. Although rural areas may have some location advantages for certain industries, which prefer to be closer to the sources of their raw material, rural industrial development on a massive scale has never occurred in the past (Fothergill 1985; Fulton 1974). The environmental impact of rural industrial development has thus never been thoroughly examined.

Since the sweeping economic reforms in the late 1970s, China has been experiencing dramatic rural industrial development. Nearly 25 million rural enterprises have emerged in the countryside. More than 130 million rural workers are working in these rural industries, which generate more than 70 percent of the gross rural output. Among all the rural

Table 1. Total rural industrial pollutant discharges between 1985 and 1995

<table>
<thead>
<tr>
<th>Years</th>
<th>1985</th>
<th>1990</th>
<th>1995</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wastewater (million tons)</td>
<td>1,610</td>
<td>1,830</td>
<td>5,900</td>
</tr>
<tr>
<td>Industrial dust and fly ash (million tons)</td>
<td>n/a</td>
<td>3.3</td>
<td>5.8*</td>
</tr>
<tr>
<td>Solid waste (million tons)</td>
<td>50</td>
<td>115</td>
<td>410</td>
</tr>
<tr>
<td>Sulfur dioxide (million tons)</td>
<td>n/a</td>
<td>2.2</td>
<td>5.5</td>
</tr>
</tbody>
</table>

* 1994 data.

Table 2. Major rural water and airborne polluters in 1994

<table>
<thead>
<tr>
<th>Wastewater Sources</th>
<th>Percentage [1]</th>
<th>Airborne Emission Sources</th>
<th>Percentage [2]</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.) Paper mill</td>
<td>43.8</td>
<td>1.) Brickyard</td>
<td>43.0</td>
</tr>
<tr>
<td>2.) Tannery</td>
<td>6.8</td>
<td>2.) Cement plant</td>
<td>20.5</td>
</tr>
<tr>
<td>3.) Printing and dyeing mill</td>
<td>6.6</td>
<td>3.) Metallurgical industry</td>
<td>11.0</td>
</tr>
<tr>
<td>4.) Brewery</td>
<td>3.8</td>
<td>4.) Coking plant</td>
<td>3.3</td>
</tr>
<tr>
<td>5.) Amylum-related</td>
<td>1.5</td>
<td>5.) Sulfur refining</td>
<td>0.2</td>
</tr>
</tbody>
</table>

[1] Percentage of total amount of industrial wastewater in the rural areas.
[2] Percentage of total amount of airborne emissions from the rural industries.
Source: data derived from Zhang 1994, 449.
Table 3. Production Expansions of the Top Three Rural Polluters, 1978-1993

<table>
<thead>
<tr>
<th>Year</th>
<th>Paper Making (million tons)</th>
<th>Cement (million tons)</th>
<th>Bricks (billions)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1978</td>
<td>0.4</td>
<td>3.3</td>
<td>73.0</td>
</tr>
<tr>
<td>1979</td>
<td>0.6</td>
<td>5.4</td>
<td>89.1</td>
</tr>
<tr>
<td>1980</td>
<td>0.8</td>
<td>6.7</td>
<td>110.4</td>
</tr>
<tr>
<td>1981</td>
<td>1.0</td>
<td>9.2</td>
<td>124.0</td>
</tr>
<tr>
<td>1982</td>
<td>1.1</td>
<td>12.2</td>
<td>152.4</td>
</tr>
<tr>
<td>1983</td>
<td>1.4</td>
<td>15.3</td>
<td>170.5</td>
</tr>
<tr>
<td>1984</td>
<td>1.6</td>
<td>19.4</td>
<td>202.7</td>
</tr>
<tr>
<td>1985</td>
<td>2.2</td>
<td>29.1</td>
<td>238.5</td>
</tr>
<tr>
<td>1986</td>
<td>2.6</td>
<td>36.7</td>
<td>280.3</td>
</tr>
<tr>
<td>1987</td>
<td>3.3</td>
<td>45.0</td>
<td>330.2</td>
</tr>
<tr>
<td>1988</td>
<td>4.1</td>
<td>54.2</td>
<td>368.2</td>
</tr>
<tr>
<td>1989</td>
<td>4.6</td>
<td>63.1</td>
<td>356.1</td>
</tr>
<tr>
<td>1990</td>
<td>4.8</td>
<td>58.8</td>
<td>339.1</td>
</tr>
<tr>
<td>1991</td>
<td>5.7</td>
<td>70.8</td>
<td>355.0</td>
</tr>
<tr>
<td>1992</td>
<td>7.9</td>
<td>103.8</td>
<td>495.4</td>
</tr>
<tr>
<td>1993</td>
<td>10.3</td>
<td>127.6</td>
<td>494.8</td>
</tr>
</tbody>
</table>

mand-and-control” system to the use of economic instruments. The government attempts to use pricing mechanisms such as tax, finance and investment incentives to influence the behavior of polluters and to internalize environmental costs associated with production and consumption. The existing economic instruments include a pollution levy system, rewards and premiums for efficient resource use, a financing mechanism for environmental protection, and a discharge permit system (Wang and Lu 1997; Zhang 1994).

A major question raised by researchers concerns how the economic instrument approach is implemented (Chan, Wong, Cheung and Lu 1995; Wang and Lu 1997; and Zhang, Wu and Wang 1997). Given that China’s political and economic system is still in transition from a socialist command system to a market-oriented one, researchers have voiced their doubt about the successful implementation of these economic instruments. The policy has already been criticized as unsystematic: “Little attention has been paid to the environmental implications of macro-economic policy adjustments nor to opportunities for better integration of environmental and sectoral policy . . . Environmental and sectoral policies are often inconsistent, and even in conflict” (Wang and Lu 1997, 20).

For rural enterprise development, the government faces a serious dilemma. On the one hand, more than 200 million rural laborers are no longer needed by agriculture. It could become a major disaster if these rural workers would move into the urban areas. The government hopes that the development of rural enterprises will generate jobs locally and retain these excess laborers in the rural areas. On the other hand, the development is almost certain to result in a severe environmental destruction if not closely monitored and supervised. Studies have suggested that the environmental consequences of rural enterprise development are often overlooked (Maurer, Wu, Wang and Xue 1998).

The economic instrument approach is also criticized for its abusive implementations at the local level. Studies reveal that some local authorities make use of the system to broaden their sources of income by levying pollution charges on the provision of civil services, such as water supply. As a result, some enterprises pay charges on both fresh water intake and wastewater discharge (Zhang, Wang, Wu and Wang 1997). Thus, enterprises in some areas might have to pay a significantly higher amount for discharges although the pollution levy in general is often believed to be too low to meet the treatment and damage costs. Such an inconsistency in environmental policy implementation sends a wrong message to the polluters and allows them to question the legitimacy of the pollution levy system.

With economic regionalism diminishing central government control, questions are also being arisen on how local governments balance their needs for economic development and growth with the need for environmental protection (Chan, Wong, Chueng and Lo 1995; UNDP 1996). Some local governments may become more lenient towards the polluters when they are under pressure to meet their investment goals (Zhang and Ferris 1998). In fact, some studies have already indicated the existence of local resistance to the pollution levy system (Florig, Spofford, Ma and Ma 1995; Wang and Lu 1997). Wang’s study indicates that “local governments believe that the implementation of economic instruments will unduly penalize industry and therefore influence the economic competitiveness of sectors or products in domestic and international trade markets” (Wang and Lu 1997, 28). Since the administrative structure (Figure 1) has all the local EPBs under dual supervision of both the local governments and the upper level EPBs, local EPBs may find it difficult to carry out their mandates. The central government tries to remedy these problems by using the mass media, environmental organizations, environmental education programs, and environmental students’ movements to raise public awareness of environmental problems (Hamburger 1998). These efforts unfortunately, can hardly reach the rural areas because of poor communication, few education programs, and low level of literacy among the rural people.

Although the environmental policy is widely considered as a success in the urban areas with the visible decline in pollution, the rapid increase in rural industrial pollution and the fact that only a small number of rural polluting enterprises have actually paid for discharges have clearly suggested the failure of this policy in the rural areas (Florig et al. 1995; Zhang et al. 1997; Abigail 1997). China’s rural enterprises have unique development style and exhibit great regional dif-

**Figure 1. China’s Administration System for Environmental Protection.**

![Diagram of China's Administration System for Environmental Protection](image)
ferences. As well, most rural enterprises are too small to afford the necessary equipment and advanced techniques needed for the proper treatment of industrial wastes (Lin 1997). Irregularity and instability in their production are cited as major problems for environmental law enforcement in rural area (Amsden, Liu and Zhang 1996). On the other hand, government pollution abatement funds usually do not go to the rural enterprises as many EPB officials worry that the funds may not be used for environmental purpose owing to a poor monitoring system (Wang and Lu 1997). Studies conducted by the United Nations Development Program indicated that poor environmental monitoring makes it impossible to collect accurate data pertaining to the pollution situation in the rural area, thus making it difficult to formulate a sound pollution control strategy (UNDP 1996). While many problems are presented in various studies pertaining to environmental destruction by the rural enterprises, few studies provide sound solutions for the proper implementation of the environmental legislation. Since the rural industrial sector is expanding at a rate of nearly 20 percent each year, there is an urgent need to have an effective approach with respect to rural industrial pollution.

**The Case Study Area and Research Methodology**

The town of Qinshan is located midway between Shanghai and Hangzhou, the two metropolitan areas in the region. For nearly two decades, the town and its area of jurisdiction have been enjoying a very high level of industrial development. The annual per capita income of the rural households reached 3,155 Yuan in 1994, comparable to the nationwide average urban income (MoA 1995a; MoA 1995b). The study area is within a region characterized by a canal network, which is traditionally used for both waterway transportation and agricultural irrigation. While this historical endowment of waterway transportation helped the development of the rural industries, it also accelerated the spread of industrial pollutants into the agricultural eco-system as many rural enterprises rely on the canal water for production and waste discharges (Figure 2).

The field study first identified the industrial polluters in the area. In order to distinguish polluting and non-polluting enterprises, some local government archives were utilized, which contain the detailed production information of each enterprise registered in the town’s industrial office. According to the types of production, a number of enterprises were selected whose production might generate pollution. Each of these enterprises was then consulted for the type, estimated amount and concentration of the wastes produced. This preliminary survey requested the selected enterprises to provide information with regard to only the three major types of pollution: solid wastes, wastewater and airborne emissions. The information collected was verified based upon the national standards for relevant industrial pollutants formulated by the National Environmental Protection Agency (NEPA 1992-1995). If any of the three types of pollutant discharges exceeded the national standard, the enterprise would be considered as a pollution maker. Following this method, a total of 41 enterprises were concluded as pollution makers in the study area.3

A questionnaire survey of these 41 enterprises was conducted and yielded 31 valid cases. Although there were serious pollution makers among the 10 enterprises that declined to respond to the survey, they as a whole did not appear to be significantly different from the 31 valid cases with regard to the seriousness of pollutant discharges. The key variables included in the questionnaire are types of production, equipment, and pollutants; estimated amounts of pollutant discharges; waste treatment procedures; discharge locations; years of operation; operation permits from the local environmental agency; and the managers’ attitudes toward waste treatment. Information related to enterprise ownership, general operations, management style, employees as well as business performance were also collected. Some of the discussions in this paper are also based on site observations and interviews with local government officials and enterprise managers.

**Research Findings**

**Development Constraints**

The earliest rural industrial development in Qinshan can be traced to the early 1970s when the central government launched a major agricultural mechanization program. Once tractors and reapers began to appear in the agricultural plots,
workshops to maintain the machinery also appeared. However, these workshops soon found that their machine tools were at rest for most of the year, but that their equipment enabled them to produce certain daily goods and machinery parts to be sold in the urban areas. As a result, some workshops tentatively produced their first-ever commercial products and found them to be much more profitable than agricultural products. As a result, the rural industrial development quickly extended to other trade areas. In Qinshan, the earliest practice of rural industrial development included a powder metallurgical factory, a few garment factories and several building material plants. Almost all of the factories were run collectively by the commune or brigades at that time.

Once the rural economic reform of 1979 made individual rural households instead of production teams responsible for the management of the land, it also became possible for rural households to become directly involved in the rural industrial development. In Qinshan, the earliest practice of rural industrial development included a powder metallurgical factory, a few garment factories and several building material plants. Almost all of the factories were run collectively by the commune or brigades at that time.

Once the rural economic reform of 1979 made individual rural households instead of production teams responsible for the management of the land, it also became possible for rural households to become directly involved in the rural industrial development.4 However, such a phenomenon did not appear until the mid-1980s. With rapid capital accumulation, more individual rural households started to join the rush of rural industrial development. Sole and joint ownership quickly became the main component of rural industry. However, because of the rapid development, most household-based enterprises operated using modest capital. Such modest financial means in rural industrial development has become a major obstacle for clean production. In Qinshan, only one polluting enterprise responded positively to the survey on whether or not it would operate in line with the government’s guidelines on industrial waste discharge. In the event that all the rural enterprises would be required to meet a deadline to set up equipment to treat their industrial wastes or face financial penalties, more than 40 percent of the polluting enterprises preferred to rather shut down their enterprises entirely (Table 4). Interviews with some enterprise managers and local EPB officials revealed a huge difference between them on enterprises’ financial responsibility for pollution. Almost all the entrepreneurs overestimated the amount. Obviously, many rural entrepreneurs were simply fearful of being forced to pay. It appears that smaller rural enterprises were particularly sensitive to any fee for discharges.

Production involving small amount of fixed capital and large labor force enables enterprises to start up quickly and to change activities easily. While these conditions for production might allow the enterprises to respond quickly to a capricious market, they also make the industries vulnerable to a possible government attack on polluting industries, that is, when the government starts to crack down polluting industries they can easily shut down the factories without incurring too many losses. The existence of such a fluky mentality among many of the entrepreneurs seems to have played a very important role in the methods of operation of these pollution-generating activities.

Small-scale industrial activities have also led the rural enterprises to purchase used or disused industrial equipment from urban areas. Rural enterprises purchasing used equipment from urban areas began to accelerate from the early 1990s. These tactics coincide with the stricter environmental law enforcement in cities, which has forced many urban polluting enterprises either to abandon their out-dated production equipment or to relocate entire factories to suburban or rural areas. For example, the nearby city of Shanghai has recently relocated over 700 industrial enterprises, all classified as “serious polluters,” from its downtown area to outlying suburbs as part of a campaign to reduce pollution and make room for the development of the city’s service sectors (China Environmental Reporter 1997). The survey in Qinshan asked the polluting enterprises about the origin of their start-up equipment using three categories: new equipment, used equipment from rural enterprises, and used equipment from urban enterprises. Their responses are compared with the number of years of operation of their enterprises. The results reveal that the median age of the rural enterprises using second-hand equipment from urban areas is clearly shorter than the other two groups (Figure 3). The length of the boxes in Figure 3 shows the spread or variability in terms of the number of years of operation. It suggests that acquiring urban used equipment among the rural enterprises is rather a recent trend.

The reuse of environmentally substandard equipment has led to an increase in the amount of pollutant discharge in villages. Among all forms of pollutants, untreated wastewater discharge has been the most significant problem (Table 5). This is obviously related to the types of polluting industries in the area (Table 6). According to local officials, water contamination has significantly changed the rural people’s life-style. No more than 30 years ago, most rural households depended on the canal water for domestic use, but this practice may be gone forever. Even the shallow groundwater, on which most rural households are now relying by using wells, is threatened. Furthermore, water pollution has started to affect agriculture in the region. Laboratory analysis of the

<table>
<thead>
<tr>
<th>Reactions</th>
<th>Number of Enterprises</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fully comply</td>
<td>1</td>
<td>3.2</td>
</tr>
<tr>
<td>Partly comply</td>
<td>5</td>
<td>16.1</td>
</tr>
<tr>
<td>Ignore orders</td>
<td>12</td>
<td>38.7</td>
</tr>
<tr>
<td>Terminate production entirely</td>
<td>13</td>
<td>41.9</td>
</tr>
<tr>
<td>Total</td>
<td>31</td>
<td>100.0</td>
</tr>
</tbody>
</table>

Table 4. Reactions to government order for waste treatment
soil and grains in 1993 suggested that they were both contaminated by alien chemicals that could only have come from the industrial wastewater.5

Spatial Constraints

One of the major characteristics of China’s rural enterprises is their spatial dispersion. This pattern began to be seen in the very early stages of development. Although various factors are discussed in the literature (Byrd and Gelb 1990), limited supply of arable land and tight controls on mobility are considered as the two most important reasons for dispersion. Limited arable land resource became a very serious issue when the baby boomers of the 1950s and 1960s entered the labor force. As of 1994, the average amount of cultivated land area per rural worker dropped to less than 0.2 hectare. In some densely populated provinces, such as Zhejiang province, it dropped down to less than 0.1 hectare (RSYC 1995, IV-73). In these areas, the land that each household received did not require the full-time effort of the rural household. As a result, rural people sought non-agricultural employment once the economic reforms had granted each household the right to manage its own labor force. However, the existence of a household registration system, which gives different treatments to rural and urban residents,6 made it very difficult for excess rural laborers to work in urban areas. Thus, the only option left for the rural households was to find a way that would permit them to work in the non-agricultural sector without moving into the urban areas. As a result, most household-based rural enterprises emerged in villages.

Enterprises scattered in villages and townships make environmental monitoring difficult. Local environmental monitoring officials agreed that activity impacting the environment carrying out by village enterprises were difficult to supervise and control due to the lack of qualified personnel and equipment as well as the instability of rural enterprises. If the pollution levy system were to be enforced, the EPB’s revenues from fee collection could drop sharply since it would have to use more of its limited resources to monitor the small and scattered rural enterprises. Since these revenues are essential in the development and maintenance of local waste treatment facilities, the local EPB has to give priority to the larger and more serious polluters. The Qinshan survey reveals that only a small number of the polluting enterprises have been inspected by the local environmental monitoring station based in the county town. Only three of them have received warning notifications from the station, and all these three are located within the town. Field visits to the villages found that factories producing similar types but greater amounts of wastewater had never been inspected by the EPB.

The fact that village-based polluting firms are apt to escape from penalties is probably responsible for the recent increase of polluting industries in the villages. The relative lack of monitoring can become an inducement for the transfer of urban polluting industries into the rural areas. Among those rural enterprises using second-hand equipment from urban areas, as suggested in Figure 3, nearly 80 percent are located in the villages.

Table 5. Pollution types of the polluting industries in Qinshan

<table>
<thead>
<tr>
<th>Pollution Types</th>
<th>Number of Enterprises</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Solid waste only</td>
<td>1</td>
<td>3.2</td>
</tr>
<tr>
<td>Wastewater only</td>
<td>20</td>
<td>64.5</td>
</tr>
<tr>
<td>Airborne emission only</td>
<td>0</td>
<td>0.0</td>
</tr>
<tr>
<td>Solid waste and air emission</td>
<td>2</td>
<td>6.5</td>
</tr>
<tr>
<td>Solid waste and wastewater</td>
<td>4</td>
<td>12.9</td>
</tr>
<tr>
<td>Wastewater and airborne emission</td>
<td>1</td>
<td>3.2</td>
</tr>
<tr>
<td>Solid waste, wastewater and airborne emission</td>
<td>3</td>
<td>9.7</td>
</tr>
<tr>
<td>Total</td>
<td>31</td>
<td>100.0</td>
</tr>
</tbody>
</table>

Table 6. Industrial types of the polluting enterprises

<table>
<thead>
<tr>
<th>Industrial Types</th>
<th>Number</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Building materials</td>
<td>9</td>
<td>29.0</td>
</tr>
<tr>
<td>Bulb factory</td>
<td>1</td>
<td>3.2</td>
</tr>
<tr>
<td>Chemical</td>
<td>3</td>
<td>9.7</td>
</tr>
<tr>
<td>Construction</td>
<td>1</td>
<td>3.2</td>
</tr>
<tr>
<td>Food processing</td>
<td>2</td>
<td>6.5</td>
</tr>
<tr>
<td>Mechanical</td>
<td>2</td>
<td>6.5</td>
</tr>
<tr>
<td>Metallurgical</td>
<td>2</td>
<td>6.5</td>
</tr>
<tr>
<td>Pesticide</td>
<td>1</td>
<td>3.2</td>
</tr>
<tr>
<td>Plastic</td>
<td>3</td>
<td>9.7</td>
</tr>
<tr>
<td>Plating</td>
<td>1</td>
<td>3.2</td>
</tr>
<tr>
<td>Textile</td>
<td>6</td>
<td>19.4</td>
</tr>
<tr>
<td>Total</td>
<td>31</td>
<td>100.0</td>
</tr>
</tbody>
</table>
For the local EPB, it would be desirable to see a more centralized development of rural enterprises. One of the obstacles that prevents village enterprises from moving into the town has been the continued involvement of industrial workers in agriculture. Although non-agricultural work has become the major economic activity for most rural households with agriculture being virtually sidelined, few rural households have decided to give up agriculture entirely. Since neither the governments nor the rural enterprises provide employment insurance for the workers, rural people are concerned that their basic economic security might be threatened in the event that their enterprises fail to succeed. Furthermore, significant fluctuations of the rural industrial sector in the late 1980s and the early 1990s confirmed the rural people not to solely rely on the enterprises. In continuing to engage in agriculture, they believe they can at least maintain a basic living (Xu 1994). In Qinshan, it is not uncommon for a rural family to spend most evenings and weekends working on the land. Since a rural household has to maintain the means for agricultural production, such as tools and storage spaces, it is highly unlikely that they will be able to move into the towns while still engaged in agriculture. Since almost all of the employees, and in most cases even the owners, do not wish to abandon the land, maintaining a comfortable travelling distance between enterprises, residences and farming plots becomes an important issue in the location decision of new enterprises. Thus, the agricultural connection of enterprise workers has been primarily responsible for the dispersion of rural enterprises.

In recent years, with intense market competition, more rural enterprises appear to be willing to relocate into the town. The survey finds that more than 15 percent of the village-based polluting enterprises in Qinshan expressed their willingness to relocate. The majority of them agreed on the reasons for such an intended move, that is, to replace the traditional canal transportation with more efficient automobile transportation. Some enterprises intend to relocate simply because their villages are too small to make road construction worthwhile. This pursuit of economies of scale might bring more village enterprises into the town and could make it easier for pollution control. Nevertheless, with the majority of rural households still reluctant to leave their villages and new household-based enterprises continuing to emerge, it is unlikely that such a move could dramatically change the spatial setting of the rural enterprises.

Administrative Constraints

China has a highly centralized public finance system dating back to the 1950s. A town government was only allowed to retain a small amount of income to offset certain expenditures. These budgetary revenues normally provide only minimal support for the basic operation of a town government. In addition, there are so-called extra-budgetary revenues that are not subject to budgetary supervision. These revenues include supplementary agricultural, industrial and commercial taxes allowed by the central government. Before widespread rural industrial development, these revenues were largely based on supplementary agricultural tax and were very small. The development of rural industries has significantly changed the situation. In Qinshan, almost all of these extra-budgetary revenues now come from the enterprises. They have become crucial for community and infrastructure development, aid to agriculture, as well as monetary rewards for government employees. These extra-budgetary revenues have become the greatest incentive for town governments in rural industrial development (Song and Du 1990).

In Qinshan, the town government is also the direct owner of many enterprises including a medium-sized cement plant, several building materials and prefabrication plants, and a sizable textile mill. The local government, therefore, has a double role: town government administration and the management of enterprises. Furthermore, the amount of revenue from these government-run enterprises also becomes an important factor in the personal income of government officials. It goes even further in the villages where cadres held concurrent positions in collectively owned enterprises. This twofold role of the local governments does not seem to have raised many objections from the local people. In fact, many rural people believe that it has been helpful for the success of some enterprises since such an income system adds some extra motivations for these cadres to work harder. However, this twofold role of local government becomes problematic when officials are involved in pollution control. Since the county EPB is unable to monitor all the rural enterprises’ environmental behavior, much of these responsibilities were transferred to the town authority. Some town government officials thus become the de facto executors of environmental laws. Because of a conflict of interest created by the twofold role of the local governments, the local officials appeared to be reluctant in penalize their enterprises for waste discharges.

Further discussions with local officials in Qinshan revealed that unequal enforcement of environmental laws in the whole region could be another reason for their protective approaches in pollution control. They worried about the negative impact on the competitiveness of local products in the market if strict pollution control would be imposed. They believed that forcing an enterprise operating on a marginal profit to retool or set up a costly waste treatment facility would be tantamount to ordering it to shut down since the costs would have to be transferred to its products and the rising prices of its products would force it out of the market anyway. The direct consequences for the local government, if
these enterprises were to close, would be rising unemployment and falling revenues, which both the town government as a whole and the officials as individual employees obviously do not want to see. According to the local officials, Qinshan would not be willing to undertake environmental reforms unless their competitors in other towns are willing to establish treatment facilities or retool following the same standard and carry these measures out at the same time. Therefore, the multiple role of the town government together with the uneven implementation of environmental laws makes it very difficult for local authorities to penalize enterprises for environmental pollution.

Discussion and Conclusions

The core of the economic instrument approach to environmental protection is to make polluters pay. With difficulties in pollution monitoring and the reluctance of local authorities to cooperate, the economic instrument approach has not been working in the rural areas. As pollution worsens and local governments wrangle for economic advantages at the cost of the environment, the central government is forced to intervene. However, without the support from local level, such an intervention cannot last. The reemergence of polluting enterprises after the central government’s crackdown along the Huai River basin appears to be a good example.

It seems that the economic instrument policy relies too much on a top-down approach in monitoring, control and supervision. While this may work in cities where industries are more concentrated and pollution-monitoring systems are well developed, it can face great difficulties in the rural areas where polluting industries dispersed in villages. Such an uneven implementation of environmental laws between urban and rural areas has been a major reason for the transfer of urban polluting industries into the rural areas. To halt such a dangerous transfer, the policy must be more evenly implemented among urban and rural areas. In rural area, this again requires the support and cooperation at the grass-roots level.

An observation made in the town of Qinshan suggests a possible bottom-up approach. Several enterprises in the town jointly installed a device to filter the solid contaminants included in their wastewater before it was discharged into the canal system. Although it was a very rough device, this joint effort did demonstrate a cooperative spirit to reduce pollution. More importantly, the cost sharing arrangement among these enterprises did not create an excess financial burden for the participant enterprises. An important implication of this effort is that it can germinate a good sense of environment among the enterprises, lead them to monitor each other in pollutant discharges, and make them more self-restrained in their environmental behaviors. It can also become supplemental to enhance the pollution monitoring effort of the local EPBs. If such efforts are well coordinated, it would also become easier for the enterprises to upgrade the treatment equipment when their economic conditions are improved. However, this approach requires a more spatially concentrated development of the rural enterprises.

The dispersion of rural enterprises is one of the key factors for the environmental destruction of rural areas. A more centralized development would make it easier for environmental monitoring and waste treatment. As suggested by the relocation of some village enterprises in Qinshan, it can also become beneficial to the development of rural enterprises. In order to achieve this goal, rural households should not be encouraged to engage in dual economic activities in both industrial works and agriculture. A significant portion of them should concentrate on their work in towns, particularly when enterprise incomes have become sufficient for them to make a decent and stable living in towns. However, this would require a fundamental change of the government’s policy for rural areas. Further studies will be needed to address issues related to such a transformation. As already indicated in this study, the existing land tenure system, the household registration system, as well as the establishment of a social security system are among the most urgent ones.

Acknowledgments

Financial support from SSHRC for the field study is gratefully acknowledged. The author wishes to thank the two anonymous reviewers for their constructive comments on the earlier draft of this paper.

Endnotes

1. Telephone: (514) 848-8064; Fax: (514) 848-2057; Email: haiqing@vax2.concordia.ca
2. Town (Zhen) is the lowest level in China’s urban system. A town administration normally has the jurisdiction over several administrative villages. Each of these administrative villages may contain a number of small and naturally formed villages. A town is normally upgraded from a township, which is administratively similar to a town but not included in the urban system.
3. Each year, all enterprises report to the town’s industrial office their production details. This record was used in identifying the pollution sources in the study area. However, it should be noted that there were a considerable number of unregistered enterprises, mostly household-run workshops, which never report their production details to the industrial office. Among them, there were pollution makers. Due to difficulties in verification, this study did not include these unregistered enterprises. For simplicity, this study did not take into account pollution types other than solid wastes, wastewater and airborne emissions.
4. Although each rural household was given a small piece of land for family management before the reform, this land was often too small to make a living for the whole household. Almost every rural worker, therefore, had to work in a collective production team that managed most of the land. The rural economic reform redistributed the land to individual rural households and made each rural household responsible for production decisions and labor management. This opened the door for rural people to work in the non-agricultural sector.

5. Samples collected and tested by the prefecture environmental monitoring office.

6. As part of this scheme, basic urban supplies and services, such as grain rations, education, employment, and housing, were available only to urban residents.

References


Abstract

We present a theory of the basis of support for a social movement. Three types of support (citizenship actions, policy support and acceptance, and personal-sphere behaviors that accord with movement principles) are empirically distinct from each other and from committed activism. Drawing on theoretical work on values and norm-activation processes, we propose a value-belief-norm (VBN) theory of movement support. Individuals who accept a movement’s basic values, believe that valued objects are threatened, and believe that their actions can help restore those values experience an obligation (personal norm) for pro-movement action that creates a predisposition to provide support; the particular type of support that results is dependent on the individual’s capabilities and constraints. Data from a national survey of 420 respondents suggest that the VBN theory, when compared with other prevalent theories, offers the best available account of support for the environmental movement.

Keywords: values, beliefs, norms, environmentalism, social movements

Public support is one of the most important resources social movements mobilize in their efforts to overcome cultural inertia and the interests of powerful actors. Indeed, as the debate about the “new social movements” has emphasized, changes in attitudes and behavior on the part of the public can be a central goal of a movement. But while a number of social movement scholars have acknowledged the importance of public support, there has been little theory developed to explain public support, and less empirical research. In this paper, we offer a theory of public support for the environmental movement that is congruent with both research on environmentalism and with the theoretical approaches being used in the social movements literature. We identify three dimensions of support and examine the determinants of each using data from a survey of the U.S. public. Our analysis suggests that support for the environmental movement can be explained by a social psychological theory that is congruent with existing social movement theory, while other contending theories of environmentalism have less explanatory power.

Movement Activism and Movement Support

Social movements depend upon highly committed and engaged activists, but support by others is also important. Supporters are potential recruits, as several researchers have noted (e.g., Hunt et al. 1994; Klandermans and Oegema 1987). Public support also provides movement organizations with a resource that can be mobilized in political struggle. Friedman and McAdam (1992, 168) note that “in many cases it will suffice that those with power merely believe that there is a large constituency for a given course of action.” Indeed our previous work shows that general public support may be one of the most important resources for the environmental movement, and one that is critical in struggles to define social problems (Dietz et al. 1989). For some movements, public support in the form of widespread change in individual behavior among non-activists is also necessary to achieve movement goals (Johnston et al. 1994).

One goal of this article is to link the extensive literature on the social psychology of environmentalism with scholarship on social movements. Because rather different language has emerged in the two fields, it is helpful to begin by clari-
fying the terms we use in referring to the environmental movement.

The U.S. environmental movement includes several distinct discourses (Brulle 1995) and many different organizations. Despite this variety, all environmental movement discourses have common elements in their beliefs and values: human action has the potential for adversely affecting the biophysical environment, changes in the biophysical environment can harm things people care about, and steps should be taken to avoid at least some harmful actions. The discourses and the organizations that promote them differ in how they define harm, in their understandings of why humans act to harm the environment, and in the remedies they propose for the problem. But it is still meaningful to speak of them as part of a single movement. The term movement, in this usage, is rather like the term “social movement industry” as used by Zald (1992).

We define movement activists as those who are committed to public actions intended to influence the behavior of the policy system and of the broader population. Committed activists are the core of a movement and have been the subject of much recent work in the social movements literature. For them the movement becomes an important part of their life and a central element in their identity. We define movement supporters as those who are sympathetic to the movement and who are willing to take some action and bear some costs in order to support the movement. Of course the boundary between supporters and activists is fuzzy, and as Snow et al. (1986) have noted, people often move back and forth, being activists for a time then retreating to a less committed but still supportive role. As noted above, it is from the supporters that new activists are drawn (Hunt et al. 1994; Klandermans and Oegema 1987).

Our conceptualization of the environmental movement, and by analogy other movements, includes not only activists but supporters. Further, we emphasize that the movement is embedded in a broader society. It is engaged in struggles in a policy system that includes not only elements of the state but also opponents. Here our conceptualization of the movement parallels that of McLaughlin and Khowaja (1999): the movement and movement organizations are engaged in a struggle with their opponents (and sometimes with other elements of the movement) to shape the ideological landscape and societal practices. McLaughlin and Khowaja provide a macro-historical account of this process, while we focus on the social psychology of public support.

What is Movement Support?

Although support can take many forms, researchers on social movements typically focus on committed public activism, such as participation in demonstrations, and active, extensive involvement in social movement organizations (McAdam, McCarthy and Zald 1988). Committed activism is essential, of course, for movement organizations to function and for movements to move forward in the face of inertia and active resistance. But other, less intense, kinds of support also are critical to a movement’s success. One is low-commitment active citizenship — political activities that are less public or present less risk than engaged activism. These include writing letters to political officials, joining and contributing funds to movement organizations, and reading movement literature. A second is support and acceptance of public policies that may require material sacrifice in order to achieve the movement’s goals. Movements often press for social changes that require such sacrifices. For example, environmental policies often require individuals to pay higher prices or higher taxes or to submit to regulation of their behavior (e.g., mandatory recycling, bans on lawn watering during droughts). Movements’ struggles are made easier if many people, not only activists, voluntarily make such sacrifices and support public policies that impose them on all. A third important kind of support involves changes in behavior in the personal or private sphere. For the environmental movement’s goals, consumer behaviors such as reductions in energy use and purchases of environmentally benign products can make a considerable contribution if they are sufficiently widespread. They also serve as a signal to government and industry regarding citizen concerns and consumer preferences.

All three non-activist types of public support are important to many movements. For example, support for minority rights movements can be measured not only in terms of committed activism that puts bodies on the line, but also in terms of the willingness of majority group members to accept policies that may require them to make sacrifices (e.g., paying increased taxes or accepting affirmative action programs to improve conditions for minorities), to change personal behavior (e.g., engaging in more positive interactions with minority group members), and to take low-commitment political actions in their citizen roles (e.g., voting, signing petitions). Support for religious fundamentalists’ opposition to sexually explicit material in the mass media can be measured not only by committed political actions, but also by willingness of individuals to sacrifice elements of personal choice by accepting restricted public access to objectionable books, films, and recorded music; by personal behaviors, such as keeping their children from exposure to these materials; and by ordinary political participation.

In summary, all three types of non-activist public support can be essential for movement success. However, we lack a theory of how individuals come to support movements short of committed activism — how they become part of what
Klandermans and Oegema (1987) call the “mobilization potential” of a movement. Here we offer the first steps toward such a theory.

Towards a Theory of Movement Support

Social movements seek to provide collective goods. In some cases the good is distributed to a small and easily identifiable group, which may minimize the problem of free riders. But in the case of movements such as the environmental movement, the collective good is often provided at a regional, national or even global scale. This suggests that although some individuals may expect enough personal gain to justify provision of the collective good on egoistic grounds, most are also motivated by a broader, altruistic concern — a willingness to take action even in the face of the free rider problem.

We propose that the base for general movement support lies in a conjunction of values, beliefs, and personal norms — feelings of personal obligation that are linked to one’s self-expectations (Schwartz 1977) — that impel individuals to act in ways that support movement goals. Personal norms and altruistic values are important because social movements, unlike pure interest groups, are organized around normative claims on individuals and social organizations to act on the movement’s principles for reasons other than self-interest. The labor movement, for example, is more than an interest group to the extent that it appeals to normatively laden principles and altruistic values such as class solidarity and to other principles that even nonworkers can support, such as social justice, workplace democracy, or the right to bargain collectively. Such principles sometimes impel supporters to sacrifice personal benefits for the good of the movement. Personal norms rather than social norms are central because to the extent that movements are forces for social change, they cannot build support on existing social norms. Personal norms that reflect a movement’s principles lead to support of the movement’s goals through political participation in the citizen role, with personal-sphere behaviors, and by accepting policies that may call for material sacrifices. Behavioral differences across these types of movement support are likely to be due to capabilities and constraints specific to particular actions and particular individuals. Capabilities and constraints determine the efficacy, real and perceived, of an individual’s taking particular actions.

We propose that movement success depends on movement activists and organizations building support by activating or reshaping personal norms to create feelings of obligation. Many social movements, including the environmental movement, are aimed at producing public goods that are advocated by reference to altruistic values. Such movements work to activate personal norms tied to those values. It is also possible, however, for a social movement to try to activate personal norms based on other kinds of values. For example, some conservative social movements, which see traditional values of duty, family loyalty, and the like as essential for providing public goods such as social order, refer to these values in attempting to activate feelings of personal obligation to support movement objectives.

In the case of committed activism, such processes of generating support have been extensively examined in the literature on framing (Snow et al. 1986; Friedman and McAdam 1992; Snow and Benford 1992). To understand the shaping of more general movement support, we apply a version of Schwartz’s (1972, 1977) moral norm-activation theory (Stern et al. 1993). We propose that norm-based actions flow from three factors: acceptance of particular personal values, beliefs that things important to those values are under threat, and beliefs that actions initiated by the individual can help alleviate the threat and restore the values. Each of these three terms involves a generalization of Schwartz’s theory. The original theory presumes altruistic values; the generalization posits that personal norms may have roots in other values as well and that levels of altruism and other relevant values may vary across individuals. The original theory emphasizes awareness of adverse consequences (AC) of events for other people (the main objects valued by altruists); the generalized theory emphasizes threats to whatever objects are the focus of the values that underlie the norm. In the case of environmentalism, threats to the nonhuman species and the biosphere may be important (Stern et al. 1993; Stern and Dietz 1994). Finally, in Schwartz’s theory, norm activation depends on ascription of responsibility (AR) to self for the undesirable consequences to others, that is, the belief or denial that one’s own actions have contributed to or could alleviate those consequences. The generalized theory emphasizes beliefs about responsibility for causing or ability to alleviate threats to any valued objects.

In expanding the range of valued objects to be given theoretical consideration, we adopt the topology of values developed by S. H. Schwartz (1992, 1994), which maps all human values onto a psychological space that can be divided into ten value types and four broader value clusters or orientations, arrayed in particular relationships to each other. Many social movements build their normative claims on altruistic value types such as that labeled by Schwartz as universalism. The environmental movement is an example (e.g., Stern and Dietz 1994; Stern, Dietz, Kalof and Guagnano 1995), as are movements for civil rights, human rights, and social justice. Other movements, however, are built on other values. Religious fundamentalist movements rest on conservative value types such as those labeled tradition, conformity, and security (Schwartz and Huismans 1995; Schwartz 1996). Libertarian and human-potential movements may be based on individual-
istic or openness-to-change value types such as stimulation, hedonism, or achievement. Movements based on altruistic and conservative values tend to emphasize the importance of collective goods, while movements based on egoistic and openness-to-change values tend to emphasize the importance of private benefits.

It is possible to investigate any social movement’s ideology to reveal the values and beliefs that underlie its policy positions. We propose that each social movement seeking a collective good develops its positions based on certain basic human values and that each movement’s ideology contains specific beliefs about consequences and responsibilities that, in conjunction with its chosen values, activate personal norms that obligate individuals to support the movement’s goals.

While our approach draws on the social psychological theory of altruism, it is quite congruent with recent work on social movements. The role of values in social movements has been emphasized by Johnston et al. (1994), Gamson (1992), and Pichado (1997). In their analysis of the environmental movement, Cotgrove (1982) suggests that personal values may be of paramount importance in determining who is an environmentalist and who is not. Snow et al. (1986), in their discussion of value amplification, argue that an intense focus on values already held by prospective constituents is one of the key steps toward committed movement activism. Further, our concepts of awareness of consequences of a problem (AC), ascription of responsibility to oneself for action (AR) and activation of a personal norm for action (PN) parallel the account of Hunt et al. (1994), which distinguishes diagnostic (AC), prognostic (AR) and motivational (PN) steps in the framing process in which movement activists construct their identities. In a similar vein, M. Schwartz and Shuva (1992, 214-215) suggest that free rider problems can be overcome when “1. There is an abiding sense of group fate. 2. There is a belief in the viability of group action as a strategy. 3. Individuals cannot distinguish themselves from other group members in terms of their capacity to contribute. 4. Personal ties among group members are sufficiently dense to activate group obligations in the face of free-rider impulses.” Their theory references individuals’ perceptions of the group. Their first condition involves a perception of consequences (AC), their second implies a belief that action can alleviate the consequences (AR), and their fourth mentions the activation of a norm about action.

We are not arguing that the theory we propose is identical to any of those offered in the literature on movement activists. Nor should it be. The step towards intense activism involves a substantial and transformational commitment, including a reframing of key elements of identity, as the literature over the last decade has demonstrated. However, the processes that lead someone to take small steps in support of a movement should be logically congruent with the process that leads to activism, and it appears that our value-belief-norm theory has such congruence with key arguments in the existing literature on activism.

Figure 1. Schematic model of variables in the Value-Belief-Norm theory as applied to environmentalism, showing direct causal relationships between pairs of variables at adjacent causal levels.

*Effects of egoistic and traditional values on other variables are negative. Variables in this model may also have direct effects (not shown) on variables more than one level downstream. In addition, each of the variables in the model may be affected by variables not shown, which are not elements of the VBN theory. However, only personal
Explaining Support for Environmentalism

This paper examines the usefulness of a value-belief-norm (VBN) theory of movement support using the case of the environmental movement. There is a huge volume of literature on public support for the environmental movement spanning 25 years. Unfortunately, the criticism offered by Heberlein (1981) nearly two decades ago still stands — most work on public environmental attitudes and behavior does not build into a cumulative understanding because too little attention has been given to systematic theory and the comparative testing of alternative theoretical models. There are at least six theoretical accounts of environmentalism that have been subject to conceptual and empirical exploration — but not to comparative tests. Our theory links three of these: norm-activation theory, the theory of personal values, and the New Ecological Paradigm hypothesis (see Figure 1). This study tests the explanatory value of our theory against each of its three elements alone and against three other theories.

The Value-Belief-Norm Theory of Environmentalism

Moral Norm Activation. S. H. Schwartz’s (1972, 1977) norm-activation theory of altruism has been applied to proenvironmental behavior with some success. The theory holds that proenvironmental actions occur in response to personal moral norms about such actions and that these are activated in individuals who believe that environmental conditions pose threats to other people, other species, or the biosphere (awareness of consequences, or AC) and that actions they initiate could avert those consequences (ascription of responsibility to self, or AR). Supportive evidence comes from studies focused on a variety of proenvironmental actions (Black 1978; Van Liere and Dunlap 1978; Black, Stern and Elworth 1985; Stern, Dietz and Black 1986; Stern, Dietz and Kalof 1993; Guagnano, Dietz and Stern 1994; Guagnano 1995; Guagnano, Stern and Dietz 1995; Stern, Dietz, Kalof and Guagnano 1995; Widegren 1998).

Personal Values. Following the reasoning already described that links proenvironmental behavior to particular basic types of values, researchers have drawn on the value measures developed in cross-national research by Schwartz and colleagues (Schwartz and Bilsky 1987; Schwartz 1992, 1994), using them or modifications of them for environmental research (Stern, Dietz, Kalof and Guagnano 1995; Stern, Dietz and Guagnano 1998; Karp 1996). In the initial formulation of this approach, Stern, Dietz, and Kalof (1993) posited three “value orientations” or types of values relevant to environmentalism: self-interest, altruism towards other humans, and altruism towards other species and the biosphere. These three bases for environmental concern are logically distinct and are noted in environmental philosophy and the environmental movement literature (e.g., Merchant 1992), but the distinction between altruism towards humans and altruism towards other species and the biosphere has not yet been demonstrated empirically in samples of the U.S. general public. The distinction may be important, however, in more strongly environmentalist populations such as U.S. students (Karp 1996; Stern, Dietz and Kalof 1993) or the general public in some other countries.

In this study, we examine two value bases for environmental concern — altruism and self-interest — that correspond with the Self-Transcendent and Self-Enhancement value clusters defined by Schwartz. We also examine the other two major value types Schwartz has identified — Conservation (traditional) values and Openness to Change — for evidence of effects on environmentalism such as have been reported elsewhere (Stern, Dietz, Kalof and Guagnano 1995).

New Ecological Paradigm. Dunlap and his colleagues have proposed that the rise of the environmental movement is linked to growing acceptance of a new ecological paradigm or worldview (NEP) — a view that human actions have substantial adverse effects on a fragile biosphere. The NEP scale developed by this group (Dunlap and Van Liere 1978, 1984; Dunlap et al. 1992) is perhaps the most widely used social-psychological measure in the literature on environmentalism. The NEP scale primarily measures broad beliefs about the biosphere and the effects of human action on it — a sort of “folk” ecological theory from which beliefs about the adverse consequences (AC) of ecological change can easily be deduced (Stern, Dietz and Guagnano 1995). In a sense, NEP measures awareness of very general adverse consequences of environmental conditions, whereas most studies using the Schwartz norm-activation model use measures of problem-specific consequences. The NEP is a worldview that predisposes an individual to accept more narrowly focused AC beliefs.

Our theory links these three accounts through a causal chain of five variables: values (especially altruistic values), NEP, AC beliefs, AR beliefs (not measured in this study), and personal norms for proenvironmental action. The rationale and empirical support for this causal ordering are presented in a series of previous works (Black, Stern and Elworth 1985; Stern and Oskamp 1987; Stern, Dietz, Kalof and Guagnano 1995; Gardner and Stern 1996, Chapter 7). The causal chain moves from relatively stable, central elements of personality and belief structure to more focused beliefs about human-environment relations, the threats they pose to valued objects, and the responsibility for action, finally activating a sense of moral obligation that creates a predisposition to act in sup-
port of movement goals. We postulate that each variable in the chain directly affects the next; each may also directly affect variables farther down the chain. We hypothesize that personal norms directly affect all three manifestations of support for the environmental movement and that all the other variables in the theory may have indirect effects through norms, as well as in some cases direct effects net of norms. Other variables from VBN theory and perhaps other social-psychological variables may directly affect particular types of movement support, but we do not expect any of these variables to have direct effects on all types. We further expect that each type of movement support will be affected by individuals’ capabilities to take the actions required to provide the particular type of support and by external, contextual conditions that facilitate or constrain those actions (Guagnano, Stern and Dietz 1995; Gardner and Stern 1996). Thus, particular types of movement support flow from a dispositional element based in personal values and normative beliefs but are further shaped by other influences — notably, capabilities and constraints — that transform the disposition into particular kinds of action. Our focus here is on three types of non-activist movement support; other theories postulate specific processes such as identity transformation that lead to committed activist participation.

Other Social-Psychological Theories of Environmentalism

We tested the VBN theory against three other theories in the literature. One, derived from so-called cultural theory (Douglas and Wildavsky 1982), posits that the bases of contemporary environmentalism lie in deep-rooted orienting dispositions or “cultural biases” that make some individuals especially fearful of environmental threats to human health and safety. Dake (1991, 1992), following Douglas and Wildavsky, has developed scales that measure four orienting dispositions: egalitarianism, hierarchy, individualism and fatalism. The theory suggests that egalitarians will be most concerned with the environment and individualists least concerned. There is some supporting evidence for this view (Dake 1991; Peters and Slovic 1995).

The theory of post-materialist values (Inglehart 1977, 1990, 1997) holds that a new set of “post-materialist” social and political values and attitudes is emerging in the industrial world as a result of increasing affluence and security. These values emphasize quality of life and self-expression as important desiderata in a society, in contrast to materialist values that have emphasized economic well-being and personal and national security. Inglehart sees emerging environmental concern as one result of increasing post-materialism (Inglehart 1995). A number of studies have examined this hypothesis, with mixed results (Abramson 1997; Brechin and Kempton 1994; Brechin and Kempton 1997; Dunlap and Mertig 1997; Kidd and Lee 1997; Lee and Kidd 1997; Pierce 1997; Dietz, Stern and Guagnano 1998).

We also examined the idea that a spiritual or religious world view may have an important influence on environmentalism (White 1967; Greeley 1993; Kempton, Boster and Hartley 1995; Eckberg and Blocker 1996; Dietz, Stern and Guagnano 1998). We focused on the view that people who hold nature sacred, whether because it was created by God or because it is sacred in itself, are more active in supporting environmental protection. Religious or spiritual beliefs may be especially important because they offer an absolute standard that supersedes appeals to efficiency, practicality and expediency.

This study examines the predictive value of VBN theory and compares it with six models found in the published literature. Although there have been tests of the explanatory power of each model separately and a few studies have used two of them as predictors of behavior (e.g., Tarrant and Cordell 1997; Widegren 1998), there has been no effort until now to compare all of them in any systematic way.

Method

Data Collection and Analytic Strategy

In June 1994, we collected data from 420 respondents throughout the United States using computer-assisted telephone interviewing. Phone numbers were generated using a random digit procedure; random respondent selection within the household was accomplished using the “next birthday” method (Salmon and Nichols 1983). The overall response rate was 87.7% based on the number of households where we were able to contact a next birthday respondent. The sample was 56% female and had a mean age of 44.2 years, a mean educational level of 14.4 years, and a median family income of $36,700.

To develop scales, we followed Armor’s (1974) method with some modifications. Candidate items were included in a principal components analysis (PCA). The PCA was bootstrapped with 500 replications to construct bias-corrected confidence intervals for the eigenvalues (Hall 1988; Hamilton 1992, 319-325). These confidence intervals were used to determine the number of factors. To identify items loading on a particular factor (i.e., the items tapping a latent variable) we used an iterated principal factors analysis, constrained to the number of factors indicated by the bootstrapping, followed by a promax rotation. All items loading above 0.4 in absolute value on a factor were considered as part of the factor and included in scales constructed from that factor. Scales were constructed by adding together all non-missing responses and dividing by the number of valid responses. This produces a scale with the same range as the original.
Variables (either 1-4 or 0-1) and allows creation of a scale even when some items comprising the scale are missing. (We also constructed weighted scales using Armor’s theta procedure and used regression-based imputation methods for replacing missing data. These produce results nearly identical to the simpler procedure described, so are not reported here.)

Models were estimated with ordinary least squares (OLS) regression. Several issues must be considered in interpreting results. OLS assumes no measurement error in the independent variables. We have also experimented with errors-in-variables regression that takes account of the reliability of the independent variables. However, because the scales developed using the Dake cultural theory items have low reliability in our sample, we cannot include them in an errors-in-variables estimation. We therefore have chosen to report OLS results that include the Dake items. Estimates using the errors-in-variables procedure of models not including the Dake scales produce results very similar to those reported here. Our estimates assume the causal ordering described above. If these assumptions are incorrect, then OLS will produce biased estimates of causal effect that are still valid measures of association. Finally, collinearity is not a serious problem in the estimates we report. The largest variance inflation factor in any model is 2.5 for personal norms in the model including both VBN variables and those suggested by other theories.

The Measures

Variables from Moral Norm Activation Theory. We measured two variables from Schwartz’s norm-activation theory: personal norms and awareness of consequences (AC). The survey included nine items on normative belief... three tapping beliefs about personal moral obligations and, following a past extension of the theory (Stern, Dietz and Black 1986), three on the obligations of government and three on the obligations of business. Beliefs about the moral obligations of such collective actors may be important determinants of personal choice to support social movements through which one may influence those actors. Factor analysis determined that the nine items loaded on a single factor that accounted for 52 percent of the variance. An additive scale of the nine items (see Appendix) has an alpha reliability of 0.88.9 Nine items designed to measure AC (see Appendix) formed a single factor accounting for 60 percent of the variance; the additive scale has an alpha of 0.91.

Personal Values. We included twenty-six items from the Schwartz value scales as we have modified them to tap environmental values (Stern, Dietz, Kalof and Guagnano 1995). Our analysis of these items indicated a four-factor solution was appropriate. We created an additive scale for each of the four factors (see Appendix), consisting of all items loading at least 0.40 on the factors for Self-Transcendent values (altruism) (alpha = 0.86), Traditional values (alpha = 0.80), Self-Enhancement (alpha = 0.69), and Openness to Change (alpha = 0.62). As in our previous analysis of data from a general-public sample in the USA (Stern, Dietz, Kalof and Guagnano 1995), this analysis does not reveal an empirical distinction between altruism towards humans and altruism towards other species. Items related to concern with the biophysical environment load on the same factor as items related to more humanistic concerns.

New Ecological Paradigm (NEP). The NEP is measured using five items from Dunlap’s longer scale (Dunlap et al. 1992). The unidimensionality of the scale was verified using Armor’s method. The additive scale has an alpha reliability of 0.73. Items are listed in the Appendix.

Cultural Theory. We included two items each from Dake’s egalitarian, individualist, hierarchist and fatalist cultural bias scales. A factor analysis of these eight items constrained to four factors, as called for by the theory, produces factors representing the hierarchy, egalitarianism and individualism dimensions. Although only one item from the fatalism scale, “Co-operation with others rarely works,” loaded above 0.4 on a factor, we used both items in creating the fatalism scale as Dake’s work suggests is appropriate. Scale items are reported in the Appendix. The alpha reliabilities for the scales are: hierarchy, 0.41; egalitarianism, 0.56; individualism, 0.67; fatalism, 0.36. The use of this minimal subset of Dake’s items has probably lowered reliability and may reduce the ability of our measures of cultural-theory variables to predict environmentalism.

Post-materialism. Post-materialism was measured using two questions asking about priorities for the country. The first is: “The following is a list of four items that some people consider important priorities for the United States. Please tell me which of the four you consider the highest priority. The four items are maintaining order in the nation, giving people more say in government decisions, fighting rising prices or protecting freedom of speech.” The second question asks about the second priority for the nation. The second and fourth items in the list are considered post-materialist values, the first and third materialist. The post-materialism variable was scored 0 if the respondent selected neither post-materialist items as a priority, scored 1 if a materialist item was the first priority but a post-materialist item as the second, scored 2 if a post-materialist item was first priority but a materialist the second priority and scored 3 if post-materialist items were selected as both first and second priorities.

Sacredness of Nature. The sacredness of nature measure is a single item: “Which of the following is closest to your views? Nature is sacred because it is created by God. Nature
is spiritual or sacred in itself. Nature is important but not in a spiritual or sacred way." We have created binary variables for respondents who selected the first or the second response, leaving the third response as the left-out category.

**Indicators of Environmentalism.** The survey included 17 items reflecting self-reported behaviors and behavioral intentions. The items were developed to tap environmentally relevant private-sector behavior, environmental citizenship, and policy support, the three types of non-activist movement support described above. We subjected these items to factor analysis to develop reliable measures of environmentalism. These results are reported below.

**Results**

**Dimensions of Environmentalism**

Factor analysis of the 17 behavioral items suggested three factors, corresponding to the three components of environmentalism we postulated. One consists of four self-reported consumer behaviors (alpha = 0.72), a subset of private-sphere movement support. A second is composed of three willingness-to-sacrifice items that indicate one form of policy support (alpha = 0.78). The third is composed of seven items asking about non-activist environmental citizenship actions taken in the last twelve months and one item asking directly about the strength of the respondent’s support for the environmental movement (alpha = 0.77). The items are listed in Appendix A. Although the three scales show moderate intercorrelations of between 0.33 and 0.39, the statistical separation of three highly coherent factors suggests that non-activist support for the environmental movement can indeed be considered as a three-dimensional construct.9

The one item in our survey that taps a more committed and higher risk form of activism, participation in demonstrations and protests, is rare in self-reports with only 7% of respondents reporting having done so in the last 12 months. It does not load on a factor with other items. Its correlation with the willingness to sacrifice scale is 0.06, with consumer behavior is 0.12 and with environmental citizenship is 0.26. Because participation in protests provides an interesting contrast with less committed more general movement support, we include it as a separate dependent variable below.10

**Explaining Environmentalism with the Value-Belief-Norm Theory**

We tested the VBN theory with a series of regression models. First, we regressed the measures of the consumer behavior, willingness to sacrifice, and environmental citizenship, as well as the indicator of participation in demonstrations against the set of predictors in the theory (four values, NEP, AC, and personal norms). Then, we regressed each of the links in the postulated causal chain against the variables postulated to be causally prior to it. These results are presented in Table 1.

<p>| Table 1. Unstandardized regression coefficients for models using predictor variables from value-belief-norm theory. |
|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|</p>
<table>
<thead>
<tr>
<th>Independent Variable</th>
<th>Consumer Behavior</th>
<th>Willingness to Sacrifice</th>
<th>Environmental Citizenship</th>
<th>Demonstrate</th>
<th>Personal Norm</th>
<th>Awareness of Consequences</th>
<th>New Ecological Paradigm</th>
</tr>
</thead>
<tbody>
<tr>
<td>Personal norm</td>
<td>0.476 (4.15)</td>
<td>0.413 (4.78)</td>
<td>0.105 (2.60)</td>
<td>-0.022 (-0.50)</td>
<td>---</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>AC</td>
<td>0.058 (0.67)</td>
<td>0.125 (1.90)</td>
<td>0.109 (3.55)</td>
<td>-0.018 (-0.54)</td>
<td>0.262 (7.50)</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>NEP</td>
<td>0.058 (0.61)</td>
<td>0.221 (3.09)</td>
<td>0.068 (2.03)</td>
<td>0.038 (1.04)</td>
<td>0.336 (9.11)</td>
<td>0.515 (11.33)</td>
<td>---</td>
</tr>
<tr>
<td>Altruism</td>
<td>0.169 (2.62)</td>
<td>0.082 (1.66)</td>
<td>0.046 (2.02)</td>
<td>0.057 (2.23)</td>
<td>0.076 (2.74)</td>
<td>0.257 (7.02)</td>
<td>0.414 (12.13)</td>
</tr>
<tr>
<td>Self-enhancement</td>
<td>-0.041 (-1.01)</td>
<td>0.024 (0.81)</td>
<td>-0.059 (-4.17)</td>
<td>-0.000 (-0.02)</td>
<td>-0.004 (-0.22)</td>
<td>0.022 (0.93)</td>
<td>-0.061 (-2.35)</td>
</tr>
<tr>
<td>Traditional</td>
<td>-0.094 (-1.19)</td>
<td>-0.119 (-2.00)</td>
<td>-0.105 (-3.78)</td>
<td>-0.087 (-2.81)</td>
<td>0.009 (0.27)</td>
<td>-0.108 (-2.28)</td>
<td>-0.230 (-4.62)</td>
</tr>
<tr>
<td>Openness to Change</td>
<td>0.028 (0.60)</td>
<td>0.026 (0.74)</td>
<td>0.030 (1.76)</td>
<td>0.037 (1.97)</td>
<td>0.019 (0.92)</td>
<td>0.030 (1.04)</td>
<td>-0.040 (-1.28)</td>
</tr>
<tr>
<td>Intercept</td>
<td>0.398 (1.05)</td>
<td>0.217 (0.75)</td>
<td>-0.149 (-1.11)</td>
<td>0.100 (0.67)</td>
<td>0.850 (5.40)</td>
<td>1.074 (4.98)</td>
<td>2.379 (11.79)</td>
</tr>
<tr>
<td>R-square</td>
<td>0.194 (417)</td>
<td>0.346 (409)</td>
<td>0.302 (419)</td>
<td>0.042 (418)</td>
<td>0.560 (419)</td>
<td>0.477 (419)</td>
<td>0.264 (419)</td>
</tr>
</tbody>
</table>

Note: t-values in parentheses.
The results of the regression analyses are strongly consistent with the theory. Personal norms had strong associations with the behavioral indicators of each type of non-activist environmentalism (the bivariate correlations of personal norm with consumer behavior, willingness to sacrifice, and environmental citizenship are 0.41, 0.55, and 0.43, respectively). In addition, norms were by far the strongest predictor of consumer behavior and willingness to sacrifice in the multiple regressions. Overall the set of predictors from VBN theory together accounted for between 19 and 35 percent of the variance of the behavioral indicators. Personal norm was the only variable from the VBN theory that had a direct effect on all three types of movement support, with the contributions of the other VBN variables being mainly indirect except in the case of environmental citizenship, where there were also multiple direct effects. However, personal norms do not have a direct effect on participation in a demonstration, though altruistic, traditional and openness to change values do. This finding is consistent with our expectation that the VBN theory as operationalized in a survey will not be a strong predictor of intense activism, such as demonstrating, and is also consistent with the social movements literature that has argued for the importance of values as a driver of committed activism. It seems likely that factors not measured in this survey, such as adoption of an environmentalist identity, are strongly implicated in activism. It remains an open question whether values affect activism directly, or indirectly through the process of identity transformation.

Table 2. Unstandardized regression coefficients for models using predictor variables from six theories of environmental support.

<table>
<thead>
<tr>
<th>Independent Variable</th>
<th>Consumer Behavior</th>
<th>Willingness to Sacrifice</th>
<th>Environmental Citizenship</th>
<th>Demonstrate</th>
<th>Personal Norm</th>
<th>Awareness of Consequences</th>
<th>R-square</th>
<th>N</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
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<td></td>
<td></td>
<td></td>
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<td></td>
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<td></td>
</tr>
<tr>
<td>Personal norm</td>
<td>0.534</td>
<td>0.412</td>
<td>0.155</td>
<td>-0.038</td>
<td></td>
<td></td>
<td>0.227</td>
<td>411</td>
</tr>
<tr>
<td>(4.46)</td>
<td>(4.56)</td>
<td>(3.86)</td>
<td>(-0.81)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>AC</td>
<td>0.042</td>
<td>0.103</td>
<td>0.090</td>
<td>-0.017</td>
<td>0.232</td>
<td></td>
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<tr>
<td>(0.48)</td>
<td>(1.56)</td>
<td>(3.05)</td>
<td>(-0.49)</td>
<td></td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>NEP</td>
<td>0.073</td>
<td>0.186</td>
<td>0.073</td>
<td>0.030</td>
<td>0.30</td>
<td>0.469</td>
<td>0.379</td>
<td>413</td>
</tr>
<tr>
<td>(0.76)</td>
<td>(2.58)</td>
<td>(2.27)</td>
<td>(0.80)</td>
<td>(8.07)</td>
<td></td>
<td>(9.78)</td>
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</tr>
<tr>
<td>Altruism</td>
<td>0.145</td>
<td>0.052</td>
<td>0.042</td>
<td>0.038</td>
<td>0.059</td>
<td>0.241</td>
<td>0.288</td>
<td>413</td>
</tr>
<tr>
<td>(2.15)</td>
<td>(1.02)</td>
<td>(1.88)</td>
<td>1.40</td>
<td>(2.10)</td>
<td></td>
<td>(6.31)</td>
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<tr>
<td>Self-enhancement</td>
<td>-0.095</td>
<td>-0.084</td>
<td>-0.034</td>
<td>0.003</td>
<td>-0.026</td>
<td>0.012</td>
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<tr>
<td>(-1.12)</td>
<td>(-1.30)</td>
<td>(-2.57)</td>
<td>(-1.94)</td>
<td>(-1.48)</td>
<td>(-0.48)</td>
<td>(-2.18)</td>
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</tr>
<tr>
<td>Traditional</td>
<td>-0.095</td>
<td>-0.084</td>
<td>-0.074</td>
<td>-0.066</td>
<td>-0.007</td>
<td>-0.134</td>
<td>-0.138</td>
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</tr>
<tr>
<td>(-1.12)</td>
<td>(-1.30)</td>
<td>(-2.57)</td>
<td>(-1.94)</td>
<td>(-1.20)</td>
<td>(-2.63)</td>
<td>(-2.63)</td>
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<td></td>
</tr>
<tr>
<td>Openness to Change</td>
<td>0.031</td>
<td>0.036</td>
<td>0.025</td>
<td>0.034</td>
<td>0.024</td>
<td>0.038</td>
<td>-0.038</td>
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<tr>
<td>(0.65)</td>
<td>(0.99)</td>
<td>(1.53)</td>
<td>(1.74)</td>
<td>(1.18)</td>
<td>(1.30)</td>
<td>(-1.28)</td>
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<tr>
<td>Post-materialism</td>
<td>0.012</td>
<td>-0.014</td>
<td>0.007</td>
<td>0.012</td>
<td>0.007</td>
<td>0.010</td>
<td>0.017</td>
<td></td>
</tr>
<tr>
<td>(0.34)</td>
<td>(-0.56)</td>
<td>(0.63)</td>
<td>(0.92)</td>
<td>(0.47)</td>
<td>(0.50)</td>
<td>(0.80)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Nature made by God</td>
<td>0.217</td>
<td>0.032</td>
<td>0.010</td>
<td>0.038</td>
<td>0.019</td>
<td>0.055</td>
<td>-0.003</td>
<td></td>
</tr>
<tr>
<td>(2.63)</td>
<td>(0.52)</td>
<td>(0.35)</td>
<td>(1.18)</td>
<td>(0.55)</td>
<td>(1.12)</td>
<td>(-0.06)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Nature sacred</td>
<td>0.210</td>
<td>0.090</td>
<td>0.093</td>
<td>0.107</td>
<td>0.043</td>
<td>0.049</td>
<td>0.067</td>
<td></td>
</tr>
<tr>
<td>(2.23)</td>
<td>(1.28)</td>
<td>(2.93)</td>
<td>(2.88)</td>
<td>(1.08)</td>
<td>(0.86)</td>
<td>(1.14)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hierarchicalist</td>
<td>-0.006</td>
<td>-0.003</td>
<td>-0.013</td>
<td>-0.003</td>
<td>0.049</td>
<td>0.096</td>
<td>-0.019</td>
<td></td>
</tr>
<tr>
<td>(-0.10)</td>
<td>(-0.06)</td>
<td>(-0.65)</td>
<td>(-1.14)</td>
<td>(-1.94)</td>
<td>(2.66)</td>
<td>(-0.51)</td>
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<tr>
<td>Egalitarian</td>
<td>-0.111</td>
<td>0.042</td>
<td>-0.075</td>
<td>0.008</td>
<td>0.130</td>
<td>0.074</td>
<td>0.222</td>
<td></td>
</tr>
<tr>
<td>(-1.80)</td>
<td>(0.91)</td>
<td>(-3.62)</td>
<td>(0.35)</td>
<td>(5.22)</td>
<td>(2.08)</td>
<td>(6.28)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Individualist</td>
<td>-0.122</td>
<td>-0.189</td>
<td>-0.079</td>
<td>-0.000</td>
<td>0.077</td>
<td>-0.034</td>
<td>-0.059</td>
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<tr>
<td>(-1.70)</td>
<td>(-3.56)</td>
<td>(-3.32)</td>
<td>(-0.02)</td>
<td>(2.62)</td>
<td>(-0.80)</td>
<td>(-1.34)</td>
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<td></td>
</tr>
<tr>
<td>Fatalist</td>
<td>-0.050</td>
<td>0.031</td>
<td>-0.067</td>
<td>0.020</td>
<td>-0.032</td>
<td>-0.076</td>
<td>0.000</td>
<td></td>
</tr>
<tr>
<td>(-0.76)</td>
<td>(0.63)</td>
<td>(-3.10)</td>
<td>(0.79)</td>
<td>(-1.18)</td>
<td>(-1.97)</td>
<td>(-0.01)</td>
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<td></td>
</tr>
<tr>
<td>Intercept</td>
<td>0.844</td>
<td>0.645</td>
<td>0.175</td>
<td>0.020</td>
<td>0.579</td>
<td>1.169</td>
<td>2.059</td>
<td></td>
</tr>
<tr>
<td>(1.96)</td>
<td>(1.99)</td>
<td>(1.21)</td>
<td>(0.81)</td>
<td>(3.27)</td>
<td>(4.72)</td>
<td>(8.69)</td>
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</tr>
<tr>
<td>R-square</td>
<td>0.227</td>
<td>0.379</td>
<td>0.393</td>
<td>0.068</td>
<td>0.598</td>
<td>0.498</td>
<td>0.349</td>
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</tr>
<tr>
<td>N</td>
<td>411</td>
<td>404</td>
<td>413</td>
<td>412</td>
<td>413</td>
<td>413</td>
<td></td>
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</tr>
</tbody>
</table>

Note: t-values in parentheses
Comparing VBN Theory with Other Theories of Environmentalism

Table 2 presents regression models that have been expanded to include variables suggested by other theories of environmental concern, and Table 3 compares the variance explained by alternative models.

As VBN theory predicts, personal norm is the only variable in the data set that consistently predicts all dimensions of non-activist support for the environmental movement — although the individualism scale of cultural theory has a significant effect on willingness to sacrifice and environmental citizenship and is nearly significant in the model of consumer behavior. In each case, individualists are less likely than others to support the environmental movement. Participating in a demonstration again emerges as a distinct form of movement support. Unlike the three dimensions of general support that are our focus, demonstrating is not well explained by any prevalent theory of environmentalism.

VBN theory appears to be the best predictor of each form of public support. Post-materialism is not related to any form of support. Sacredness of nature has significant effects on consumer behavior (p(F) = 0.023) and environmental citizenship (p(F) = 0.004) but not on willingness to sacrifice (p(F) = 0.425). The variables representing Dake’s approach to cultural theory show mixed results — individualists and, strangely, egalitarians, are less likely to engage in environmental citizenship behaviors. As Table 3 shows, the full model, including explanatory variables from all six theoretical accounts of environmentalism, increases explanatory power (R^2) only 3 percent beyond that achieved by VBN theory for consumer behavior and willingness to sacrifice, and by 9 percent for environmental citizenship.

The data contain some support for our hypothesis that variability across dimensions of support reflects special characteristics of the dimensions and the capabilities and constraints affecting individuals. This is most clearly seen with environmental citizenship. This type of movement support is distinct from others in at least two ways: it implies acceptance of a definition of environmental problems as social, requiring collective action and change by government, industry, and other social institutions; and it is a more promising course of action for individuals who have the status, access, and human capital resources to be effective influence agents in large organizations or the political system. The evidence shows that environmental citizenship is in fact differentially a function of variables that reflect a social definition of environmental problems and of individuals’ access to resources for social influence.

Individuals’ resources for social influence are affected by their socioeconomic and social-structural positions. Our data set included information on each respondent’s age, educational attainment, household income, gender, and race, which we analyzed to examine consistency and variation across the types of environmental movement support. Holding the social-psychological variables constant, these demographic variables had no effect on consumer behavior (p(F) = 0.19) or policy support (p(F) = 0.19)^11 However, the demographic variables did have an effect on environmental citizenship (p(F)<0.001). Blacks were less likely to offer this type of movement support than whites (t = -2.22) but higher income was associated with increased environmental citizenship (t = 3.11), consistent with our hypothesis about resources for social influence. And once again participating in a demonstration emerges as a different mode of action —

Table 3. Comparison of variance explained by VBN theory, other theories and the full model

<table>
<thead>
<tr>
<th>Independent Variable</th>
<th>Consumer Behavior</th>
<th>Willingness to Sacrifice</th>
<th>Environmental Citizenship</th>
<th>Demonstrate</th>
<th>Personal Norm</th>
<th>Awareness of Consequences</th>
<th>New Ecological Paradigm</th>
</tr>
</thead>
<tbody>
<tr>
<td>Norm activation theory</td>
<td>0.176</td>
<td>0.316</td>
<td>0.223</td>
<td>0.006</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Other theories alone</td>
<td>0.094</td>
<td>0.199</td>
<td>0.187</td>
<td>0.048</td>
<td>0.304</td>
<td>0.223</td>
<td>0.250</td>
</tr>
<tr>
<td>VBN theory alone</td>
<td>0.194</td>
<td>0.346</td>
<td>0.302</td>
<td>0.042</td>
<td>0.560</td>
<td>0.477</td>
<td>0.264</td>
</tr>
<tr>
<td>Full Model</td>
<td>0.227</td>
<td>0.379</td>
<td>0.393</td>
<td>0.068</td>
<td>0.598</td>
<td>0.498</td>
<td>0.349</td>
</tr>
<tr>
<td>Full minus VBN</td>
<td>0.033</td>
<td>0.033</td>
<td>0.091</td>
<td>0.026</td>
<td>0.038</td>
<td>0.021</td>
<td>0.085</td>
</tr>
<tr>
<td>Full minus other theories</td>
<td>0.133</td>
<td>0.180</td>
<td>0.206</td>
<td>0.020</td>
<td>0.294</td>
<td>0.275</td>
<td>0.099</td>
</tr>
</tbody>
</table>
it is negatively related to household income (t = -2.53) and to age (t = -2.93).

**Discussion**

Our findings can be summarized as follows:

1. **Non-activist support for the environmental movement can be usefully divided into three dimensions:** consumer behavior, environmental citizenship, and policy support or acceptance. Seventeen behavioral measures collapsed into three factors that closely corresponded to these dimensions. Each type of support is associated with a distinct cluster of predictive variables, suggesting that support as a dispositional variable is insufficient to explain particular kinds of support.

2. **Personal proenvironmental norms — the belief that the individual and other social actors have an obligation to alleviate environmental problems—are the only social-psychological element common to all three types of non-activist environmentalism.** This finding is consistent with the interpretation that personal norms create a general predisposition to support movement goals.

3. **A value-belief-norm theory that postulates causal links among variables from three of the six theories in the published literature offers the best available theoretical account of all three types of non-activist environmentalism.** The VBN theory builds on the strong associations of personal norms with all these forms of environmentalism by adding an account of the social-psychological determination of acceptance of those norms. The VBN theory accounts for 19 percent of the variance in consumer behavior, 35 percent of the variance in willingness to sacrifice, 30 percent of the variance in environmental citizenship, 56 percent of the variance in personal norms, 48 percent of the variance in AC, and 26 percent of the variance in NEP. Adding variables from the other social-psychological theories of environmentalism increases the variance explained by relatively small amounts. The VBN theory as operationalized in this study is not a strong predictor of self-reported participation in demonstrations, accounting for only 4 percent of the variance.

4. **Other social-psychological theories may still provide useful insights into specific types of non-activist environmentalism, particularly environmental citizenship.** For instance, variables from cultural theory increase the ability to predict environmental citizenship by 7 percent. We presume that the added predictive value reflects the fact that cultural-theory variables reflect beliefs about how society should be ordered, and are thus more likely to affect public-sphere behavior than behavior in the private sphere. In addition, beliefs in the sacredness of nature add small but statistically significant amounts of predictive value for the consumer behavior and citizenship types of movement support. People who believe nature is sacred, whether for theistic reasons or not, are more likely to engage in proenvironmental consumer behavior; environmental citizenship behaviors, however, depend only on the belief that nature is sacred in itself. This finding suggests that different aspects of religious belief affect different types of environmentalism (similar results were reported by Dietz, Stern and Guagnano 1998, from the larger national sample of the 1993 General Social Survey).

5. **The study provides evidence that factors in the social context affect the ways environmentalism finds behavioral expression.** In particular, environmental citizenship behavior, but not other forms of non-activist environmentalism, is affected by broad beliefs about how society should be organized and by social-structural variables that reflect an individual’s access to resources to act as a social change agent (i.e., income and race). Further work is needed to understand how specific opportunities and constraints act, and also how life histories embedded in gender, race/ethnicity, and community may shape values and beliefs (Kalof et al. 1999).

6. **The kind of committed activism studied by most social movement researchers is distinct from the kinds of non-activist support we examine.** Our theory is consistent with the ideas of frame alignment and identity transformation in the social movement literature, but those experiences may depend on variables (e.g., identity) not measured in our survey.

The present data suggest that the VBN theory provides the best available social-psychological account of non-activist support for the goals of the environmental movement. In addition to providing a very strong empirical accounting for all three types of support, VBN theory is consistent with much social-psychological theory and data about the structure of values, beliefs, and attitudes.

An important conclusion from the present study is that research has progressed beyond the point where it makes sense to talk about the relationships of “environmental attitudes” and “proenvironmental behavior” in general terms. Knowledge about environmentalism will accumulate more easily if future research is explicit about which types of environmentalist behavior are being investigated and which social-psychological antecedents (sometimes loosely lumped together as “attitudes”) are being put forward as explanatory constructs. Research on support for other social movements may similarly benefit by distinguishing clearly among committed movement activism, non-activist citizenship behaviors, private-sphere behavior, and policy support. As with environmentalism, different social-psychological variables may be associated with each type of support.

VBN theory has heuristic value for future studies of environmentalism and other social movements. It offers a
classification of types of movement support and proposes both a detailed theory of non-activist support for social movements and a plausible and empirically supported conceptual framework for analyzing the determinants of particular types of support, such as citizenship behavior.

The theory of non-activist movement support posits that social movements are rooted in particular human values and implies that in mobilizing support, movement activists and organizations will highlight those values, threats to them (AC), and the ability of their targets to alleviate those threats by appropriate action (AR). This sort of mobilization strategy is apparent from cursory examination of fund-raising mailings by movement organizations, but it has not to our knowledge been subjected to systematic study. The mobilization strategies of different movements should be distinguishable by the values they emphasize and the things they define as threatening those values. Individuals’ susceptibility to mobilization will depend in part on their basic value priorities and their willingness to believe in the claimed threats. The theory also posits that different kinds of support can be elicited from movement supporters according to the beliefs they hold and the capabilities and constraints affecting them. The finding that social-structural position affects citizenship behavior but not other forms of non-activist movement support is worth examination in the context of other social movements.

The social-psychological theory presented here has the potential to link several research literatures. For instance, it suggests ways of connecting concepts of social movement mobilization with related literatures on the formation of public opinion and on attitude-behavior relationships. It points to the social-psychological roots of movement support in norm-activation processes, at the same time positing that particular types of movement support are affected by particular kinds of contextual variables, which may include economic, technological, and social-structural factors as direct influences on behavior or that may influence behavior indirectly by shaping the social psychology of movement support (Guagnano, Stern and Dietz, 1995; Gardner and Stern 1996).

Endnotes

1. Since Kalof was one of the coauthors of this paper, the review process from submission to decision was handled by the Managing Editor, Jonathan Taylor. Troy Abel is now at the Department of Political Science and the Environmental Science Program, Southern Illinois University, Edwardsville, Illinois 62026. This research was supported in part by the U.S. Environmental Protection Agency grant “The Social Psychology of Stated Preferences” and by National Science Foundation grants SES 9211591 and 9224036.

2. The policy system (Dietz and Rycroft 1987) is all those people and organizations who are actively engaged in trying to influence policy on the issues being contested. The environmental policy system in the United States includes movement organizations, government agencies, Congress, law and consulting firms, corporations and trade associations, and scholars working at think tanks and universities. Our approach applies to social movements that engage in struggles over policy. It may be less applicable to movements that do not attempt to achieve policy changes, such as spiritual or self-help movements, except as they might occasionally engage with the state. We also do not consider revolutionary movements that opt out of participation in the policy system in order to pull it down and substitute an alternative system.

3. We differ with those who suggest that the environmental movement, as a new social movement, is primarily about identity. The identity processes so well described in the literature on new social movements are certainly important in the development of movement activists. Indeed, some research indicates little mobility between environmental groups and other parts of the policy system (Dietz and Rycroft 1987), suggesting that environmental movement activists do maintain an identity distinct from that of general environmental professionals. But nearly every strain of the environmental movement actively engages with the policy system and is not content to confine itself to the politics of identity. We also differ with those who have characterized the environmental movement as a consensus movement (McCarthy and Wolfson 1992; Schwartz and Shuba 1992). Although environmentalism enjoys broad public support, it also faces strong and well-organized opposition. Even in communities affected by toxic contamination, where the geographic spread of the problem is narrow and the effects perceived are severe, there are nearly always powerful local opponents (Gould et al. 1996). And even a seemingly innocuous policy such as mandatory recycling faces systematic opposition.

4. Schwartz (1977, 231) distinguishes personal norms from social norms by noting “that the sanctions attached to personal norms are tied to the self-concept. Anticipation of or actual conformity to a self-expectation results in pride, enhanced self-esteem, security, or other favorable self-evaluations; violation or its anticipation produce guilt, self-deprecation, loss of self-esteem, or other negative self-evaluations.”

5. Our focus on values and expectations about future events suggests that we are proposing a value-expectancy theory of norms. However, our theory diverges from the rational calculation model associated with most value-expectancy theories. We do not presume that decisions are typically taken on the basis of a full consideration of all relevant values and outcomes. Rather, we believe that personal norms are activated by application of fairly simple rule: if I discern that one of my values is threatened and if I believe my actions can alleviate the threat, I am obligated by my value structure to act (Dietz and Stern 1995). The fact that the calculations do not involve a full consideration of all one’s values makes it possible for social movement organizations to influence decisions by directing individuals’ attention selectively, for example, by defining choices in terms of particular values or labeling certain events as threats to those values. This parallels the framing process used to understand committed activism. Of course, there are situations in which individuals carefully deliberate about how all consequences of alternative courses of action may affect all their values. Indeed, some recent suggestions in environ-
mental policy analysis call for collective deliberative processes as a way to prevent manipulation of public judgment (Dietz 1994; Dietz and Stern 1998).

6. Pichado (1997) has criticized the application of Inglehart’s theory to the new social movements.

7. A scale consisting of the three items concerning personal moral obligation has an alpha of 0.74 and yields highly similar results to the 9-item scale in regression analyses, except that it is a weaker predictor of environmental citizenship behaviors in this general public sample.

8. The consumer behavior scale is focused on household purchase behavior. Other environmentally significant private-sphere behavior, such as household waste disposal and maintenance of motor vehicles, may be shaped by different patterns of social-psychological variables, capabilities, and constraints.

9. In addition to bootstrapping we used a maximum likelihood factor analysis to examine the dimensions of public support for the environmental movement. A three factor solution produces chi-square = 116.3, df = 88, p = 0.02. A four factor solution produces chi-square of 87.35, df = 74 and p = 0.14. The only substantive difference between the two solutions is that in the latter, an item asking if the respondent had read any environmental group literature in the last 12 months loads alone on a factor. In the three factor solution, it loads with other environmental citizenship items.

10. We report results of OLS regressions for a 0-1 dichotomous variable because they are easier to compare with the results for other measures of movement support. While a logit model is more appropriate for a dependent variable representing a categorical choice, the OLS estimates are consistent and are not likely to mislead in a sample of this size.

11. Gender approaches statistical significance in the model of consumer behavior, with women more likely to engage in such behavior (t = 1.94).

References


Kalof, Linda, Thomas Dietz, Paul C. Stern and Gregory A. Guagnano. 1999. Race, Gender and Environmentalism: The atypical values and beliefs of white men. Unpublished manuscript, George Mason University, Department of Sociology and Anthropology, Fairfax, VA 22030.


Appendix 1: Scales

New Ecological Paradigm (NEP)
The so-called “ecological crisis” facing humankind has been greatly exaggerated. (R)
The earth is like a spaceship with limited room and resources.
If things continue on their present course, we will soon experience a major ecological catastrophe.
The balance of nature is strong enough to cope with the impacts of modern industrial nations. (R)
Humans are severely abusing the environment.

Values
Altruistic:
Social justice, correcting injustice, care for the weak
Preventing pollution, conserving natural resources
Equality, equal opportunity for all
Unity with nature, fitting into nature
A world of peace, free of war and conflict

Respecting the earth, harmony with other species
Protecting the environment, preserving nature

Traditional:
True friendship, close supportive friends
Loyal, faithful to my friends
Sense of belonging, feeling that others care about me
Obedient, dutiful, meeting obligations
Self-discipline, self-restraint, resistance to temptations
Family security, safety for loved ones
Honoring parents and elders, showing respect
Honest, genuine, sincere
Forgiving, willing to pardon others

Self-interest:
Social power, control over others, dominance
Influential, having an impact on people and events
Wealth, material possessions, money
Authority, the right to lead or command

Openness to change:
Curious, interested in everything, exploring
A varied life, filled with challenge, novelty and change
An exciting life, stimulating experiences

Cultural Biases
Hierarchy:
One of the problems with people today is that they challenge authority too often.
The best way to provide for future generations is to preserve our customs and heritage.

Egalitarianism:
What this world needs is a fairness revolution to make the distribution of goods more equal.
I support a tax shift so that the burden falls more heavily on corporations and persons with large incomes.

Individualism:
If people have the vision and ability to acquire property, they should be allowed to enjoy it.
Everyone should have an equal chance to succeed and fail without government interference.

Fatalism:
Co-operation with others rarely works.
It seems that no matter who you vote for in an election, things remain pretty much the same.

Awareness of Consequences (AC)
In general, do you think that climate change, which is sometimes called the greenhouse effect, will be a very serious problem for you and your family, somewhat of a problem for you and your family or won’t really be a problem for you and your family?
Do you think that climate change will be a very serious problem for the country as a whole, somewhat of a problem or won’t really be a problem for the country as a whole?

Do you think that climate change will be a very serious problem for other species of plants and animals, somewhat of a problem or won’t really be a problem for other species of plants and animals?

Next, I’d like you to consider the problem of loss of tropical forests. Do you think this will be a very serious problem for you and your family, somewhat of a problem or won’t really be a problem for you and your family?

Do you think that loss of tropical forests will be a very serious problem for the country as a whole, somewhat of a problem or won’t really be a problem for the country as a whole?

Do you think that loss of tropical forests will be a very serious problem for other species of plants and animals, somewhat of a problem or won’t really be a problem for other species of plants and animals?

Next, I’d like you to consider the problem of toxic substances in air, water and the soil. Do you think this will be a very serious problem for you and your family, somewhat of a problem or won’t really be a problem for you and your family?

Do you think that toxic substances in air, water and the soil will be a very serious problem for the country as a whole, somewhat of a problem or won’t really be a problem for the country as a whole?

Do you think that toxic substances in air, water and the soil will be a very serious problem for other species of plants and animals, somewhat of a problem or won’t really be a problem for other species of plants and animals?

**Personal Normative Beliefs**

The government should take stronger action to clean up toxic substances in the environment.

I feel a personal obligation to do whatever I can to prevent climate change.

I feel a sense of personal obligation to take action to stop the disposal of toxic substances in the air, water, and soil.

Business and industry should reduce their emissions to help prevent climate change.

The government should exert pressure internationally to preserve the tropical forests.

The government should take strong action to reduce emissions and prevent global climate change.

Companies that import products from the tropics have a responsibility to prevent destruction of the forests in those countries.

People like me should do whatever we can to prevent the loss of tropical forests.

The chemical industry should clean up the toxic waste products it has emitted into the environment.

**Consumer Behavior**

How often do you make a special effort to buy fruits and vegetables grown without pesticides or chemicals; also known as organic fruits and vegetables?

How often do you make a special effort to buy paper and plastic products that are made from recycled materials?

How often do you avoid buying products from a company that you know may be harming the environment?

How often do you make a special effort to buy household chemicals such as detergent and cleaning solutions that are environmentally friendly?

**Willingness to Sacrifice**

I would be willing to pay much higher taxes in order to protect the environment.

I would be willing to accept cuts in my standard of living to protect the environment.

I would be willing to pay much higher prices in order to protect the environment.

**Environmental Citizenship**

Are you a member of any group whose main aim is to preserve or protect the environment?

In the last twelve months, have you read any newsletters, magazines or other publications written by environmental groups?

Signed a petition in support of protecting the environment?

Given money to an environmental group?

Written a letter or called your member of Congress or another government official to support strong environmental protection?

Boycotted or avoided buying the products of a company because you felt that company was harming the environment?

Voted for a candidate in an election at least in part because he or she was in favor of strong environmental protection?
Some people feel the environmental movement does a great deal of good and strongly support it, others feel the environmental movement does more harm than good and strongly oppose it. Where do you stand? Do you strongly support, somewhat support, somewhat oppose or strongly oppose the environmental movement.**

Notes: All scales scored so that high scores indicate strong endorsement of the concept. (R) indicates an attitude item that was reversed in creating scales. Unless otherwise noted, response categories were: Strongly agree, Somewhat agree, Somewhat disagree, Strongly disagree. *—Response categories were: Always, Often, Sometimes, Never. +—Response categories were: Yes, No. **—Scores were rescaled to 0, 0.33, 0.67 and 1 to match the 0-1 scoring of other items in the scale.
“Energy, Agriculture, Patriarchy and Ecocide” by Thomas Lough is radical human ecology. It is radical in the sense that it is provocative, disquieting, and likely to raise the hackles of some readers. It is also radical in the deeper sense that it is an analysis of root causes of ecological problems and inequality. It is an important contribution because it examines both power and energy — both social forces and ecological processes. Nearly every reader will find something with which they disagree. But I submit that in understanding why you disagree with Lough, either in detail or overall, you will be prompted to think carefully about your own assumptions and the deductions you make about the character of the modern world and our history. This is the kind of thinking a Human Ecology Review Forum is intended to provoke.

Lough is a pioneer in human ecology and environmental sociology. Some of the ideas presented here he first began to explore three decades ago, when very few sociologists were thinking about the environment. In the late 1960s, Kent State University was an incubator for human ecology. Lough, along with Owen Lovejoy, Bud Shane and Gene Wenninger, worked from the perspective of sociology and anthropology. Their work was aided by engagement with an active environmental movement and by colleagues in ecology who were able to cross disciplinary lines. Past-SHE president Richard Borden was completing a Ph.D. in the Psychology Department. I was an undergraduate pursuing a self-created interdisciplinary major. Many other students were doing work in what would come to be called environmental science. Unfortunately, the killings at Kent State in May 1970 and the punitive reaction of the state government crippled many intellectual endeavors at the university, and what might have been a vibrant garden of human ecological work never blossomed. But many of us continue to be inspired by those early insights and efforts at cross-disciplinary synthesis. This paper is the result of Lough’s ongoing struggle with difficult problems.

Three distinguished thinkers offer commentary on Lough’s analysis. The exchange of ideas and criticisms is enlightening and stimulating. As editor of the Forum, I have edited the contributions, hoping to preserve the character of the arguments while shortening the texts to fit within a resource constraint — the number of pages available. In particular, readers should note that Lough’s original essay offers much more detailed arguments and many examples that could not be included here.
Energy, Agriculture, Patriarchy and Ecocide

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Introduction

This essay is an explanation of how our EuroAmerican civilization has become so effectively ecocidal. This is not a call to arms; this is not a “how to stop it.” I not only do not presume to know what is to be done, I believe that our problems stem from EuroAmerican men assuming they know what is best, for others and for the planet. Most of us have been egregiously misinformed and uninformed by our mass media, including our institutions of higher learning, about the inefficiency and destructiveness of past and present agricultural food production systems; about the privatization of land and women, especially during the last five centuries; about the human costs of civilizations, including our own; and about the principal human societies in the world today. Deconstructing these areas of misinformation and disinformation explain much about our current ecological crises.

Ten thousand years ago the earth was all common land, neither public nor private, and although human and other groups asserted territoriality, misuse of common land was surely apparent because those who misused it perished or moved on. The eight million humans at that time lived in thousands of small societies with as many distinctive ways of living on the earth, for centuries and millennia. These hundreds of thousands of societies, some of which still exist today, had in common that they adopted the most efficient form of food procurement possible: They let nature grow it out of the store through a checkout line. They may have to wait until certain of their favorite foods are in season, but they know which aisle they will be in.

Presently 6,000 million humans inhabit the earth, and patriarchal multinations and the government bureaucracies and militaries of 190 “countries” assert sovereignty over the world’s 3,000 to 5,000 nations and peoples, all of the continents, 40 percent of the oceans, and even the lower reaches of space (Nietzsche 1987, 1,3). They dispute all claims of common land. Based in the northern industrialized countries of the planet, these organizations have been and continue to destroy our life-support systems. They control almost all the forces of organized violence in the world. They also control technologies, equipment, and payrolls. According to the World Bank, international financial institutions have resources of $14 trillion, about the same as the total GNPs of the world. Governments have no control over their economies when capital of this magnitude can enter and leave at will.

These patriarchies also control most of the education systems and other mass media through which they promote mass destruction. These efforts are legitimated by using such labels as “development,” “jobs,” “national security,” “nuclear power,” “nation building,” “social progress,” “border security,” “eradicating drugs and drug traffic,” “terrorists,” “tribals,” “insurgents,” and “exploding populations.” To make matters even worse, the worldwide “population explosion” is almost entirely a consequence of patriarchal societies within which men exercise and promote their traditional and legal rights to torment, impregnate, abandon and/or murder women. Sex and reproduction are not under women’s control.

Patriarchal militaries, multinations, and governments have acquired unprecedented power and pay at least 100 million of their employees to do the hands-on work of destroying and poisoning the earth’s habitat — logging, bombing, spraying, incinerating, extracting, burying, dumping, and so on. Those involved in the hands-on destruction of our life support systems do their jobs more completely and effectively by using machines powered by the extraordinary energy subsidies embedded in fossil fuels, and by creating, using and broadcasting substances against which the natural world has no defense. They do it for money. And they really do need the money because nearly all the commons of the earth have been privately appropriated. Billions of people are desperate to do anything for money because they cannot survive without it. And the militaries, multinations, and governments are the sole purveyors of money.

The dominant ideology of the planetary rulers is bad enough: megalomaniacal, materialistic greed. But the more ominous danger these powerful men pose is their alienation from the real, living world. They are utterly divorced from reality. They do not care about or understand the life-threatening implications of their enterprises. So what we have is millions of people destroying our life support systems in the service of extremely powerful international organizations.
What Happened? An Alternative Way of Understanding Agriculture and Other Forms of Food Procurement

A History of Agriculture

People began to domesticate plants and animals about 10,000 years ago, and today sedentary agriculturally based societies are almost universal. Horticulture, agriculture, fishing, and tending livestock take somewhat more work than gathering and hunting, but cultivating and fishing societies have more apparent control over their future food needs once they learn to store surplus food. Agriculture is the cultivation of single crops through plowing, as compared with horticulture, where many crops are cultivated with hoes and digging sticks. Agriculture involves replacing some area of a natural habitat with an artificial one. Agriculture therefore always means the destruction of habitat.

Studies of skeletons found at dozens of sites on all continents of the eastern and western hemispheres allow comparisons of pre- and post-agricultural well being. A general decline in well-being with the adoption of agriculture was evidenced by a precipitous decline in height — 5 to 6 inches less than their gatherer-hunter ancestors in ancient Greece and Turkey, a decline from which modern Greeks and Turks have yet to recover (Angel 1984, Table 3). Cohen and Armelagos say that studies “suggest fairly consistently that the adoption of farming was accompanied by a decline in the overall quality of nutrition” (1984, 587). Diamond (1987) put it more bluntly: agriculture was “the worst mistake in the history of the human race.”

Agriculture brought both ruling classes and the subjugation of women. Royal skeletons in Greek tombs are two to three inches taller than those of commoners, and have better teeth (Angel 1984, 66); royal Chilean mummies are taller and have a far lower rate of bone lesions caused by disease (Allison 1984, 525-527). Similarly, women suffered from diet deficiencies as evidenced by smaller skeletons and having more bone lesions from infectious disease than men, and more frequent pregnancies than their subsistence foremothers (Allison 1984; Angel 1984; Dickel et al. 1984; Larsen 1984; Smith et al. 1984).

Why does the adoption of agriculture result in socioeconomic inequality, patriarchy, malnutrition, and a decline in well being? The answer seems to follow from the fact that agriculture is inherently inefficient: clearing land, plowing, sowing, fertilizing, weeding, harvesting, storing and distributing single crops takes organization, which means hierarchy. Furthermore, distributing food surpluses invites the distributors to assume political and religious power, and to accumulate wealth and privilege (Lenski 1966; Boulding 1992, vol. 2, 299). At the same time, the practice of stratification leads to power discrepancies between men and women (Holter 1970; Tinker 1990). And agriculture leads to an emphasis on women producing and caring for more children (Kolata 1974; Collier and Rosaldo 1981; Leacock 1987). Getting people to do all this extra work takes coercion: slavery, wage slavery, and/or religious-political socialization and ideological hegemony. Agriculture, patriarchy, and population growth are closely related. To begin to see these linkages we need to understand energy efficiency in relation to food procurement.

Energy Efficiency of Food Procurement: The Principle of Least Effort

Planet Earth is solar-powered, and life on our planet has evolved to take full advantage of that. The First Law of Thermodynamics, that energy cannot be created or destroyed, puts all living creatures on notice to depend fundamentally on the sun’s energy, which is unimaginably bountiful. Although in an unconcentrated form, the total amount of solar energy that continually falls on the United States is 10,000 times greater than the fossil fuel energy we now use (Wayne et al. 1986, 290).

The living world operates on the “principle of least effort” (Maupertuis 1750; Jeans 1905; Zipf 1949). Absent civilized control, no plants or animals work more than is necessary in order to live, reproduce, nourish their offspring, and maintain their own structures and the structures of their colonies. Given the enormous energy subsidy of the sun, the principle of least effort dictates that each organism maximizes energy efficiency by obtaining as much energy as it can while expending as little energy as it can. Efficiency is the ratio of work output to work input, which is the same as the ratio of energy output to energy input during a given period of time. Plants and animals, including subsistence human societies with little hierarchy, have adopted the most efficient method of food production possible: They let nature grow food and store it until they eat it.

Lee and DeVore (1968) and Sahlins (1968, 1972) documented that producing members of subsistence societies put in about two to three hours each day procuring and preparing food, thus exemplifying the Principle of Least Effort. In my physiological model of food procurement strategies (Lough 1995b) I showed that the least effort spent in procuring food leads to the preservation of habitat. In contrast, the average producing adult in the market economy works 12-15 hours per day if unpaid women’s labor is included.

Any colony or species that practices a food procurement technique that requires more work than is necessary, more work than it takes to go and eat the food that nature has grown and stored, is put at a disadvantage relative to other colonies and species that work less to obtain the same food energy. Nature automatically penalizes energy inefficiency.
by reducing the energy return on energy invested (EROI). When the denominator (work done by the individual or colony) goes up, the efficiency goes down, and there is less energy available to the individual or species that works more than it needs to.

This doesn’t mean that in the short-term a relatively low energy efficiency will be fatal for a species, society, or individual. Sedentary horticultural societies have “mixed” procurement strategies that sacrifice short-term efficiency in order to lay aside food and other supplies to carry them through droughts, floods, winters, and unforeseen variations in the environment. Over time, these calculated expenditures of effort keep their energy efficiencies high enough to stay afloat amongst others that maximize efficiency in the short-term. Also, diversity in any particular time and place involves inefficiency for some species and colonies in the short run. But as we will see, the overall efficiency of any species or society on earth, all of which are solar-powered in the long-term, cannot fall below the level needed to maintain their structures over time.

**Energy Efficiency of Agriculture**

*Agriculture as a non-sustainable land use.* Agriculture involves the destruction of habitat, replacing it with an artificial environment in which single crops are cultivated, typically through the use of plows, draft animals, and machines. Here is an example of the conventional wisdom about agriculture:

> The use of [the plow] greatly improves the productivity of the land; it brings to the surface nutrients that have sunk out of reach of the roots of plants, and it returns weeds to the soil to act as fertilizers. The same land can be cultivated almost continuously, and fully permanent settlements become possible (Robertson 1987, 105).

All of this is incorrect. Cultivation and plowing oxidizes the reserves of organic matter in the soil and the balance of fertility is soon destroyed as they are carried away by wind and water runoff (Shiva 1989, 107). And just as in the case of industrialized agriculture, bringing nutrients to the surface by deep plowing amounts to an energy subsidy that the roots of the plants do not have to provide for themselves, and thus the plants become dependent on continual inputs of such energy in order to survive. The same is true for irrigation and the application of artificial pesticides and herbicides.

As for returning weeds to the soil, the subsistence farmer has a different conception of “weeds.” Of course there are plants that the gardener has no use for, and these may be composted. But what for the agricultural monocropper is “weeding” is instead a process of sorting for the gardener: varieties of deliberately intermixed and “volunteer” plants are sorted into those that are edible, those that are medicinal, those that are herbs and spices, those that keep pests and unwanted plants away, and so on.

Agriculture has never been as energy-efficient as subsistence gathering and gardening. Agriculture results in more food per person per unit of time, but only because a disproportionate amount of energy is exerted by the agricultural work force. Nor is the product as nutritious (Cohen and Armelagos 1984; Diamond 1987).

Modern high-yield agriculture is particularly disastrous. The so-called Green Revolution is nothing of the sort. It is wasteful of fossil energy and other nonrenewable resources (Pimentel 1991, 1992a). It threatens diversity because it involves monocropping and replacement of indigenous species (Paolelli et al. 1992). It is degrading the environment because it depends on polluting pesticides, fertilizers, machinery, and relatively large inputs of water (Pimentel 1992b). It has failed to benefit those who cannot pay for it (Editors of The Ecologist 1992; George 1977, 1979, 1984).

And as Pimentel (1992b) has pointed out, topsoil, like water, is being mined.13 Topsoil is being depleted at a rate 16 times the rate of reformation, and this is due in large part to the agribusiness research industry, which focuses its efforts on marketable annuals that require pesticides, herbicides and financial assistance from banks every year, rather than hardy perennials that would require none of the above and require no tillage for years. Those who care for the vineyards of France and Germany are proud to point out that they have not replowed or replanted some of their vines for twelve centuries.

Charles A. S. Hall has summarized the shortcomings of high-yield plants from the standpoint of energy efficiency (1990, 103-104). He notes that modern agricultural technology provides energy subsidies that allow domesticated varieties to channel all of their production to the desired product. Thus the net yield of the marketable product is higher, but not the gross production. When farm products are treated with artificial supports, like tractors that dig up the ground, and irrigation systems that bring the water to the plant, and pesticides that make it so the plant doesn’t have to defend itself, and fertilizers that mean the plant doesn’t have to capture nutrients, it’s as if the farm products were made of petroleum. The proportion of the plant’s energy that it devotes to the part we use is increased, but the plant cannot make it on it’s own, and won’t be there when we run out of these artificial subsidies. Further, not one step in this process is free; from seed to supermarket, food becomes available only through the market.
Energy Efficiencies of Food Procurement Strategies

Table 1 shows the energy efficiencies of various food procurement strategies — that is, the food energy return on the energy spent on getting the food. As noted in the table, according to my calculations, gathering societies of the past, today called subsistence societies, have had energy efficiencies of about 12.4 (Lough 1995b). That is, for every Calorie of energy that producing members of a subsistence society exert, the habitat yields 12.4 Calories in return. This is consistent with the now-classic findings of Steinhart and Steinhart (1974), who showed that preagricultural and milpa (swidden, slash-and-burn) agricultural societies realized energy efficiencies between 50-to-1 and 20-to-1.

The Steinharts found that for coastal fishing and grass-fed cows, the energy return equals the energy expended, which comes nowhere near even providing the food procurers with the energy needed to maintain their structures. There is a net loss for feedlot beef (15 Calories in for 1 out) and distant fishing (a 12-to-1 loss). Their estimate for the U. S. food system as a whole around the early 1970s was an inefficiency of about 9 Calories in for each 1 out.14 Based on energy analysis (Hannon et al. 1985; Lough 1995a) the energy efficiencies of the food sectors of the U.S. economy in 1977 was 16% (that is, about 6 Calories in for 1 out), and a lowly 10% for the feed and grain sector, which provides food for feedlot animals that have not yet become food.15

The averages and rounded figures used in this example obscure the fact that the human animal is uniquely energy efficient, ranging from an energy efficiency of perhaps 12% even in the case of a sedentary college professor, to 56% in the case of the lumberjack.18 In contrast, the efficiency of the horse “scarcely rises above ten percent and that of the ox is still lower” (Debeir et al. 1986/1991, 4). Thus, from an energy efficiency standpoint, a human work force is far more efficient, ranging from a general rule, stable subsistence and other societies have a ratio of producing to non-producing individuals of about two-to-three (Sahlins 1972, 21, citing Lee 1969, 67; Cohen 1977, 27-40). This means that on average, every five persons have available only 1,250 to 2,000 Calories of energy from the two productive adults in order to produce the total of 12,500 Calories the five will need, assuming that each needs 2,500.17

Continuing this numerical example, if every five people need 12,500 Calories of food every day (a figure commonly used by the World Health Organization and the Food and Agriculture Organization), and have only 1,250 to 2,000 Calories available to obtain that food energy, the food procurement strategy must be at least 625 to 1,000 percent efficient. Then in order to provide for people of leisure, or leisure for people, a society needs a food procurement strategy similar to that of subsistence gardeners and gatherers, which I estimated to be about 1,200 percent — 12 Calories out for 1 out (Lough 1995b). Undisturbed forest peoples, if any survive, are probably still realizing robust efficiencies of 1,500 percent or more by working very little.

In order to meet the requirements of the Second Law of Thermodynamics, human beings need to take in about 3 to 6 times as much food energy as they spend in activities of all kinds, including getting and eating food. This is another way of saying that we use between 60 and 75 percent of our food energy maintaining our bodily structures (McArdle et al. 1991, Ch. 9). That is, a person who consumes 2,500 Calories of food in a day will use 1,500 to 1,875 of them maintaining structure and function for homeostasis (steady state).16 Only 625 to 1,000 Calories are available for work and leisure. As a general rule, stable subsistence and other societies have a ratio of producing to non-producing individuals of about two-to-three (Sahlins 1972, 21, citing Lee 1969, 67; Cohen 1977, 27-40). This means that on average, every five persons have available only 1,250 to 2,000 Calories of energy from the two productive adults in order to produce the total of 12,500 Calories the five will need, assuming that each needs 2,500.17

Physiology and Food

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cal conversion, is the most efficient form of renewable energy conversion system. As was shown in Siberia and the Nazi slave labor camps, slavery is the energy of last resort when non-renewable energy systems are not available.

Agriculture and the Destruction of Habitat

How have human civilizations, all agriculturally based, managed to survive using non-sustainable food procurement strategies? By using up habitat. We’ve gotten along for thousands of years using non-sustainable agriculture (sustainable agriculture is small-scale gardening or milpa agriculture) because there was so much habitat to begin with, and relatively few people. At the origins of agriculture there were about 8 million people and 46 million square kilometers of forest; now there are 6,000 million people and 6 million square kilometers of forest (Matthews 1983). Agriculturally based human civilizations also got by for millennia using energy inputs from humans, the maximum energy efficiency of which are about 50 percent, and draft animals, the maximum energy efficiency of which is about 10 percent. In a subsistence society, the food energy the human or the draft animal eats comes from plants and animals in their habitat; and in order to make up for the energy deficit — at least 50 percent for the human, and 90 percent for the horse or ox — the food procurement technique must have an energy efficiency of 200 percent in the case of the human and 1000 percent in the case of the draft animal. (As we have just seen, a human society requires an energy efficiency of about 1,200 percent. The 200 percent would apply to an individual, probably a slave.) But if the food procurement strategy is inefficient, which translates into requiring more work energy than necessary, the habitat does not renew itself as fast as it is used; it is thereby destroyed or degraded. Put another way, when too many people need to eat too much to get enough food to feed themselves, or others, they are forced to eat up their habitat (Chase-Dunn and Hall 1994).

The food energy that was (and is) absolutely necessary to power humans and draft animals had to have been at least 1,000 percent, and that energy had to have come from habitat for a long time. Coal, the first fossil fuel used to power our present civilization, was not used as an energy source until the eighteenth century (Debier et al. 1986/1991, Ch. 5). Current agro-industrial food production technologies, as noted above, achieve energy efficiencies of less than 10 percent. (Comparing the United States with other societies on the basis of its efficiency in producing food, the U.S. has achieved an all-time low — less than 2 percent.) That these technologies produce any food at all is due to massive inputs of fossil and nuclear energy. But this cannot continue much longer; the world’s petroleum is expected to be exhausted within about 45 years (British Petroleum 1993, 2).

Now let’s look at an uncommonly understood explanation of how agricultural societies and civilizations have gotten us into this endless war between humans and habitat. Just as we deconstructed agriculture, we now need to deconstruct agricultural societies, and then the civilizations that developed from them.

A Deconstruction of Agricultural Societies

Large-scale agriculture is a relatively inefficient way of obtaining food, compared with horticulture, fishing, and/or gathering. Being relatively inefficient means it takes more work to produce a given amount of food, and even more work to produce a surplus of food. So in order to practice agriculture, and certainly to produce food surpluses from this inefficient procedure, human energy had to be captured and organized to do the extra work.

Basically, more human energy comes in two forms: individual humans working longer and harder, and/or more humans working. In either case the humans must be persuaded to do more work than is necessary; and historically, the only conditions under which humans work harder than necessary are when they are pushed to do so by coercion, greed, and/or ideology (Tilgher 1929/1958; Lough 1987, Ch. 7). When the strategy is to increase the number of humans in the work force, it is necessary to capture slaves and/or effect an increase in fertility of women already caught within the system. Both of these strategies involve coercion.

According to Maria Mies’ analysis (1986, Ch. 2), pastoralist nomad societies played a significant role in the development of patriarchal societies. Following Fisher (1979) Mies suggests that pastoralist men discovered that their flocks and herds could be increased by breeding the animals — a new mode of production — and then used similar practices in domesticating and breeding women in their own societies. The pastoralists also invaded agricultural communities to appropriate women to breed children. Thus were women and females of other species subjected to sexual coercion, based on breeding, with the object of increasing the sizes of herds, families, and labor forces. There is no inconsistency between Mies’ analysis and that presented here. Insofar as pastoralists increased productivity at the expense of habitat, and privatized women within patriarchies, both processes would result in similar outcomes over time, and would be mutually supportive.

There have been both gathering (sometimes called foraging) and agricultural societies that produced surpluses of food that were shared equitably (Leacock 1977, 1987). But the surplus generating societies we know most about, the great civilizations, produced other surpluses as well — material surpluses in the form of implements, ornaments, roads, temples, and so on. These surpluses are the “works” and the
wealth of a society, and when they reach a certain quantity and quality we call the society a civilization.19

The combination of the need for more people to do the work, the hierarchy to organize and make people work, and the surpluses generated as the wealth of the ruling classes, create and reinforce patriarchy. The need for more workers to till the fields and staff the hierarchy becomes a demand on women to produce more children than is necessary for replacement. The accumulation of wealth (surplus) by the ruling classes means that the paternity of women’s babies has to be controlled in order to keep the wealth within the ruling classes, through inheritance. Therefore, women need to be privately owned. This requires patriarchal monogamy.

What Happened? An Alternative Understanding of Civilizations

Deconstructing Civilizations: Hierarchies, Work, and Power

Civilizations always sacrifice energy efficiency for power. A civilization is a hierarchy of power within which human and other sources of energy are organized so as to work longer and harder than they would in the absence of the hierarchy.20 In accordance with the Second Law of Thermodynamics (every organism must continually capture energy in order to maintain its structure), people within a civilization must work to maintain the hierarchy and sustain those who toil within it.

Social power can easily be translated into the amount of work (expenditure of energy) that one or more individuals or groups cause to be done in a period of time. Appropriately processed, a source of energy can be mobilized to serve the purposes of the system that “has” them. Note that the process of mobilizing energy involves the expenditure of energy — that is, the use of power. Clearly, the use of fossil and other nonrenewable sources of energy increases enormously the power of those who direct the activities of those in subordinate positions in the power structure. As Gever et al. put it, “The primary function of people in an industrial economy is to control and direct fossil fuel energy, or to manage other people who do” (1986, 17).

People within a hierarchical system of power we call a civilization must also work to produce and maintain the “works” of the civilization. A civilization is known by its works, and these works are the wealth of those in power. Those who can be converted by slavery, coercion and/or socialization (or inspiration) into comprising work forces, which Lewis Mumford named megamachines (1966), create the works of the civilization, including pyramids, irrigation systems, temples, roads, war, automobiles, and government and financial bureaucracies, as well as works of art, literature and science.21

Thus hierarchies generate work, and in so doing, sacrifice efficiency. Efficiency and hierarchical power are inversely related: the greater the hierarchy, the more work is done, and the less the efficiency. Lough (1995a) showed that even in the case of industrial organizations, larger organizations are less energy efficient than smaller organizations, as measured in Btu per employee-year.22 Harris (1979) and Ponting (1991b) point out repeatedly that with the growth of hierarchies, more and more work is required to provide more wealth and food for all involved. Many of us have been misled to confuse the considerable accomplishments of civilizations — their works — with efficiency.

It is commonly argued that if a fair and just access to valued resources could be realized for the peoples of the world (especially for women), many of the planet’s miseries would be ameliorated. As I noted earlier, I will not presume to offer solutions to our predicament. But I do note that the thousands of societies on earth have many different definitions of resources and their needs for them, and the technological enterprises now in place act quite independently of people’s needs and claims on resources.

Also, many are loathe to fault hierarchies themselves. Don’t plants, animals, and subsistence societies have divisions of labor and organizations? Yes, but not on scales that warrant the name hierarchy. Stephen Jay Gould points out that Nature has bushes, not ladders. The metaphor can as easily be applied to human societies; subsistence societies often develop minimal hierarchies (Leacock 1987 and her references, Note 8, 35-36).

Civilizations Destroy Habitat

Civilizations have been destroying the living systems of the earth for at least 5,000 years. Civilizations destroy habitat because the inefficiency of agriculture requires ever-expanding work forces to produce surplus food, which means converting ever-increasing areas of habitat into farmland. Further the material works of civilizations (roads, temples, automobiles, nuclear power plants, ships, etc.) are manufactured from materials extracted from habitat in quantities not sustainable over time (Debier et al. 1986/1991).

Converting humans into work forces always involves environmental degradation because the humans are withdrawn from the practices that have sustained their societies for centuries and put to work on projects devised by people who are separated from the real world. The environment is thereby degraded because those who produce food are required to take more from the environment in order to feed those doing unproductive work, as well as themselves and their traditional dependents, i.e., children, elders, the infirm.
Furthermore, the specific projects to which work forces are committed involve the destruction of the life support systems directly, not only through logging, clearing, damming and irrigating for monocropping; but also war and preparation for war, extermination or assimilation of indigenous peoples, and the extraction and processing of materials, to name a few (Bunker 1985; Debier et al. 1986/1991; Mander 1991; Shiva 1989). Habitat is also destroyed indirectly, through the manufacture, distribution, consumption, and “disposal” of all that is produced by the civilization. Sometimes the destruction of habitat occurs in the present, as when a forest is logged or cleared, or an indigenous nation is assimilated and its people educated. Other times a process is set in motion that will destroy habitat for hundreds of thousands of years, as in the case of the by-products of the nuclear industry.

Civilizations’ Rulers are Alienated from Life Support Systems

Because the rulers of civilizations are exempted from providing for their own necessities (food, water, air, and shelter) they are divorced and alienated from what is involved in living on the earth (Mainardi 1970, 451). The rulers are also alienated from humanity, both from those below them (particularly women) and those not part of “their” society. All but themselves are excluded from their universe of obligation (Gamson 1994). In fact, as Barstow (1994) and Millett (1994) have shown, the powerful demonstrate and exercise their power through cruelty. “Torture is practiced now on a scale the world has never seen before, diminishing even the centuries of the Inquisition” (Millett 1994, 15).

Ungrounded in the living world, and even in their own society, the rulers of civilizations usually do not stop at simply having the majority do their necessary work for them. Instead of doing nothing but rule, which is all they have to do once their survival needs are met by others, these ruling minorities often continue to act out their fantasies, and sometimes get majorities to do enormous amounts of additional work, such as fighting wars, building pyramids, castles, dams, railroads, and so on. So these fantasies end up as the accumulations of beliefs and artifacts called civilizations. Important among these belief systems are civilized ideologies and religions, the fantasies of the rulers that justify their rules.

Often the rulers of recent civilizations failed to maintain the works of their own civilizations, preferring instead to extend their empires or to proliferate their “works.” This failure to provide for the maintenance of the structure of a civilization is contributing greatly to the disintegration in the backwashes of the technological society. The rulers of EuroAmerican civilization have built and laid to waste a surplus of product so vast and deadly that the human labor force, even if it could be mobilized to do so, has not nearly the time or energy to take care of it.

What Happened? The Violent Privatization of Women

Wherever and whenever gender-egalitarian societies have occurred, women have not only shared power and status with men, but in the sexual division of labor (apparently a feature of human societies), women have usually been primary providers of food; and primary decision-makers on when and where to forage (gather); when, where, and what to cultivate; and when and where to provide and care for children. Women as well as men hunt and care for animals, and often when men are primarily the hunters, women have decided when, and where, and what was to be hunted.

Privatization of Women

Some egalitarian societies have survived for centuries (Leacock 1977, 1987), but most have become extinguished or rendered patriarchal. When societies become sedentary, destroy habitat, and replace it with agriculture, men take over and women do 70-80 percent of the work (Boserup 1965, 1970, 1983, 1990a, 1990b; Tinker 1990). Women ensnared in patriarchal societies have not only been the providers of the ever-increasing populations needed to supply the ever-increasing demand for labor; women have at the same time cared and provided for the children they bore, the men in their families and communities, and labored to produce the surplus goods and services that stratified societies demand. In general, women have also been made available for sex, both for procreation and for pleasure.

In the process of destroying habitat and subordinating women, women’s prior knowledge of subsistence, nutrition, and healing in particular habitats was also lost, even as they were often reduced to slaves and sexual chattel in order to perpetuate inequalities of gender, wealth, and privilege. Put more plainly, women had to be “privatized” in order to make it customary and legal to invade, control, and exploit them, for profit and pleasure (Mies 1986, esp. Ch. 2).

Women bear and care for children; women heal and educate; women care about the future their children will experience. Women also abhor violence. With few exceptions, women have not waged war, and the issue that now unites all women of the world is that of ending violence against women, almost all of which involves rape. Yet there is no English word to describe a society whose members hold women’s values of life, caring, and healing. Maria Mies introduced the word “matristic” to refer to such societies:
Most of the early gathering and present subsistence societies (that have escaped the ravages of missionaries, state militia, and developers) are thus matristic, although matristic must be a matter of degree. Gender egalitarian societies, accounts of which are cited above, have generally been matristic.

Four consequences of the subordination of women have been: (1) elimination of their vernacular knowledge, skills, and relationships that enabled their communities to sustain themselves in particular habitats over time (Boserup 1970; Shiva 1989, 1994; Editors of The Ecologist 1992; Tinker 1990); (2) reducing women’s influence over preserving their environments; (3) reducing women’s control over the number and spacing of children they bear and care for (Kolata 1974; Collier and Rosaldo 1981; Editors of The Ecologist 1992; Leacock 1987, 29-32; Sachs 1994); and (4) the nearly universal practice of violence against women.

The violence visited against women has been used so as to render them submissive and seize their property. This has perhaps been more often discussed than the other topics with which I deal. In the next section I offer a brief account of the witchburnings that occurred primarily in Europe between the fifteenth and eighteenth centuries that can serve as an example of the process of violent coercion.

The Witchburnings

The patriarchal monotheisms “emerged” over the last thousand years and now claim as adherents half the world’s population. During the thirteenth century the Roman Catholic church invented the Inquisition to exert power over the French aristocracy. The torture and murder of heretics, however, was such a successful political tool that the practice spread throughout Europe. Pope Innocent VIII pronounced a Papal Bull against the newly discovered crime of witchcraft, which he said was an organized conspiracy of the Devil’s army. In 1486 two Dominican monks, Heinrich Kramer and Jakob Sprenger, published Malleus Maleficarum: The Hammer of Witches, which became the official handbook of the witch-hunters, translated into many languages and enjoying a dozen reprintings. Thus was launched a war against women as a diversionary tactic to keep the Christian papacy in power through sheer terror. The Protestant clergy also joined in.

European societies were experiencing unprecedented turmoil during these centuries, beginning with bankruptcies caused by the Crusades (eleventh, twelfth, thirteenth centuries) and the Hundred Years War (between England and France, 1337-1453). The Black Death killed an estimated one-fourth to one-third of the population of Europe in the fourteenth century, and capitalism was in its early stages. Scapegoats were needed, and women became an obvious and seemingly limitless source.

Estimates vary on the number of people accused and the number convicted and tortured to death (Daly 1990; Karlsen 1989; Merchant 1990; Mies 1986; Sjöö and Mor 1991). Barstow (1994) puts the number of accused at 200,000 over two centuries, and the number tortured to death at 100,000. Harris (1974) says 500,000. Ehrenreich and English (1978, 35) give some sense of the extent of the terror:

One writer has estimate the number of executions at an average of six hundred a year for certain German cities — or two a day, “leaving out Sundays.” Nine hundred witches were destroyed in a single year in the Würzburg area, and a thousand in and around Como. At Toulouse, four hundred were put to death in a day. In the Bishopric of Trier, in 1585, two villages were left with only one female inhabitant each. Many writers have estimated the total number killed to have been in the millions. Women made up some 85 per cent of those executed — old women, young women, children.

Historian Gerhard Schormann claims that the killing of witches was “the largest mass killing of human beings by other human beings, not caused by warfare” (Der Spiegel, No. 43, 1984, cited in Mies 1986, 110).

During these centuries identifying women who were to be raped, tortured, and burned alive became an industry, as did the production and use of instruments of torture. Many victims were tortured to death before thousands of onlookers. This provided sadistic hands-on sexual entertainment for the jailers, torturers, and clergymen, and sheer horror for onlook- ing women (old, young, and children). Men and boys were also tortured to death for being related to the women being sacrificed, or objecting to the witch-burnings, but there is common agreement that about 85 percent of those tortured to death were women. As the Editors of The Ecologist (1992, 18) noted:

A main objective of the witch-hunts was to remove women’s control over their bodies, in particular, their knowledge of contraception, abortion and childbirth. There was also an economic motivation: the rising class of merchant traders felt threatened by independent women involved in trade and commerce, while entrepreneurs, landowners and the emerging nation-state benefited from confiscated witch property.
The sadistic, prolonged, and usually public torture and murder of even one hundred thousand women, children, and their sympathizers over a 300-year period averages out to a rate of one torture-death per day, enough to keep women as a class in abject, mortal terror for some time. Yet this fact is not a prominent feature in (patriarchal) EuroAmerican history. “By the 19th century, many women had little option but to depend on a male breadwinner, a position reinforced by marriage and property laws. They were confined to the home to bear children, be sexually available, and consume industrial products and imports from the colonies” (Editors of *The Ecologist* 1992, 138).

### The Larger Context of the Witchburnings

The domination of women in sedentary societies was underway 10,000 years ago. Between the Paleolithic and the present, the neglect, abuse, and domination of women has been documented repeatedly. And although this paper is not meant to survey the domination of women through time, some startling little-known information provides a context for the next section on population.

Most African slaves were women, and “women were given away as wives, pawned in times of famine, or used as payment of debt. Women were also presented to ruling linkages in exchange for political exemptions or influence and used to pay fines or reward soldiers” (Tadesse 1988, 360; Wright 1975; Strobel 1982; Robertson and Klein 1983). Slavery — traffic in women, and particularly girls — is known to occur in Asia (Jacobson 1992) and in Pakistan. Ponting (1991b, Ch. 10) shows that there have been (and are) many ways in which people are legally enslaved; these practices have many different names, but they have the same outcome, slavery.

The worldwide extent of misogyny is shown by Amartya Sen’s survey of sex ratios in all regions of the world. He finds that “a great more than 100 million women are ‘missing.’ These numbers tell us, quietly, a terrible story of inequality and neglect leading to the excess mortality of women” (1990b, 61). Sen shows that these missing women are not due to differences between “East” and “West,” or to economic underdevelopment alone, but rather to women’s lack of access to health care, medicine, nutrition, political participation, and employment, as well as to policies restricting the size of families (in China). These “missing women” are just the tip of the iceberg. The iceberg itself is worldwide violence against women. (See also, Sivard 1985, forthcoming; Sen 1990a, 1992, 1993.)

How are so many women missing? Besides abuse, neglect, and inequality, there is new technology. “[In 1988] In the Delhi area and in Punjab, clinics do amniocentesis testing primarily to determine the sex of the fetus and then perform abortions if the sex is not the desired one. Since estimates that up to 99 percent of such abortions are on female fetuses, some women activists have demanded the prohibition of amniocentesis” (Ramusack 1988, 31).

### Deconstructing the Population Explosion: Men at Work

“Overpopulation” threatens habitat in an escalating circle of violence that involves the disempowerment of women at every stage. All accounts of subsistence societies that have not adopted agriculture (and thus hierarchical patriarchy) point to the absence of gender inequality. Most accounts point out that women tend to play a fundamental role in decisions on when and where to plant and gather food, and when and whether to bear children.

As communities are destroyed by development, so are the collective powers of women. Some women are driven toward the patriarchal extended or even nuclear family. Wage earning in the money economy provides the only possible mode of survival. Some employers prefer male over female laborers, believing men to be less encumbered by family affairs and children than women, which becomes a self-fulfilling prophecy as men leave their families to work for money. Other employers in “feminized” industries prefer unskilled women to unskilled men, particularly younger women who can be paid even less than men, are docile and less likely to protest appalling work conditions and are available for sexual harassment (Joekes 1985; Villalva 1986).

It is also true that women’s vernacular knowledge of habitat and subsistence is much less relevant after their particular habitats are confiscated and destroyed. And once the preferential treatment of men is in place, women are left relatively less knowledgeable than men about their new, nonreflexive environments. As subsistence communities and their habitats have been destroyed, and women disempowered, patriarchal power has led to worldwide violence against women, a substantial amount of which is rape. Within patriarchal families (which result from the destruction of communities and habitat) it is normal for men to decide when and how often to have sex and children. Men in several Third World countries surveyed want significantly more children than do women; and, by age 50, men in all countries surveyed have had between 15 and 69 per cent more children than women over 50, in part by “over-using” younger women (Sachs 1994).

Sachs (1994, 15) notes that “The reality in many developing countries is that if a man’s wife resists childbearing, he will often simply withdraw his financial support and marry another woman. Even worse, many men have resorted to violence in order to keep their wives from using contraception. One recent study showed that more than 50 percent of Mexican women using state-sponsored birth control services..."
do so secretly, for fear of being physically abused by their husbands.”

The population control industry also threatens violence, presumably against women. (Hartmann 1987, 122, citing Berelson and Lieberson 1979, 609), quotes two leading writers on population: “The degree of coercive policy brought into play should be proportional to the degree of seriousness of the present problem and should be introduced only after less coercive means have been exhausted. . . . Thus, overt violence or other potentially injurious coercion is not to be used before noninjurious coercion has been exhausted.”

The EuroAmerican-sponsored population control industry has responded to the “population explosion” by offering male-oriented and male-designed population-prevention devices like foam, implants, and pills, that are only available through the EuroAmerican market economy and which further disempower women, instead of barriers such as condoms, which men often refuse to use. These devices, all of which are administered to women through male-dominated institutions, hardly “give” women what they had prior to the raging witch-hunts of the past five centuries — knowledge of contraceptives, abortifacients; choices about childbirth; and relative equality and, if necessary, independence from males.

As The Editors of The Ecologist point out, “. . . non-invasive ways to limit the number of births were and still are used in some cultures. A prolonged period of breast-feeding can prevent conception because ovulation is reduced during lactation, leading to longer intervals between births. In addition, in polygynous marriages in Africa, for example, coitus is taboo while a woman is breast-feeding, often for up to two years. Other cultural patterns also influenced the stability of the numbers of people, including sexual abstinence, the segregation of the sexes, a later age for marriage and restrictions on widows remarrying” (1992, 171; see also Fisher 1979; Hartmann 1987; Wichterich 1988).

So, five centuries of the violent empowerment of men and the equally violent disempowerment of women — of shoveling power from women to men — has now had its predictable effects. Much of men’s vernacular knowledge of habitats has been erased, together with the habitats they tended. Much of women’s traditional knowledge of contraceptives and abortifacients was lost centuries ago in Europe (as a consequence of the witch-hunts, enforced Christianity, and the development of male EuroAmerican science and medicine) and more recently in colonized countries. Shiva notes that there is a tendency to “blame the victim”:

Extraction of surplus and exploitation and destruction of resources have left people without livelihoods. Without access to resources for survival, the poor have been forced to generate security through large families. . . . However, instead of seeing these multifaceted problems as caused by global domination of certain narrow interests of the North, they are selectively transformed from consequence to cause. Poverty and population are turned into causes of environmental degradation. Diversity is turned into a disease and identified as a cause for ethnic conflict — A problem caused by an irresponsible chemical industry is converted into a problem caused by fertility rates in the poor countries of the South. The 1991 cyclone in Bangladesh was similarly linked causally to babies in Bangladesh (Shiva 1993, 28).

The preceding sections have been an attempt to piece together an explanation for the simultaneous crises of environmental destruction, overpopulation, and mad leadership. We turn finally to a deconstruction of the private ownership of the world. Land, like women, needed to be privatized before it could be invaded, controlled, and exploited. This process continues today (as does the violent subjugation and exploitation of women).

What Happened?
The Violent Privatization of the World

Nations and States

Based on the estimate of about 8 million humans 10,000 years ago and that subsistence human societies averaged 40 to 50 individuals, I estimated there were about 180,000 societies at that time. Using distinctive languages and dialects as indicators of different societies, there are now about 5,000 societies (Sachs 1992; Nietschmann 1987). The number of societies is declining rapidly, as they are rendered literate and their habitats are destroyed.

We are led to think of the world as consisting of 30 rich countries and 160 poor ones. A more useful (and more historically and geographically accurate) way of envisioning the world’s societies begins by noting that the state is a purely Western notion, one that until the 20th century applied only to countries that covered 11/2 percent of the earth’s surface (but decided the rest of it belonged to them). The other 98 1/2 percent were occupied by nations, tens of thousands of distinct societies that lived in particular places on the earth, most of them for centuries and some for millennia. Except as corrupted by civilizations and agriculture, each of these societies had figured out how to live in their particular commons, whether forests, wetlands, coasts, lakes, tundra. Each developed a sustainable lifestyle. Each society figured out how to live in its particular environment: what foods grow, when; what to plant, and when; what foods and medicines contribute to health and well being. Each has/had art, philosophy, and science.
We should distinguish between nations and states, because the peoples of nations, and particularly the women of nations, are best positioned by language, spirit, and their relationships with habitat (even badly degraded habitat) to understand what sustainable living involves. Peoples of states are not. Tilly (1992, 1-2) suggests:

Let us define states as coercion-wielding organizations that are distinct from households and kinship groups and exercise clear priority in some respects over all other organizations within substantial territories. The term therefore includes city-states, empires, theocracies, and many other forms of government, but excludes tribes, lineages, firms, and churches as such.

In contrast, a nation is a group of people who consider themselves to belong together in one place by virtue of birth, common culture, territorial heritage, language, religion, and ideology. Unlike a state, a nation does not require a central military-political bureaucracy to create nationality, nationalism or national territory; to force people to obey one set of institutions and laws; to enforce the use of one language, or the practice of one religion that the nation did not previously acknowledge. Nations already adhere to their own institutions, laws (if any), language and religion (if any), and so need no centralized military enforcement. Sachs’ (1992, 102) argues:

At present, roughly 5,100 languages are spoken around the globe. Just under 99 per cent of them are native to Asia and Africa, the Pacific and the American continents, while a mere 1 percent find their homes in Europe. In Nigeria, for instance, more than 400 languages have been counted; in India 1,682; and even Central America, tiny as it is geographically, boasts 260. A great number of these languages cling to remote places. They hide out in isolated mountain valleys, far-off islands and inaccessible deserts. Others govern entire continents and connect different peoples into a larger universe. Taken together, a multitude of linguistic worlds, large and small, covers the globe like a patchwork quilt. Yet many indicators suggest that, within a generation or two, not many more than 100 of these languages will survive. . . . Transistor radios and ‘Dallas’, agricultural advisers and nurses, the regime of the clock and the laws of the market have triggered an unprecedented transformation. — Whichever way one looks at it, the homogenization of the world is in full swing. A global monoculture spreads like an oil slick over the entire planet.

As Nietschmann (1987) points out, media and academia are anchored in the state. Their tendency is to consider struggles against the state to be illegitimate or invisible. Those who end up in the media and the universities of the states have been educated in state- and corporate-controlled media and schools, have been taught the dominant state version of history, science, politics, war, and all the rest. They have not been made aware that states are a fairly recent form of violent exploitation of the planet and the peoples of the world, and that when the states have not exterminated peoples and their habitats, the peoples remaining have far more legitimate claims to “sovereignty” in their habitats than the states that seek to overcome and exploit them.

In the global struggles with militaries, multinationals and governments, the terms rebels, separatists, extremists, dissidents, insurgents, terrorists, tribal, minorities, or ethnic groups substitute state-related, nonpeople identification for the actual names that nation peoples call themselves and their countries. These terms define these groups as illegitimate and dangerous to the stability of the state. This allows the state to exterminate them, take their resources, their traditional lands, their commons by treating them as formless non-people, described in any terms the invading state chooses to apply to them.

It is as if there is a quarantine on peoples’ identities, an embargo on who nation peoples say they are and the name of the place they say is their country. States define nation peoples as “ethnic groups” and “minorities” as a tactic to annex their identities in order to incorporate their lands and resources. Nietschmann also points out that the ideological hegemony of states is so complete that there is nowhere even a listing of the nations of the world.28

Privatizing the World

During the last 500 years, subsistence societies have been systematically exterminated by the minions of the Christian men in Europe and more recently North America, and by EuroAmericans based in Japan and Asia as well. The commons that sustained these societies has been developed (i.e., rendered into private/state property and ruined). Colonial boundaries were imposed during the 19th and 20th centuries. Christian men in Europe decided they owned the rest of the world. The invention of the chronometer (1761) allowed a longitude-latitude grid to be superimposed on maps of the world, to be “filled in” (i.e., deeded over to the Christian men for exploitation) by explorers, surveyors, and missionaries, all backed up by military forces (Anderson 1991, 173, 184).

Thus have the various civilizations of the past been succeeded by the military industrial states, third world states, and religious empires that now lay claim to all the world. The
global mass media (including schools, churches, science, art, architecture) have distanced us from the real world and from thousands of still-existing nations.

**Concluding Observations**

Since the appearance of civilizations, indigenous people have struggled to preserve the commons that sustain them: usually the forests, which provide food, soil, water, clean air, medicine, and fuel. Today, even many indigenous families are split as women try to protect the forests that sustain them from their husbands who are intent on logging them for money (Shiva 1989; Bunker 1985).

Over the last ten thousand years the life support system of the earth has been reduced by about one-third (Postel and Heise 1988, 5) while the number of humans who seem to be willing to destroy the remainder has increased by at least one thousand fold. One of the brightest instances of possible sustainable de-development is in present-day Cuba. In the absence of trade with the former USSR, the Cuban people have suffered drastic food shortages and cutbacks in imports of the petroleum, pesticides and herbicides that fueled their high-tech agricultural exports of sugar and coffee. In response to this life-threatening national crisis, Cuban leaders have within months converted to organic food production, subdivided large agricultural areas into many small plots of land, and initiated incentive programs to get urban dwellers to go back to the land. In Cuban cities, the premises of hospitals, schools, and other institutions are being planted with vegetable gardens (Perfecto 1993).

Wage-earning is clearly a life-threatening institution. People in work forces are still degrading the environment, and now the cumulative effects of 10,000 years of hierarchically-driven work forces are apparent. Our problem is not to find jobs for everyone, but to stop many people from working at all, and to convince the rest not to work as long and as hard as they’re used to thinking they must. We need to pay (for starters) the military, monocroppers, loggers, and developers their usual salaries, provided they agree to do nothing, or at least to stop doing what they’re doing. There is ample precedent for this practice in the instance of our support for the wealthy, who do nothing for lots of money. Another historical precedent is featherbedding — the practice of hiring (during the 1920s, under pressure from unions) those whose jobs were rendered obsolete by the advance of technology, and who therefore had nothing to do. Today, there may be a revival of this practice in connection with the impending shutdown of the Fermi II nuclear reactor in Monroe, Michigan. The Detroit Edison management is considering abandoning the plant if they can thereby be assured a substantial financial profit that would be borne by rate-payers.

I am arguing that it is prudent to pay people not to destroy our life support system. Who disagrees? What is your life support system worth? What about the life support system of your community, loved ones, family, children or grandchildren?

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**Endnote**

1. Footnotes and references can be found at: members.aol.com/dietzvt/HER_lough.html
Overcoming Patriarchy and Sexism Won’t Save Us

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Throughout the winter of 1997-98, as the southeastern and southwestern corners of the continental United States experienced some of El Nino’s especially harsh effects, one had to hope the weather events and their serious impact might be opening some minds, yielding a rising consciousness of at least the possibility that our habitat is undergoing major changes. It remains uncertain how much realization there will be that seriously harmful anthropogenic changes are possible. Writers arguing that Homo sapiens has already worsened the conditions of life on this planet will probably continue for a while to seem eccentric.

Eccentric or not, an outspoken description of what Homo sapiens has done to the world in ten thousand years should convey an important message. Thomas Lough vividly contrasts the Earth ten thousand years ago with today’s world. For humans alive back then, he tells us, their environment was “an extensive supermarket” in which everything was “free.” All about them was “common land, neither public nor private,” except for comparatively modest assertions of territoriality by thousands of small societies comprising no more than eight million people altogether. Now we live on a planet where human population is approaching 6 billion and is organized into fewer than 200 much larger societies. And, as Lough points out, all claims of common land are challenged.

To conventional thinking, the growth from small to large societies, enabling the world to support billions instead of mere millions of people, might seem like real progress. But important human societies today are industrial (or industrializing). The dire significance of this might be made clearer by invoking the once familiar concept of cultural lag (Ogburn 1922) — stress arising when parts of a culture change more than other parts so that there is no longer the former degree of adjustment between them. When there were only 8 million hunter-gatherers, whatever useful materials could be found in the world around them were to all intents and purposes inexhaustible (in any time frame meaningful to them). But not now. Based in the Northern industrialized countries, the organizations that function as instruments of industrial living have been, in effect, staking claims to fragments of that former planetary “supermarket” and then exploiting whatever resources to which this gives them exclusive access as if the supply were inexhaustible.

As Lough rightly points out, these organizations are “destroying our life-support systems.” He is not alone. In letters to Science (19 September 1997, 1746-7), America’s political leaders were said by Hoover Institution Visiting Scholar B. Meredith Burke to “have sealed our ecological fate” by having chosen “to maximize rather than optimize population,” while retired University of Colorado physics professor Albert A. Bartlett questioned whether scientists themselves are being responsible when they “hold out the hope that endless population growth can be matched by endless doublings of world food production.”

Will the ominous message in Lough’s opening paragraphs “soak in,” or will it encounter a “duck’s back” response among readers? In an effort to avoid such dismissal, he insists modern societal entities “continue to destroy our life-support systems, and plan to finish the job as rapidly as possible.” To emphasize, he reiterates. “They may well succeed,” he suggests, “because they control almost all the forces of organized violence in the world. They also control the technologies, equipment, and payrolls they need to destroy our life support systems.”

The important message of so clear a comparison of the world at the dawn of agriculture and the world today is that humanity is committing ecocide. But the interest groups antagonized by Lough’s passionate “explanation” will surely resist that message. To be too intent on placing blame may be counterproductive. Finger-pointing can be emotionally satisfying, but unless culprits are few and relatively powerless compared to those in a position to “correct” their behavior by applying sanctions, even the most ignignant revelation of culpability is unlikely to produce needed change.

The problem of adverse human impact on the planet upon which we depend is indeed serious, but a call to arms against patriarchy and sexism is not likely to save the world. Because many attributes of today’s social structure and culture are reprehensible, it does not follow that the necessary ecological redirection can be attained (or even facilitated) by exposing the alleged connections of system flaws to patriarchal patterns and sexist manifestations of power. Such an approach to the profound danger confronting human societies today is just too simplistic.

The naivete of attributing all human woes to faulty institutions and expecting what would amount to merely political change to put things right was pointed out two centuries ago by Malthus when he wrote (Appelman 1976, 66):

The great error under which Mr. Godwin labours throughout his whole work is the attributing almost all the vices and misery that are seen in civil soci-
et to human institutions. Political regulations and the established administration of property are with him the fruitful sources of all evil, the hotbeds of all the crimes that degrade mankind. Were this really a true state of the case, it would not seem a hopeless task to remove evil completely from the world, and reason seems to be the proper and adequate instrument for effecting so great a purpose. But the truth is, that though human institutions appear to be the obvious and obtrusive causes of much mischief to mankind, yet in reality they are light and superficial, they are mere feathers that float on the surface, in comparison with those deeper seated causes of impurity that corrupt the springs and render turbid the whole stream of human life.

It is important to stand back and contemplate “the big picture.” We must try to transcend natural tendencies toward ethnocentrism — to see whether flaws in our own society’s relation to the Earth upon which life depends may not just be elements of our culture, but are perhaps widely replicated in other societies. If so, that suggests their causes are somehow deeper and more pervasive and they will be harder to change. It is also important to transcend anthropocentrism. Are we as a species uniquely susceptible to temptations to behave in ways that diminish the carrying capacity upon which our future depends? If overshooting carrying capacity is a problem not unique to Homo sapiens, then it surely will take more than some ordinary political revolution or even a major cultural transformation to ensure our future.

If, for the sake of argument, we grant that somehow it has been our patriarchal and sexist tendencies that led us to overshoot carrying capacity, shouldn’t we ask whether we differ from our animal relatives in being patriarchal and sexist? If similar patterns prevail among other species, what causes them to arise and persist among non-human populations? What contributions do they make to survival and reproduction? Can we depend for ecological salvation on prescriptions that fail to take into account the possibly prehuman origins of human behaviors we deplore?

No social scientist should presume to answer (or dismiss) these questions without having at least sampled the recent literature on animal behavior, ethology, and evolutionary theory. There is a good deal of evidence that practices we can pejoratively label “patriarchal” and “sexist” arise in response to challenges confronting many species. They are common among social bands of our nearest relatives, the great apes (Byrne and Whiten 1988; Kano 1992; Rubenstein and Wrangham 1986; Standen and Foley 1989; Tanner 1981). If sins against the laws of ecology are not uniquely human, they are unlikely to be eradicated by preaching, however well it may document its castigations.

The fact remains, we are today using the planet in unsustainable ways to an unsustainable extent. With our modern technologies and modes of organization, we have exceeded Earth’s carrying capacity for these ways. Lough is justifiably concerned about the consequences of our having overshot carrying capacity, but many readers will question his notions about how and why this has happened, and few (apart from more or less fanatic ideologues) will accept the notion that expunging patriarchy and sexism from our culture will solve the overshoot problem. In a chapter on “Unsustainable Human Ecology,” Freese (1997, 171-208) has provided a much more illuminating discussion of the causes and ramifications of the condition we have wrought.

The innovative idea most important for our time may well be the human relevance of the concept of carrying capacity. Without it, trashing of the planet by our species will continue dragging us toward ultimate catastrophe. By (human) “carrying capacity” I mean the maximum load (of human use) that can be sustained by an environment without diminishing its future suitability for supporting an equivalent load. The key word is “sustained.” An environment may be able temporarily to “support” a larger load than it can permanently sustain.

The heuristic importance of such a concept of carrying capacity is not diminished by the difficulty of specifying its numerical value. In fact, attempts to assign it a numerical value have tended to mislead, because they misconstrue the very idea of carrying capacity. They imply that somehow the planet can “support” X number of people, with any beyond that number starving immediately, as if, somehow, there were an absolute numerical limit, an impenetrable ceiling. Whenever someone’s estimate of that “ceiling” has been surpassed by actual population, it has then seemed easy to scoff at the very idea of “limits to growth.” By not conceiving the possibility (and implied consequences) of overshooting carrying capacity, numerical estimates of a limit have tended to make the limit concept too fragile.

But carrying capacity is not a maximum number which it is impossible to surpass. Populations (of various species) do sometimes overshoot carrying capacity (Catton 1982). As the load grows larger, observable environmental degradation must be seen as symptomatic of having overshot carrying capacity. Numerical estimates fail usually to provide enlightenment regarding the consequences of exceeding the limit, which are not as simple as mere starvation of the excess. In a book whose title asks, “How many people can the Earth support?” Joel E. Cohen (1995, 161, emphasis added) was led to decide that the question was “obviously incomplete,” and required further specification: “Support with what kind of Earth for the future?” As those two questions I have italicized imply, it is becoming increasingly evident that the
essence of the carrying capacity concept is the issue of sustainability (see, e.g., Brown 1981; Milbrath 1989; Daily and Ehrlich 1992; Hardin 1993; Catton 1995).

It is important to stop merely wondering how many people the earth could “support,” and to start facing the more realistic question. How much of the ecological load human living imposes can the world sustain, over a prolonged stretch of future time. The load we are imposing has many dimensions. The number of people imposing it is just one dimension, and does not alone suffice as an adequate measure of the load’s magnitude. Not just the human head count has escalated; the kinds of materials we use as “resources” has also proliferated; the amount of energy expended per capita is vastly larger today than among past generations; the quantity and diversity of life-threatening stuff human life generates has greatly increased our disposal problems. In short, our per capita ecological impact was becoming ever more enormous at the same time our numbers were “exploding.”

The history of efforts to determine the planet’s human carrying capacity has been considered in abundant detail by Cohen (1995, 237), who found “at least four different concepts of carrying capacity” have been used in “ecology as a basic science,” plus “at least five additional concepts of carrying capacity” which turned up in applied ecology’s various specialties (i.e., range management, wildlife management, fisheries management, forest management and agriculture). Unfortunately, because he concluded that none of these previous concepts of carrying capacity in basic or applied ecology could fit for the human population, his book may too easily be misconstrued as documentation of a basis for rejecting further use of any carrying capacity concept. Simon and Kahn (1984, 45) had, of course, already declared that “Because of increases in knowledge, the earth’s ‘carrying capacity’ has been increasing throughout the decades and centuries and millennia to such an extent that the term ‘carrying capacity’ has by now no useful meaning.”

A careful reader should realize Cohen’s message was not an endorsement of their flagrantly cornucopian view. His chapter about the diverse definitions of carrying capacity closed with sentences in which the sustainability idea remains implicit. That idea is basic to the human relevance of carrying capacity limits. “This generation inherited the Earth and will surely leave it to future generations,” said Cohen (1995, 260). “The view that your generation and mine take of the role and importance of future generations will influence how we treat the Earth today.” Lough’s paper is clearly intended to persuade readers to cease and desist from preparing as our legacy for posterity a ruined ecosphere.

It may be easier to condemn mining and manufacturing for being environmentally devastating, but it should shock readers to encounter Lough’s contention that agriculture, too, involves the destruction of habitat. Whose habitat? Obviously when an area is farmed it no longer serves as habitat for whatever creatures might have used it in its wild state. But more to Lough’s point, modern farming techniques, so dependent on energy subsidies in the form of chemical fertilizers and pesticides as well as fuels for the “labor-saving” machinery now so indispensable, all add up to “a non-sustainable land use.” That familiar expression “labor saving” masks reality; modern machinery’s real significance is that it turns humans into giants. Their labor is not so much “saved” as amplified.

Amplified by modern devices, agricultural labor destroys the soils on which we utterly depend. The destruction occurs faster than new soil is naturally formed. So our habitat is diminished. Farming has become a form of mining. Ostensibly renewable resources are produced today largely by the prodigal expenditure of nonrenewables.

Although there are many people who will regard as absurd Lough’s proposals for paying people not to do what they have previously been paid to do, given the ecological state of the world there is probably a real need to get outlandish ideas onto the agenda. Converting agriculture to a form of mining, as we have done with modern methods and equipment, has enabled more mouths to be fed in the present, at the cost of worse famines in the future. The longer we continue destroying carrying capacity, the worse the crash will be.

There are constraints on Earth’s human carrying capacity. According to Cohen (1995, 356), they are no less real than the choices people and their institutional agents have to make within such limits. As “one example of the many civilizations that undercut their own ecological foundations” he cited Easter Island — an example we must learn to realize is entirely consistent with Darwinist evolutionary theory. Natural selection is a process of selective survival and differential reproduction. Its biases are shaped by existing environmental conditions, not future conditions. In proliferating, the Easter Islanders had thrived on short term advantage at the cost of long term ruin.

There was apparent aid and comfort to believers in the cornucopian faith when Cohen (1995, 358) declared that a “number or range of numbers, presented as a constraint independent of human choices, is an inadequate answer to the question ‘How many people can the Earth support?’ ” But that aid and comfort was contradicted when he almost echoed Malthus by saying, “If human choices somehow failed to prevent population size from approaching absolute upper limits, then gradually worsening conditions for human and other life on the Earth would first prompt and eventually enforce human choices to stop such an approach.”

As a heuristic concept, carrying capacity is essential to realistic thinking about the human prospect. Carrying capac-
ity constrains whether or not it is known and accurately measured (like gravity, or chemical reactivity). No criticism of the various methods used heretofore in attempts to establish the numerical magnitude of a sustainable global load can repeal the principle that exceeding present carrying capacity is destructive of future carrying capacity. In the final analysis, the following statements by Garrett Hardin (1993, 207, 213) must become humanity’s guide: “Exceeding the carrying capacity in one year diminishes the carrying capacity in subsequent years.” — and “at a sustainable size of population, the quality of life and the quantity of it are inversely related.”

Endnote

1. Email address: WRNLCATTON@aol.com. Footnotes and references can be found at: members.aol.com/dietzvt/HER_lough.html
Beyond Dueling Determinisms: Toward Complex, Humane and Just Ecologies

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Introduction

After reading the article and reflecting at some length on my mixed reaction, I came away with the sense of having been on a roller coaster ride. It inspired a kind of virtual fear, followed by grateful relief that the fright would not carry over into the real world. The fear comes from exaggeration of real experience and reference to a long history of possible danger (falling, crashing, sickness) attached to similar sensations. We are alternately exhilarated, terrified, uncomfortable and restored. We experience a heightened sensation of movement and acceleration (up, down and around), coupled with a confusion of the sense of direction. In this case the present danger is real but may actually be obfuscated by the overstatement of virtual danger. We confront an overwhelming array of distopian determinisms, and biological, historical and national destinies. We are presented with a brick wall at the end of the ride. We are left in animated suspension (not a typo), to endlessly contemplate the immanent and seemingly unavoidable cataclysm that flows naturally from who we are and who they are (they being in charge of where we are). We defy gravity only to be overcome by it again and again. This ride gives us the fear and exhilaration of flight without the freedom and teaches us that leaving the ground is a fearsome and ultimately futile proposition. Looking ahead, resistance is futile, or alternatively, looking back, resistance leads to the pre-feudal. We end, where we began, chastised and a little dizzy from the journey.

There are real dangers on this ride. First, we may be so dizzy and confused by these theoretical and empirical ups and downs that we will not recognize the real social, economic and ecological dangers that face us outside. Secondly, we may be so paralyzed with pessimism as we contemplate the brick wall mural at the end of the ride that we are unable or unwilling to act, to seek change, to engage in cultural and social transformations to address real but not intractable social, economic and ecological problems.

There are, however, several alternatives to fear of flying. It is perhaps no accident that many feminist authors of speculative fiction as well as social theory have grappled with the question of technology, gender, nature and power in the far future, in deep and distant space. For several novelists, among them Ursula Le Guin, Marge Piercy, and Octavia Butler, technology is only as good or bad as the nexus of social relations in which it is embedded. While it is never neutral in actual practice, it is not necessarily, intrinsically, good or bad. It does not exist as an abstraction, it exists only in practice, situated in space, place and social order. The point is that technology is always embedded in systems of social relations. Likewise, feminist social theorist Donna Haraway (1991) suggests that we blur the boundaries that we have drawn between animal, human and machine and that we complicate our notions of technological progress to confront the infinite array of possible recombinant relations between humans, “nature,” social orders and technologies.

As I read through the collection of examples, evidence and arguments in Lough’s article I find myself looking to those novels, as well as formal philosophy (taught to me, I dare to say, by some very literate men and women, in person and in writing) and everyday ethics (taught to me by mothers, grandmothers and others), rather than to evidence from biology, ecology and the laws of thermodynamics. I will include a few comments on the technical points but will not dwell on that. I also look to examples of encounters between contemporary social movements and technocracies to test and respond to Lough’s analysis. After noting the key contributions in the article and discussing some of our differences, I suggest an alternative theoretical grounding in non-essentialist ecofeminism, feminist poststructuralism, feminist environmental activism and theories of complexity in ecology.

Challenges to Patriarchal Civilization(s)

What is refreshing about Lough’s analysis is the straight-up challenge to civilization-as-we-know-it, the suggestion that it is not necessarily a “good thing.” What is troubling is the assertion that any civilization is necessarily, always and everywhere, a “bad thing.” Lough judges production systems by human centered biological criteria such as nutrition, health, life span, and social yardsticks, including distribution of labor, food and political control. The article provides a rich source of references and useful data summaries on health and nutrition performance criteria for production technologies and land use systems. Economic efficiency is rejected in favor of energy efficiency, equitable distribution and adequate nutrition. The reference to basic biological indicators of well-being is laudable and tells us much about the cost of the transition from foraging to sedentary agriculture. Yet Lough does not give equal weight to the fact that life...
expectancy is far higher in urban and industrial societies, and in some agricultural and mixed farming systems. Statistics on the current skewed distribution of these indicators might still make a compelling critique of the high cost of “progress,” but they are not included in Lough’s tally of the costs and benefits of various systems. He limits that particular argument to the transition to agriculture. Overall the argument is not yet developed enough to carry the weight of these very broad questions and to integrate the very discrete (albeit illuminating) data sets and examples that Lough invokes to support his case.

One of the strongest aspects of Lough’s work is his inclusion of gender at the national and international scales, acknowledging and applying several important insights in the work of Mies, Shiva, Merchant and Seager. Like them he relates patriarchy to political and production systems, both historical and contemporary and he recognizes and makes more visible the connections of gender ideologies to social units well beyond the household. He cites prevailing gender ideologies as pathological influences on society (so far I’m with him) but he also posits these as logical outcomes of biological differences and specific land use technologies. If, instead, we see those ideologies as socially constructed, then we can recognize their existence and their impact, yet we can imagine change and a myriad of alternatives. It is those alternatives that feminist poststructuralists seek to imagine and to realize.

Lough’s analysis also recognizes the political, technological and ideological connections in the history of women’s oppression, including the use of witch burnings to discipline women and men to accept male domination and displacement of women from positions of power (as healers, religious leaders and landowners). Lough accepts however, the proposition that political and economic domination is equal to annihilation, and laments the “elimination of [women’s] vernacular knowledge, skills and relationships.” Several ecofeminist authors also suggest this, including Merchant (1980, 1989), although she notes that some people carry over previous types of consciousness into new eras marked by technological and ecological revolutions. However, Lough and Merchant both imply a historical progression and totality of domination that is belied by repeated outbreaks of social and ecological consciousness that reassert knowledge and values supposedly displaced and erased by a given civilization. This periodic resurgence of alternatives indicates a broader contingency of multiple cultures, arts and sciences (whether among women or ethnic, religious, race and class-based groups).

**Biological and Technological Determinisms**

One of the troubling points in the text is the reliance on necessity. Mechanistic connections are presented as almost genetically determined, which undermines the possibilities for creativity and a viable humanity with more than 8 million (human) persons on the planet. To identify literacy and civilization as inherently destructive of our habitat (from global to local) feeds the misanthropic version of environmentalism and justifies the Draconian excesses of Malthusian population control advocates. At the same time this analysis justifies, from another position, the anti-environmental politics of those who claim that environmentalism is inherently committed to the end of culture and/or civilization. Many of us might not shed a tear over civilization-as-we-know-it, but would not be willing to condemn all organized social groupings greater than 250 people to the trash heap.

The whole argument against civilization is made on the back of necessity, while climbing a ladder of linear progression from foraging to agriculture to industrial production. The ladder takes us from subsistence heaven to postindustrial hell. It is this one-track journey that railroads the complex history of technology, society and politics into two gears, forward and reverse. What happened to the reference to Stephen Jay Gould and the suggestion that “nature” has bushes, not ladders? I’m voting for the bushes, thorns and all, and suggest that Lough restructure his analysis around that model; he might break free of the necessity trap that now sits ready to strike anyone who moves up the intensification railroad.

In one section Lough states that plants, animals and subsistence cultures (an uncomfortable and dangerous association, for me) have division of labor and organization but not hierarchies. Yet earlier he equated organization with hierarchies. It is, I think, important to differentiate between the two. While some may suggest that all organization is and must be hierarchical, meaning a very centralized and top-down power structure, there are others in biology as well as social science who have made compelling cases for self-organization from below (Ahl et al. 1996).

To naturalize socially created differences also invites the possibility that our work will be used to create alibis of power, as biological excuses for the necessity of social oppression. The recent Commentary article Professional Denial by Gretchen Schafft in the January 1999 issue of Anthropology Newsletter provides a powerful example. She documents the complicity of some schools of anthropology and anthropologists in the Holocaust, based on evidence of direct and active collaboration as well as the indirect contributions through essentialist racial categories and hierarchies and theories of biological determinism of social behavior. While we may not abandon all possibilities of biological or genetic influences, “natural” categories and biological determinism certainly warrant a great deal of caution, given the demonstrated potential for abuse.
In *Feminism and the Mastery of Nature*, Val Plumwood (1991) examines the difficult impasse encountered when ecofeminists have adhered to biological explanations of gendered relations to nature and culture and have affirmed essential gender identities. One group of feminists solves this problem by rejecting the link of women to nature, while still accepting the nature/culture duality, with culture superior. Lough would no doubt place them among the “female clones” mentioned in his discussion of patriarchy. Many ecofeminists embrace an essential and necessary dichotomy between women and men and between nature and culture. Women are connected to nature and men to culture; women are enjoined to reject culture and rejoice in their exclusion from it and to claim privileged connections to nature. Men are then left to inhabit the powerful but desecrated domain of culture, or to cross over to the feminine, “good” side. Women claim subsistence and men commerce and so on. Why would women embrace the down side of this nature/culture duality that has been turned on its side and converted into a hierarchy, with culture above and nature below? One ecofeminist response has been to propose the reversal of gender-polarized power relations, putting women and nature on top. Another response is a variant of separate but equal, accepting the duality of women and men and also of nature and culture, but not the hierarchy. There is, however, more choice than up, down or a precarious neutral in the duality sweepstakes. We can reject the simple dichotomies and necessary associations/identifications based on gender, or for that matter ethnicity or “nations.” One can claim women’s place in culture, and also embrace “nature” and many women’s actual, but not necessary connection, yet reject the rigid dualities of culture/nature and woman/man. It is this latter option (well presented in the works of Donna Haraway (1991), Sandra Harding (1998) and Val Plumwood (1993)) that is missing in Lough’s analysis.

Perhaps the option to join an ecocidal and misogynist culture isn’t much of a choice, but surely it’s worth exploring the possibility of creating another kind of culture and civilization, one that is not destined to reach such ends, a different branch as it were. The ladder of land use and labor intensification may be a dead end, literally, but the tree of life (or S. J. Gould’s lowly shrub) offers infinite possibilities for rooting ourselves in earth, yet reaching in every direction for sun and sky. Rather than positing culture and civilization as polar opposites, or divergent binary branches of a single trunk, perhaps we need to rethink the culture/nature (and Lough’s culture/civilization) dichotomy.

Lough also separates pre-and post-agricultural cultures into polar opposites with a newly reversed status. He places foraging and “subsistence” agriculture in pre-agriculture and everything else as sedentary agriculture and beyond. This binary logic places intensive multi-story gardening systems in the same category as an economy based on the manufacture of weapons with massive production of toxic wastes. In his analysis the one leads inexorably, necessarily, to the next. Yet, intensive agriculture and industrial wage labor have no exclusive on oppression. Henrietta Moore’s description of gendered space and power among the Marakwet (in Kenya, during the 1970’s and 80’s) suggests a powerful patriarchal ideology at work in a society that still depended heavily on foraging and subsistence agriculture. The accounts of the Yanomami in Brazil, though now subject to highly contested explanation, also suggests that male domination can occur among foragers and subsistence cultivators. What do we make of this? We could embrace the necessity of this connection and postulate a kind of patriarchal original sin or divine right, depending on who we are and how we think. We could however, accept that such structures and behaviors can and do — but need not — occur across many kinds of societies, technologies and land use systems. We could then look at patriarchy as one well-trodden and too often chosen path to be avoided, or once embarked upon, to be abandoned. If we are branching on trees instead of climbing ladders then there is always somewhere else to go, and it doesn’t have to be the Neolithic past.

**Nations, States and Actually Existing Communities**

I would suggest that actually existing communities come in many packages. Lineages, nations (in Lough’s sense), and states can all represent clear and present danger as well as safe haven and refuge to women and men or to the multiple species that shape and co-habit the complex ecologies that sustain life. Confronted with absolutist arguments about the goodness or evil of various types and levels of social units I have resorted to role playing. If I cast myself as an African American woman in the rural southern U.S. of the 1960’s, then one nation (African American) is a refuge and safe haven, and the other (dominant white culture/Caucasia) is largely hostile. The local state might be a fierce enemy, while the national state is more friend than foe, for the moment. Lineages vary from brutal and oppressive to nurturing and protective, sometimes combining both. Likewise a whole constellation of formally patriarchal churches actively creates safe space while another cluster of churches indirectly foment violence against me and yet another simply looks the other way as struggles of historic proportions envelop me. I would loathe to write off all of the positive instances of state and church intervention as minor aberrations of civilization. The federal state seems to me to have played a major role in invoking the rule of civil society for a more even distribution of rights, even if assets were not re-distributed. Local states often acted to maintain segregation and white
privilege. Churches varied, with major differences within and among particular denominations.

In contrast, if I try to imagine the experience of a young Dominican man (age 18, living in 1998 in the inner city of a rusting post-industrial region) then the local state, the national state and the local (white) homeowners’ association may all be hostile. Fractal nations might well be expressed as gang turf in neighborhoods and identity politics at city level, both of which might pit him against others who share much of his experience. The patriarchal, extended family and community level rainbow coalitions might represent the safest havens, or alternatively, elite (and usually private, white and patriarchal) schools might best shelter the “high achievers” among his peers. Shelter, survival and life-affirming values may be rooted in communities of political solidarity as well as in biologically related male lineages. The state and the gang might well conspire (unwittingly in concert) to send him to prison, where fraternal nations re-assert themselves in even starker and more brutal terms. His mother might find her sons to be more at risk from state and gang violence and her daughters from “domestic” violence. Yet the daughters might also be prosecuted and imprisoned by a hostile state for domestic relationships with “outlaw” men. They might in turn be sustained and supported by extended families and women held together within patriarchal lineages.

A contemporary international example of the changing and complex roles of social organizations and institutions is that of U.S. sponsored land tenure reform in the “transition economies” of Eastern Europe. In Albania, the “liberal” land tenure reform in the 1990’s has taken land back from the state (and actually existing communities which had sprung up on the state land over several decades). The land is then re-distributed to the “original and rightful owners” according to the “national culture” and local lineages, that is, to the “patriarchs.” They refer to themselves by that term and are so named in formal reports to USAID. Immigrants and other non-lineage residents and women then ceased to have any standing as legal occupants and users of the land. Here we have a mix of multi-national corporations, intergovernmental agencies and national bureaucracies acting to dismantle state power over land and people and to restore nationalist and explicitly patriarchal power over women and land. Actually existing communities of people who are from the place but not lineage members are simply disenfranchised. Their material dependence on the land and daily practice of social and ecological relations over decades is erased, trumped by “nation versus state” arguments.

The recent protests over privatization of state forest lands in Nairobi, Kenya — led by women’s groups and students — provide a very dramatic and positive example of multiple subjectivities at work in actually existing ecofemi-
then links civilization to patriarchy, misogyny and ecocide. We are left with a necessary link between literacy (and all literate humans), misogyny and ecocide.

We need to look at proximate structures of control and dependency that selectively damage people (by gender, ethnicity, nationality, religion, class) and ecologies, and we also need to examine the larger (and less selective) webs of control and dependency. And we ought to observe the leakages and linkages between systems, a subject treated in depth by Donna Haraway. The frequent references to discourse in global struggles and to the linguistic tricks used to demonize or dismiss resistance would find resonance and clarification in the work of Escobar (1994, 1996), among others.

Overall the necessity arguments block any possibility for mapping our way out of the mazes that contain and constrain us. If we can see the complexity of those mazes, with all their branches and turns, we are more likely to see a multitude of possibilities for ways out, through and around the structures that both support and distort our lives. In a word, the necessity in Lough’s argument is entirely unnecessary.

Families, Values and Valuation

The article ends on a troubling note, with an appeal to reconsider our values and re-think our social, ecological and economic politics. Lough asks “What is your life support system worth? And that of your children and loved ones?” What else is at the root of patriarchy but seeing the world as the life support system of ourselves and our progeny? Isn’t that what gave rise to so many of the very real problems he’s raised? Isn’t part of the problem the fact that powerful people so often try to make ecologies into subsidiaries of private lineages, economies and other “members only” institutions.

What else would improve our ability to tackle these questions? On the ecological side I would return to the work of Howard Odum and other systems ecologists, as well as Rappaport and the cultural ecologists. The discussions of efficiency would be better grounded in the work of Odum and several of his colleagues and students, who include solar energy as an input, which incorporates land area, and substantially changes calculations of efficiency. Lough’s energy analysis, as far as I can determine, is based on human energy input as if the sun didn’t matter. Gerald Leach (1976) conducted an illuminating analysis of energy returns to labor, land and other inputs under a wide variety of agricultural systems, from foraging and shifting cultivation to highly industrialized monocrop production. The winner of the optimal land/labor/energy efficiency contest in his analysis was Chinese peasant agriculture of the 1930’s. Other subsequent analyses have found the Quaker farms in Pennsylvania to optimize returns to land and labor in energy terms with substantial use of unpaid family labor. The contrasts and common features of these two systems present a sobering prospect for linear models of literacy, labor, politics and energetic efficiency. Each case offers a very instructive example of the complex relationships between social systems and technologies, without assuming that the connections are necessary.

Perhaps the really important question is “Where do we find the roots of a common sense of social and ecological proportion, connection, and responsibility?” Where do respect for human rights and reverence for life reside? How is it expressed and mobilized? Why is it situated in particular social relations? How does it relate to other social and biological categories? How does this impulse toward affinity articulate with relations among groups of people and between humans and other beings? Is this sense of social and ecological responsibility widespread? Is it identified with a particular level of social organization or is it an opposition force existing within and across many levels of organization and in networks across many places? How can we foster it?

While Lough largely historicizes and institutionalizes difference I would prefer to socialize it and to recognize the differences within and across cultures as well as historical periods. In fact, I’d like to get beyond social location in the institutional sense and complicate our situation. To embrace complexity is to accept the possibility of desired changes as well as surprises.

Nothing is what it seems at the moment or what it was at its inception, least of all the partially patriarchal institutions which now do govern so much of our lives and Life-on-Earth. Just as a capitalist society can produce contradictory processes, people and eventually revolutions, so can patriarchal societies (agrarian, industrial, post-industrial) produce complicated encounters and surprising offspring. The apparently ineradicable “march of progress” carries with it the possibility of a street dance or a country carnival. Even as we acknowledge and confront social injustice and ecocidal behavior we can also recognize, and take courage from, the partiality of patriarchy, the complexity of states, nations, lineages and households, and the recombinant possibilities of future cultures and ecologies.

Endnote

1. Footnotes and references can be found at: members.aol.com/dietztvt/HER_lough.html
I would like to raise the following points regarding Thomas Lough’s “Energy, Agriculture, Patriarchy and Ecocide.” First, he blames the destruction of habitat on inefficient food production, but makes no mention of industrial (i.e., large-scale, machine-based) commodity production. Food and other human bodily needs — though their production may require increasing amounts of energy due to inefficiencies — remain finite needs.

Using Lough’s own figures, human food requirement is 2,500 calories/person-day. For 365 days and 5.6 billion persons, the world therefore needs 5.1 x 10^{15} calories. Lough’s worst case food production efficiency of 0.1 means an energy requirement up to ten times higher, or 51 x 10^{15} calories. This is equivalent to around 35 million barrels of oil. Yet, the world today consumes in oil alone (i.e., not counting coal, nuclear and other energy sources) around 23 billion barrels per year, or around 660 times larger than the energy requirements for food production!

I suggest that it is profit-seeking through commodity production that recognizes no limit. It is the engine that propels the non-stop transformation of raw materials from nature into finished products for sale in the market. I believe that if we were to identify the roots of the environmental crisis, this — rather than inefficient agriculture — would be the process to look into.

Second, Lough’s adoption of efficiency (or gain maximization) as the measuring stick for desirable social practices needs to be reviewed. It is true that today’s economics puts gain maximization on top of its priorities. But other criteria have guided human behavior in the past. I would suggest an alternative measuring stick: reliability (or risk minimization).

It was Adam Smith who provided the theoretical foundations for the gain-maximizing strategy, by showing that individuals who maximize gains for themselves are supposedly maximizing the gain for society. Since then, gain maximization has become the mantra of economics, and the unabashed pursuit of self-interest has even become a moral imperative. It may even be said that corporations are a new organism altogether, higher on the food chain than H. sapiens and immune to many of the problems that the latter is prone to. Unhampered by such human needs as air, water or food, and unhindered by such human weaknesses as pity, love, guilt, fear, or kindness, corporations have exceeded all expectations in their relentless effort to transform raw materials from nature into finished products in pursuit of infinite gain.

It would be an interesting exercise to determine what kind of economy — and society — would emerge if most members pursued a risk-minimizing rather than a gain-maximizing strategy. I would expect a society that encourages resource conservation rather than exploitation, cooperation rather than competition, and the expansion rather than the privatization of public commons. I would further expect a society constrained by the limit of zero risk. Again, maximizing society’s optimum is infinite gain, which poses no constraint at all.

There are indications, for instance, that many pre-industrial communities tend to minimize risk when optimizing their resources. Corporations, on the other hand, would optimize these same resources by maximizing their gain. We can expect that the optimum level of resource-use from the corporate point of view will tend to be higher than from the communities’ point of view. Thus, to corporate eyes, as well as to all gain-maximizing interested parties, the community resources would appear to be under-utilized, while the communities themselves would believe their resources are already deployed optimally. Here’s the germ of various resource conflicts that is so common in the countryside.

Third, the personality that embodies in pure form both industrial commodity production and gain maximization is of course the corporation. Modern society, taking Adam Smith’s gain-maximizing idea to its conclusion, has created a legal person that is guided by one and only one motive — the maximization of profit.

Let loose among humans and competing with them for economic advantage — it is a no contest. Unhampered by such human needs as air, water or food, and unhindered by such human weaknesses as pity, love, guilt, fear, or kindness, corporations have exceeded all expectations in their relentless effort to transform raw materials from nature into finished products in pursuit of infinite gain.

It may even be said that corporations are a new organism altogether, higher on the food chain than H. sapiens and immune to many of the problems that the latter is prone to. Having learned how to fight for their rights (“liberalization”), avoid human-imposed restrictions (“deregulation”), and take over government functions (“privatization”), they are now fashioning the entire world in their own image (“globalization”). This is why the world’s ecology today is in crisis.
Response to Commentaries

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I appreciate the comments of Bill Catton, Bob Verzola, and Dianne Rocheleau. While their comments were critical in some ways, they were also supportive and helpful in most ways. Thanks.

Response to William Catton

Catton’s title, “Overcoming Patriarchy and Sexism Won’t Save Us,” is on the money. I agree. Overcoming patriarchy and sexism won’t save us because “overcome” is one of the master’s tools that will never be useful in dismantling the master’s house (Lorde 1984). Also, I think we do not frame “save the world” in the same terms. Catton sees the nearly 6 billion humans as organized into fewer than 200 much larger societies. I see us as four or five thousand societies engaged in struggles against the corporations and militaries of those larger societies that seek to exploit and privatize the peoples and resources of the world.

Ogburn’s 1922 thesis that some parts of a culture change more rapidly than others seems quaint. In a world of thousands of societies, millions of innovations, and very little consensus on what constitutes innovation, transfer or diffusion, it’s hard to test or even observe. The corporate biopirates (Shiva 1997) are very serious about finding and patenting “innovations.” But these “innovations” were known to women in subsistence societies for centuries and regularly fine-tuned as conditions change. It’s hard to locate cultural lag here. Similarly, Catton notes that corporations of the Northern industrialized countries treat the earth’s resources as inexhaustible, thus lagging far behind subsistence societies in which women keep careful account of the relationships between population, resources and environment.

Catton also says that the interest groups that are responsible for the devastation and poisoning of the planet will be antagonized by being singled out, that blaming individual culprits may be counterproductive. But apropos of finger pointing, if we don’t speak truth to power, who will? How will they be stopped? If people don’t know their enemies — the people who are poisoning and destroying us and our habitat — how can humans respond appropriately? In fact, although there are many people involved in the patriarchal corporate-capitalist system, the major wrongdoers are known, and their crimes documented. (Moore 1996; Hightower 1997)

Catton must have skipped over the first paragraph of my paper, in which I specifically disclaimed that my analysis is a call to arms or a “how to stop it.” To re-iterate: “I not only do not presume to know what is to be done, I believe that our problems stem from EuroAmerican men assuming they know what is best, for others and for the planet.”

Catton says that exposing the alleged connections of system flaws to patriarchal patterns and sexist manifestations of power are too simplistic. On the contrary, I would argue that the intersection of corporate capitalism, racism and patriarchy in any locale, at any time, has helped to bring about what Catton calls our “predicament.” These are situationally constructed and situationally specific forces that combine to maintain our ecocidal course. Were that these forces were simplistic.

Catton also suggests that correcting human institutions would not address the problem, and that we should address the big picture, which might reveal that flaws in our own society are perhaps widely replicated in other societies, in which case ordinary political revolution or even a major cultural transformation would not ensure our future. Further, overshooting carrying capacity may not be unique to Homo sapiens. And do we differ from our animal relatives in being patriarchal and sexist? Should we not take into account the possibly pre-human origins of human behaviors we deplore?

On the extent to which the flaws in EuroAmerican societies are found in other societies, the answer is that they are not. This patriarchal paradigm has been historically specific. “Patriarchy was not developed universally all over the globe but by distinctive patriarchal societies. They include the Jews, the Aryans (Indians and Europeans), the Arabs, the Chinese, and their respective great religions. The rise and the universality of all these civilizations, but particularly the Judeo-European one, are based on conquest and war. Europe was not invaded by Africans, but Africa was invaded by predatory Europeans” (Mies 1986, 66).

As for the need to examine recent literature on animal behavior, ethology, and evolutionary theory (including socio-biological literature, I assume), I have been persuaded by Shaw and Darling (1985), Gould (1980, 1981), Lewontin et al. (1984), and by Leacock, Miller, Zihlman and many others I cite in relevant sections of the paper, that these are largely malestream fantasies that have a patriarchal and corporate-capitalist agenda. Our task is not to find out how gorillas and Mbuti might have solved these problems, but to curb the known sociopaths and the social-political structure within which they carry on. More research is not needed on this; instead, understanding and support is needed for the largely unreported but growing grassroots resistance that is occurring.
worldwide as indigenous peoples and their allies are reclaiming their commons. Over two-thirds of the activists in these lengthy, persistent movements are women (Wellin 1996, personal communication). I agree on the importance of carrying capacities. Carrying capacities are sets of conditions that vary by region, habitat, climate, social structure, values, and land use. Carrying capacity is what subsistence societies have tended for thousands of years. In egalitarian societies, women have seen to balancing population, resources and environment.

It is EuroAmerican CEOs, advisors, generals, et al., that need to understand carrying capacity. Try to envision the forum in which the concept of carrying capacity might be discussed and illustrated, along with examples of the thousands of habitats within which carrying capacity has variously been overshot. I submit that there is no such forum. I think that forum is a EuroAmerican male academic fantasy in which people of power will some day listen to academics.

Outlandish ideas. It is outlandish to a subsistence farmer to not save seeds. Yet that is what corporations are forcing in agriculture (Editor of The Ecologist 1996, 1998). If people say, “We can’t stop polluting because we’ll lose jobs,” then try to meet people’s needs. The Protestant work ethic, which makes this sound outlandish, is part and parcel of the problem.

Featherbedding is not an absurd idea. As noted on my last page, the corporate capitalist system continually pours wealth, income and prestige on corporations, their executives, and their stockholders for doing little or nothing, but nonetheless find time to fire workers and order the destruction of habitat. What makes it seem absurd is that I advocate that we featherbed the workers who do the hands-on destruction. We all have to overcome and compensate for a decided class-biased myopia about an egalitarian work ethic.

Actually the idea of featherbedding is alive and well today. As Gottlieb (1993, 301) points out, “[The] Superfund for Workers proposal calls for up to four years of assistance to allow for a change of career for workers who lose their jobs through environmental or occupational regulations or due to a decline in hazardous military-based production. Such assistance includes income and benefits set at average union levels in a particular region, plus tuition for universities or for other programs to help prepare workers for new careers. In this way, Superfund for Workers can be defined as a job transformation strategy for workers in hazardous industries, but only indirectly as an industrial restructuring initiative” (Wykle et al. 1991; Merrill 1991).

The concept of featherbedding is also alive in current debates over the management of rainforests. Schnaiberg and Gould (1994, 38) in discussing the North’s encouraging the South to preserve rainforests rather than deforest them to provide capital for debt reduction or “development,” point out that deforestation was the North’s own path to economic power. If the nations of the South are to be asked to forfeit much of the economic gains experienced by the industrialized world in creating the global climate problem, in order to provide ecological benefits for all, it is only fair that they somehow be compensated for their sacrifice and rewarded for their efforts.

Response to Dianne Rocheleau

Dianne Rocheleau describes — not inaccurately — the feelings that accompanied my research on the subjects at hand — exhilaration, terror, discomfort. But I found no “brick wall at the end of an infinite ride.” Rather I found some substantive interrelations among the four big topics I investigated for ten years — energy, agriculture, patriarchy and ecocide. The evidence I found and brought to bear on these interrelations does not fit neatly into the discourses of sociology, anthropology, or philosophy. Thinking within these discourses has not yielded the solutions necessary to meet our current crises. Thinking outside the box, even outside four boxes, is perhaps academically risky but beginning to make ties between promising discourses is a primary goal of the paper. Rocheleau suggests that the “ride” on which I’ve taken the reader in this paper will leave the reader so confused and dizzy that she “will not recognize the real social, economic and ecological dangers that face us outside.”

Rocheleau seems to fault my paper for not considering technology, gender, nature and power in the far future; and for not appreciating that technology is only as good or bad as the social relations in which it is embedded. The paper was not intended to address the far future, but rather their relationships in the past and present. And as I said in the second sentence of the paper, I do not presume to know what is to be done, and I believe that (in part) our problems stem from EuroAmerican men assuming they know what is best for others and for the planet. I hope that many of the thousands of societies that still exist — our cultural gene pool — will create their own alternatives to the present debacle. As for the social and political relationships in which present technologies are embedded, the paper is informed by the careful arguments and documentations of Joni Seager (1993) and Judy Wajcman (1991), among many others.

Under “Challenges to Patriarchal Civilization(s)” Rocheleau is troubled by my assertion that any civilization is necessarily, always and everywhere, a “bad thing.” I’m only familiar with the civilizations during the period I studied (10,000 BP to present) and they have all been and/or are agriculturally based patriarchies. As for life expectancy, one should not look at life expectancy in industrialized countries alone, since the nourishment of their peoples is now at the expense of the nourishment of Third World peoples who have
been forced to replace their own food supplies with cash crops for export. Life expectancy in civilizations has been and is a matter of class. It is quite low in the Baltimore ghetto today. And although I’m not sure that physical stature is a measure of quality of life in all cases, it is often a sign of the state of nutrition; and as I point out, the Turks and Greeks have yet to achieve the stature they had before they adopted agriculture. The nutrition of most of the peoples of the world still depends on agriculture, and to the extent that agribusinesses continue to commandeer the world’s food supplies, the efficiency of agriculture will get lower and lower, and require further destruction of habitat and continued poisoning of the living world.

Rocheleau also says that I claim that prevailing (pathological) gender ideologies are logical outcomes of biological differences and specific land use technologies. I don’t claim any teleological trajectory here, much less one based on biological differences. I’m with Stephen Jay Gould here, too: if history were run over again, it would be different. The world history that happens to have happened is what I’ve described, and I hope many of us will imagine and develop alternatives to the present system.

Rocheleau also argues that women’s vernacular knowledge (of herbs, healing, nutrition, habitat, socialization, conflict resolution, caring, etc.) has not been eliminated, and that “some people carry over previous types of consciousness into new eras marked by technological and ecological revolutions.” I hope so, and I tried to qualify this loss of women’s knowledge by saying that it is lost to the extent that the habitat and technology to which it has applied is destroyed. One cannot teach one’s daughter to use nonexistent herbs or spinning wheels. And the millions of European women who were tortured to death were thereafter unavailable as mentors.

Under “Biological and Technological Determinisms,” Rocheleau mistakenly accuses me of both. Talking about what has happened is not the same as claiming that that is all that could have happened, can happen, and/or will happen. Nowhere do I argue for a world of illiterate 250-person societies with a total population of 8 million. (I suspect there has been an overshoot, but I wouldn’t hazard a guess as to how much. That’s Catton’s (1982) province.) I specifically eschew such prescriptions in my second sentence. And nowhere have I given the male- and market-oriented population control industry any support. I would argue that a dominant language displaces local languages, especially when survival depends on learning the dominant language; and I would argue that hierarchies on the scale that have characterized the civilizations of the past are dangerous and bad for habitat and peoples. As for the distinction between organization and hierarchy, that is certainly a matter of scale.

Again, characterizing what is or what has been is not the same as essentialism or dualism, and nowhere do I dichotomize culture and civilization, nor do I place pre- and post-agricultural societies as polar opposites. Such binary logic is not mine. There were, of course, important changes that accompanied the adoption of agriculture, but the small economies that survive today use a variety of strategies for subsisting, including gardening, fishing, wage labor, hawking and vending and bartering, etc. Insofar as they resort to agriculture (deep plowing and monocropping) it is only a question of time before the soil will be depleted.

The remainder of Rocheleau’s commentary seems to be devoted to examples of oppression of women in subsistence societies and safe havens for women in the midst of patriarchy. Of course. There are thousands of societies, and they were not made by cookie-cutters. There are degrees of patriarchy and degrees of egalitarianism, just as there have been and still are degrees of dominance over slaves. (I am cautious about the analysis of the good works of the U.S. government, USAID, and the like. The government lies and the media swear to it.) I see many reasons for optimism in the widespread resistance to corporate takeover. Few of these struggles are covered by the mainstream media, and most are composed mainly of women. Also, there is a growing healthy resistance to the neocolonial governments of the world, especially by the indigenous nations of the world. But these were not the subject of my paper.

Toward the end of Rocheleau’s commentary she alleges historical absolutism, according to which certain types and levels of social organization are more woman-friendly and habitat-friendly than others. At the beginning of the section on the privatization of women, I cited eight works that contain several hundred references to gender-egalitarian societies. I recommend that all of us spend some time poring through some of them for the absence/presence of historical absolutism.

Again, I am not positing a necessary connection between particular kinds of technologies, economies, cultures and polities. I just reported out on the connections I found in the literature. I can appreciate that Rocheleau doesn’t like what I found; most of us don’t, or we wouldn’t be doing this sort of work. On the connection between literacy and civilization, historians use literacy as one criterion of civilization (even though they disagree on other defining characteristics of civilizations).

The last section of Rocheleau’s commentary — “Families, Values and Valuation” — leads me to believe that Rocheleau at least misconstrued some parts of my paper. I hardly ignored the sun; and although I found Tom Odum’s analyses too speculative to be of use in my study, I use Tom’s brother Gene’s text for reference. Rocheleau doesn’t seem to understand energy efficiency in the way I am using it or she
wouldn’t cite Chinese agriculture and Quaker use of family as winners in the energy efficiency contest. Calories don’t lie, and don’t depend on family labor — which is, after all, labor. The first and second laws of thermodynamics are not likely to be repealed by social arrangements. I provided relevant citations on this.

In closing, I urge Dianna Rocheleau to envision her own future; I specifically refused to do it on anyone’s behalf.

Response to Roberto Verzola

Roberto Verzola says I blame the destruction of habitat on inefficient food production, and shows that there is plenty of energy to provide enough food for all, using even the worst case inefficient technology to produce it. He goes on to argue that the root of our environmental crisis is profit seeking through commodity production that recognizes no limit.

I did not blame the destruction of habitat solely on the efficiencies of agriculture. Instead I showed that agriculture, by definition, has always involved the destruction of habitat, and that it virtually always involves patriarchy. Patriarchies seem to endure over time and involve traditionally male values and projects — warfare; luxury for the rulers; subservient women, slaves, and workers; alienation from habitat; and ideologies that involve the worship of hierarchy.

Verzola has mistakenly conflated my use of efficiency with his notion of gain maximization. I cite the Principle of Least Effort to show that the most efficient food procurement strategy involves as little work as possible, not the most food at whatever cost. Modern agriculture seeks to maximize product (and therefore profits) no matter what the efficiency; and because of great power of transnational corporations, they have virtually unlimited access to available energy. I suspect that biogenetically engineered produce has driven the efficiency of food production even lower than 1 percent.

Verzola and I agree on the inconsistency between reliability and gain-maximization. (Although he again equates efficiency with the latter. The most efficient use of energy would involve the least work for all involved, and certainly no maximization of product.) In this connection he wonders what kind of economy or society would emerge if most members pursued a risk-minimizing strategy. As the literature just cited will attest, the societies that minimize risk have already been found and described. They are gender egalitarian societies, practicing subsistence gathering and horticulture, in which traditional women’s values are held — nurture, caring, healing, and balancing population, resources and environment.
Better Not Bigger: How to Take Control of Urban Growth and Improve Your Community

By Eben Fodor
New Society Publishers, 1999
Gabriola Island B.C., Canada.

Reviewed by Graham Brown
University of Utah
Family, Consumer, and Community Studies Department

Portland is an area that has been dealing progressively with growth issues for many years. By living in this area, coupled with his professional experience as a planning consultant and educational experience in environmental studies and urban and regional planning, Eben Fodor is an appropriate witness to and commentator on growth issues.

The focus of the book is to refute the idea that growth is a natural extension and necessary function of our society. In the opening chapters he outlines the course of the book and sets the stage for his argument. Chapter 1 extends the introduction and generally defines growth and the problems associated with too much growth. Here he expresses his concern for the “endangered landscape” that is threatened by development.

Fodor describes growth as a machine with various parts and argues that growth is primarily a business. Fodor also points out who are the key players and major benefactors in the growth business. He follows up this idea with illustrations about the costs to taxpayers of new developments. He believes that citizens can combat growth through involvement in local organizations, writing letters to the editor, and becoming active participants in the planning process.

Fodor explores 12 common myths of growth that are used by growth proponents to encourage further growth. He debunks these myths with common sense, logic, anecdotal support, and occasional empirical research. Equally as important, he does not just criticize but offers alternatives and subsequent policy. Although growth proponents often claim that growth is good for creating jobs and making housing affordable, Fodor contends that the external competition for employment results in the same proportion of unemployment and negligible affects on housing.

He supports smart growth but ultimately his utopia is no growth. More precisely, he suggests that we strive for qualitative growth as opposed to quantitative growth. He uses the analogy of a library that does not grow in size or number of books but replaces existing books with higher quality ones. In the same sense, he advocates that we can build qualitatively better communities, despite the absence of growth.

Although Fodor clearly prefers no-growth strategies, I was pleased to see him devote part of a chapter to growth management issues (Chapter 6). As is the case in Salt Lake City and county, internal population increases will necessitate growth so it is important to recognize the need for smart growth. He describes several cities’ growth management issues and strategies with regards to housing, employment, and population increases. Interestingly, Portland has recently adopted a new approach to growth management. As reported in the New York Times (6/9/99) Portland has adopted a policy that will penalize companies for adding jobs. This is in line with Fodor’s account of Boulder, Colorado, another community that has a history of policy changes consistent with qualitative growth ideals.

I applaud his efforts to represent the growth issue and support his arguments through multiple sources of information. He uses both real and hypothetical examples to support and clarify points. He further draws on his experience and previous work to describe many growth scenarios. For example, he draws upon his economic background to include an informative chapter on the economic costs of growth versus non-growth. This extends his previous work in the area where he recently published a paper in Population and Environment (vol. 18, 1996) called The Real Cost of Growth in Oregon.

Despite the overall sound line of reasoning and use of multiple sources of information, I felt that the arguments could have been strengthened by addressing the psychological consequences and aspects of growth — i.e., disruption of sense of community. A concern of Fodor was the lack of research to support many claims. Although there may be a deficiency in growth development research, there is a wealth of psychological literature that could be used to strengthen Fodor’s claims (i.e., community, environmental, and social psychology included). He does mention some psychological effects (including loss of sense of community) but does not offer empirical research to develop or support these claims. Similarly, he talks about the economic costs in detail and suggests that the environment and social costs may be even higher but does not fully develop these suggestions.

This book has the potential to impact policy. However, at a minimum, Fodor needs to offer a cautionary note about many of the studies he reviews. Many results are descriptive and correlational — the same statistics that are used by the “other side” to promote growth. We need further research to confirm earlier findings and to explore new options. Unfortunately, as pointed out by Fodor, there are many barriers to this research. However, there are also great opportunities for disciplinary collaboration among sociologists, psychologists, geographers, planners, economists, etc. Either way, there needs to be more research in order to create sound policy.
On a different note, the beginning survey that precedes the first chapter sets a polemic tone at the outset and suggests that the book will be a one-sided call to action. Although Fodor clearly advocates against growth, his treatment of the issues is more scholarly than the introductory survey would suggest. Similarly, in the concluding chapter, I felt that Fodor’s impassioned plea for sustainable development distracts the reader from an otherwise stimulating discussion of growth. His critique of technologies’ impact on our current lifestyle seems to advocate for a reversal to earlier times. Although he raises some valid points, they are incongruent with and distract from the rest of the book. These remarks may turn a lot of people away from what is an excellent and timely argument against uncontrolled growth. In contrast, I feel that the points made further in the chapter about the distinction between quantitative growth and qualitative growth provide a more coherent focus to the book.

On the one hand, I feel the need for the author to discuss growth issues in greater depth (particularly with reference to psychological, social, and environmental issues). Yet on the other hand I would suggest a briefer version or report that would reach the policy makers. For example, he could use an executive summary at the beginning of the book that outlines the critical points of the book and links the reader to the appropriate section in the book where the issue is discussed in depth. I feel that this would be a lot more useful than the sarcastic survey (at the beginning) which immediately makes people skeptical about the contents of the volume. Nevertheless, this is a timely book that discusses a theme of vital importance. The book can be targeted to several audiences all of whom would benefit, including residents who are concerned about growth issues, policy makers who could use the information to aid their decision making, and academics who will note the many areas that need researching. More research would in turn inform the debate and help create better policy.
Briefly Noted

Edited and Compiled by Scott D. Wright
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Nature & The Orient: The Environmental History of South and Southeast Asia.
Edited by Richard H. Grove, Vinita Damodaran, Satpal Sangwan
New Delhi: Oxford University Press, 1998
ISBN 0 19 563896 4

This book serves as an introduction to issues in the environmental history of an enormous contiguous region stretching from Peshwar and the North West Frontier in the west to the Maluku islands of Indonesia in the east. Although this region is immensely variable in terms of climate, topography and culture, it does constitute a very meaningful whole in terms of the collective history of its resource management over the last two centuries. A major objective of this book is to critically examine the development of colonial discourses about nature, risk and the control of natural resources. The editors also aim to make a start in building up a picture of the indigenous response to changing patterns of environmental control, both under colonialism and in the post-colonial period. A sweeping scholarly project containing 31 chapters and over a 1,000 pages of material that covers not just the “grand themes” in environmental history, but also highlights the very local, small-scale histories of single communities and their experiences of ecological pressures and change over time.

Guyana: Fragile Frontier
Loggers, Miners, and Forest Peoples
By Marcus Colchester
New York: Ian Randle Publisher (IRP), 1997
ISBN 0 85345 971 1

Guyana’s environment is now in danger of wholesale destruction. In the name of structural adjustment, this poor and indebted country is promoting a dramatic escalation of logging, mining and other forms of extraction. Half of the country has a new and potentially disastrous boom. The Omai mine disaster of 1995 was dramatic proof of the environmental threat. At the center of Guyana’s ecological crisis stands the country’s indigenous peoples, long marginalized and threatened by violent conflict with loggers, miners, and ranchers.

Marcus Colchester is Director of the Forest Peoples Programme of the World Rainforest Movement.

Ethnoecology
Situated Knowledge/Located Lives
Edited by Virginia D. Nazarea
Tucson: University of Arizona Press, 1998
ISBN 0 8165 1882 3

The re-emerging field of ethnoecology offers a promising way to document and analyze human-environment interactions. This collection brings the discipline into sharp focus, conveying local understandings of environments and proposing a way of looking at the relationship between humans and the natural world that emphasizes the importance of cognition in shaping behavior.

Case studies by international experts explore the varied views of scholars on the human dimension of conservation and the different views of local peoples regarding their own environments. Filled with peoples’ voices from North and South America, Africa, and Asia, these cases cover a range of issues: natural resource conservation and sustainable development, the relationship between local knowledge and biodiversity, the role of the commons in development, and the importance of diversity and equity in environmental management. As the only volume to address the status of this increasingly multidisciplinary field — especially as it relates to the differential power of multiple stakeholders — Ethnoecology: Situated Knowledge/Located Lives is intended for a wide range of specialists not only in social and natural sciences but also in agricultural studies. It conveys the overriding importance of this powerful methodological approach in providing insiders’ perspectives on their environment and how they manage it.

Virginia D. Nazarea is Associate Professor of Anthropology at the University of Georgia and the author of Cultural Memory and Biodiversity.

Toward Sustainable Communities, Resources For Citizens and Their Governments
By Mark Roseland with foreword by Hazel Henderson
ISBN 0 86571 374 X

Sustainable Development—Yes! But how do we actually do it? This completely updated and revised edition of Mark Roseland’s classic text is the best resource available for citizens and their governments on how to apply the concept of sustainable development in their communities. Toward Sustainable Communities offers practical suggestions and innovative solutions to a wide range of municipal and community problems in clear, accessible language. Topics include:
• making community policy
• greening the city
• water and sewage
• waste reduction and recycling
• energy efficiency and renewables
• atmosphere change and air quality
• transportation planning and traffic management
• land use and urban form
• housing and community development
• community economic development
• governance, and tools for community sustainability

Chapters include Tools and Initiatives sections, plus essential contacts and references including e-mail and web addresses.

Mark Roseland is the editor of the Eco-City Dimensions: Health Communities, Healthy Planet and is past editor of RAIN magazine. He directs the Community Economic Development Centre at Simon Fraser University in Vancouver, British Columbia, and teaches in the Department of Geography.

Chicano Culture, Ecology, Politics: Subversive Kin
Edited by Devon G. Pena
Tucson: The University of Arizona Press, 1999
ISBN 0 8165 1873 4

Until recently, mainstream American environmentalism has been a predominantly white, middle class movement, essentially ignoring the class, race, and gender dimensions of environmental politics. In this provocative collection of original essays, the environmental dimensions of the Chicana/o experience are explicitly expressed and debated. Employing a variety of genres ranging from poetry to autobiography to theoretical and empirical essays, the voices in this collection speak to the most significant issues on environmentalism and social justice, recognizing throughout the need for a pluralism of Chicana/o philosophies. Grounded in actual political struggles waged by Chicana/o communities over issues of environmental destruction, cultural genocide, and socio-economic domination, this volume provides as important series of snapshots of Chicana/o history. Chicano Culture Ecology, Politics illuminates the connections that must be understood among race, ethnicity, class, gender, politics, and ecology.

Devon G. Pena is a Sociologist at Colorado College and past director of La Sierra Foundation of San Luis. He has written several books on Chicano issues.
The past two centuries and especially during the last fifty years, The Condor’s Shadow examines the factors that determine a species’ vulnerability to extinction and reveals the unanticipated, even improbable, consequences or removing even a small part of any ecosystem. A compelling ecological history of American wildlife, The Condor’s Shadow is essential reading to anyone interested in saving our imperiled natural heritage.

Design for Human Ecosystems: Landscape, Land Use, & Natural Resources
By John Tillman Lyle
Washington, DC: Island Press
ISBN 1-55963-720-X

For more than 30 years, John Tillman Lyle (1934-1998) was one of the leading thinkers in the field of ecological design. Design for Human Ecosystems, originally published in 1985, is his classic text that explored methods of designing landscapes that function on the sustainable ways of natural ecosystems.

The book provides a framework for thinking about and understanding ecological design, along with a wealth of real world examples that bring to life Lyle’s key ideas. Lyle traces the historical growth of design approaches involving natural processes, and presents an introduction to the principles, methods, and techniques that can be used to shape landscape, land use, and natural resources in an ecologically sensitive and sustainable manner.

Lyle argues that careful design of human ecosystems recognizes three fundamental concerns: scale (the relative size of the landscape and its connections with larger and smaller systems), the design process itself, and the underlying order that binds ecosystems together and makes them work. He discusses the importance of each of these concerns, and presents a workable approach to designing systems that effectively accounts for all of them. The theory presented is supported throughout by numerous case studies that illustrate its practical applications.

This new edition features a foreword by Joan Woodward, noted landscape architecture professor and colleague of Lyle, that places the book in the context of current ecological design thinking and discusses Lyle’s contributions to the field. It will be a valuable resource for landscape architects, planners, students of ecological design, and anyone interested in creating landscapes that meet the needs of all an area’s inhabitants — human and nonhuman alike.

John Tillman Lyle was, until his death in the summer of 1998, professor of landscape architecture at California State Polytechnic University in Pomona, California.
Human ecology and the human condition: Is it time for SHE to shift gears again? If one takes the biological definition of ecology and applies it to humans, almost all of the human enterprise would fall within the scope of study: what human process, physical, social or spiritual does not have some manifestation in the way humans are wired into the dynamic living and non-living processes around them? But sometimes, to say all is to say nothing, to exclude nothing is to include less. And so, perhaps understandably, many who stand securely in the tall, narrow towers of conventional academic disciplines look suspiciously at human ecology’s attempt to understand ourselves. So be it. They do have things to attend to. Some of the rest of us came to SHE-X.

A conference attendee is perhaps a little like one of John Godfrey Saxe’s blind men at the elephant who concluded, each correctly: “God bless me, but the Elephant is very like a wall!” ... or a spear, a snake, a tree, or ... Each person at a conference with multiple parallel sessions experiences the whole as the sum of the sessions attended, and so each comes away with a definite, but distinct, sense of a coherent whole.

A conference organizer is in a strange position, perhaps — to extend the simile — like a (blind?) bus driver who brings others to the elephant’s tent but must wait outside while they visit. I saw almost nothing of the conference myself, and yet it is possible that I heard reports in one form or another from well over half of the people there. There are three salient images that emerged from this meta-experience of the conference. I was impressed by the clarity and consistency of the images, and I think they are relevant to who we are, or will become, as an organization.

The relevance of the core questions of SHE. The first (but not the most emphatic) image that emerged was of the multifaceted, but maturing, crisis of the human condition. The array of topics being discussed was impressive, but what unified them was that they all represented some degree of dysfunctionality in human ecological relationships, and they all seemed to be mutually contingent. The problems seemed “mature” in this sense: whereas a few decades ago there may have been a wider acceptance of, or faith in, the notion of human progress, and the dissenting view was seen as eccentric, it now seems that the recognition of the problems of human ecology is universal. Alarmist warnings have become conventional wisdom and we are less interested in describing the problems than in working diligently toward solutions. In that, we are ahead of the game. It struck me that there would be great interest outside SHE in knowing more about the work our members do to find solutions.

The intellectual breadth of SHE. The second image that emerged — and this was the one most strongly and most frequently expressed — was of the remarkable power of interdisciplinary encounters. People with very different disciplinary backgrounds found themselves together in sessions on common themes. While some of the language was strange, and the conceptualization of the problem new, people recognized that the same issues and concerns were shared across disciplines. This allowed people to see their own work in a new perspective and also to encounter new ideas with which they could enrich their own research. One person said that it was almost as though long-lost pieces of a puzzle had shown up simultaneously in one room. There was great excitement about this convergence (but, she added, just when they were discovering the remarkable fit, the session ended, and the magic was lost as they dissipated back out into the crowd). There was a general sense of exhilaration, but perhaps also a persistent sense of frustration that — Cinderella-like — the chemistry was ruled by the clock.

Interdisciplinarity, along with the internationality, makes SHE unusual. Could it be true that within our ranks we do, now, have sufficient information and experience to provide new, coherent and compelling solutions to some of the world’s challenges? Could it be that the deficiencies are not in raw data or basic knowledge, but rather in our ability to generate a synthetic view out of the fragments of knowledge that we do have? The Nepalese and Pakistani home economists in our midst perhaps best exemplified the potential. If I understand correctly, home economists treat the family or the home as the unit of analysis. Other scholars view the world at other scales: sociologists view societies; political scientists, nation states; geographers, regions; planners, towns and villages; anthropologists, communities, ecologists, ecosystems; biologists, organisms, etc. The family is the unit of reproduction, of basic education and enculturation, of health, nutrition, security and probably spirituality. It seems so appropriate, indeed, essential as a scale of study and of
action. What productive new partnerships might arise if researchers and practitioners could make their scales of analysis concentric, so that each scale supported and illuminated the scales above and below? The prospects seemed very exciting to many at the conference, and the promise of SHE for facilitating such a convergence seemed great. Yet, of course, meetings end and people do go back to their isolated tasks. How long does the enthusiastic glow of potential synergies last in isolation? Can we be doing more to promote it? The third image may provide an answer.

The dramatic potential for SHE. The last of the three images derives from the first two. It is best illustrated perhaps by a question that was asked by a local journalist: “Will there be a concluding statement on findings from the conference?” During the conference, a few people mentioned that they felt — especially given the good weather on the quiet, bucolic, campus — that we were meeting in relative luxury just to talk, talk, talk. Of course, that is what conferences are, and yet it does seem as though with our impressive intellectual resources and deep levels of commitment we could be turning our attention to more concrete action plans.

The journalist was thinking of something like the International AIDS conference, where the world expects a report on the specific advances since the last meeting. With a narrowly focused research agenda and a clearly defined, sensational crisis situation, salient summaries are feasible. But perhaps SHE is developed enough as a society to generate task forces or working groups on specific questions and to structure, perhaps even seek funding for, strategic analyses. The internationality, interdisciplinarity, constructive thinking that characterize SHE are attributes that could make our deliberations very influential.

We do give titles to our conferences, and these themes do influence the nature of the interaction that takes place during the conferences. But as far as I know, we have not yet gone as far as we could in crystallizing the positive results of our events. In his open letter in HER 5.1, Scott Wright noted, with his references to Wilson’s Consilience, that SHE is an organization that is ahead of its time. This view is reinforced by the three images that emerged from this meeting. SHE draws people who are capable of looking beyond their home disciplines for new ideas and challenges. In our very discipline-based and competitive institutions, this willingness does come at a cost. But, more and more, the world is recognizing the importance of what SHE was premised on: the belief that infinitely fragmenting academic research will not address the integrated challenges that face humans. Those who opened the intellectual commons of human ecology should be rewarded for their foresight, leadership and even courage. The best reward is positive results.

The last of the three images is therefore the most important. Should we be looking for new ways to ensure that the power of our collective knowledge and experience is captured, distilled, and distributed? Should we be attempting to articulate specific questions that SHE can tackle? Should we be able to consolidate material that will permit us to say “yes” to journalists asking for “products”? Of course, the goal is not media visibility, but concrete, positive proposals that can be explained to journalists will also reach the research community, policy-makers and practitioners. New ideas, well explained, do shape human behavior. Ideas on human ecology become part of human ecology. As we move towards understanding human ecology more fully, we should be fully prepared to let that understanding help humans adapt.

Scott reviewed Rich Borden’s initial vision for SHE: meetings, publications and networks. The success has been remarkable and has put us in a strong position.

As SHE-X came to a close, and I reflected on the three meta-images outlined above — leadership on widely acknowledged issues, enormous potential in the breadth of our intellectual base; and significant opportunities for concerted projects — I felt that there may be interest in opening discussions on new activities for SHE. Hence, this letter. Possibilities include setting research agendas, widening cross-disciplinary peer review, supporting strategic alliances, targeting policy issues. Any comments? Perhaps this could be a sub-theme for SHE-XI.
The Parable of the Blind Men and the Elephant
John Godfrey Saxe

It was six men of Indostan
To learning much inclined,
Who went to see the Elephant
Though all of them were blind,
That each by observation
Might satisfy his mind.

The First approached the Elephant
And, happening to fall
Against his broad and sturdy side,
At once began to bawl:
“God bless me, but the Elephant
Is very like a wall!”

The Second, feeling the tusk,
Cried, “Ho! what have we here
So very round and smooth and sharp?
To me ’tis very clear
This wonder of an Elephant
Is very like a spear!”

The Third approached the animal
And, happening to take
The squirming trunk within his hands,
Thus boldly up he spake:
“I see,” quoth he, “The Elephant
Is very like a snake!”

The Fourth reached out an eager hand,
And felt about the knee:
“What most the wondrous beast is like
Is very plain,” quoth he;
“Tis clear enough the Elephant
Is very like a tree!”

The Fifth, who chanced to touch the ear,
Said, “Even the blindest man
Can tell what this resembles most;
Deny the fact who can:
This marvel of an Elephant
Is very like a fan!”

The Sixth no sooner had begun
About the beast to grope
Than, seizing on the swinging tail
That fell within his scope,
“I see,” quoth he, “the Elephant
Is very like a rope!”

And so these men of Indostan
Disputed loud and long,
Each in his own opinion
Exceeding stiff and strong.
Though each was partly in the right,
They all were in the wrong!

So, oft in theologic wars
The disputants, I ween,
Rail on in utter ignorance
Of what each other mean
And prate about an Elephant
Not one of them has seen!
The Society for Human Ecology

Notice of Award Winners

of the

Student Paper and Presentation Competitions

Tenth International Conference

Montreal, PQ, Canada
May 1999

Student Paper Award Winner:
Mary Catherine Cox
University of Michigan
School of Natural Resources and Environment
“Human Ecology and Conservation:
What Characterizes Successful Community-Based Conservation?”

Student Paper Award Finalists:
William Hipwell
Desiree DiMauro

Student Presentation Award Winners:
Sean Markey
Brian Donohoe
Society for Human Ecology

XI International Conference
Democracy and Sustainability: Adaptive Planning and Management

October 18 – 22, 2000
Snow King Resort
Jackson, Wyoming

The Society for Human Ecology has been meeting at 18-month intervals since 1985. Scholars and practitioners from around the world have gathered at these conferences to consider issues, exchange theory and research, and develop the emerging field of Human Ecology. The theme for 2000 reflects the growing emphasis on making environmental and resource decisions amongst an engaged and interested public. The 21st Century can be expected to see increasing public involvement while land managers strive to plan and manage in ways adaptive to ecological needs and human desires.

We anticipate significant participation by resource practitioners and interested parties in the Jackson Hole region at SHE-XI, including demonstration tours of human problems in resource management.

The structure of the Conference will include: Paper Sessions, Symposia and Round Table Forums, and Poster Presentations concerning research and theoretical development within Human Ecology. Traditional SHE subject areas have included population, evolution and human behavior, impacts of environmental change, trade and environment, collaborative planning and decision making, democratic processes, equity & environmental justice, perception of environment, ethics and aesthetics. Papers and Forums on Human Ecology Education and on Sustainable Development are also welcome.

If you would like to attend, chair a session, present a paper or poster, organize or take part in a round table, please reply at your earliest opportunity. Send presentation proposals, including Title, Authors, Abstract, and general category to: Jonathan_taylor@usgs.gov, (Dr. Jonathan G. Taylor, First Vice President, Society for Human Ecology, C/O USGS/MESC, 4512 McMurray Ave, Fort Collins, CO 80525, FAX 970-226-9230).

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• Provide a forum through which scientists, scholars, educators, and practitioners may exchange ideas and information
• Promote the advancement of an ecological perspective in interdisciplinary studies and practice
• Identify problems, discover their origins, examine possible solutions and their implications, and then make recommendations for implementing those solutions
• Anticipate the consequences of human action on our social, natural, and built environments
• Build cooperative arrangements among human ecology programs and organizations throughout the world
• Facilitate the exchange of this information throughout our international network of individuals interested in human ecology

The Society holds regular conferences, conducts workshops and symposia, and co-sponsors a variety of related activities to further integrate work among professionals in fields pertaining to human ecology. SHE is an affiliate of INTERCOL (International Association for Ecology) and IAIA (International Association for Impact Assessment) and works in a consortium with other national and regional human ecology organizations throughout the world. Members of SHE receive a subscription to Human Ecology Review; special purchase rates for the International Directory of Human Ecologists containing descriptions of the background, current work and areas of interest of human ecologists around the world; reduced rates on other selected journal publications; reduced registration fees at SHE conferences; the opportunity to join the society's special interest working groups on planning, health, modeling, theory, and education. Membership fees are $50 for regular members, $150 for contributing members, $1,000 for sustaining members, and $25 for student members. For membership information contact: The Society for Human Ecology, College of the Atlantic, 105 Eden Street, Bar Harbor, ME 04609, USA.
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