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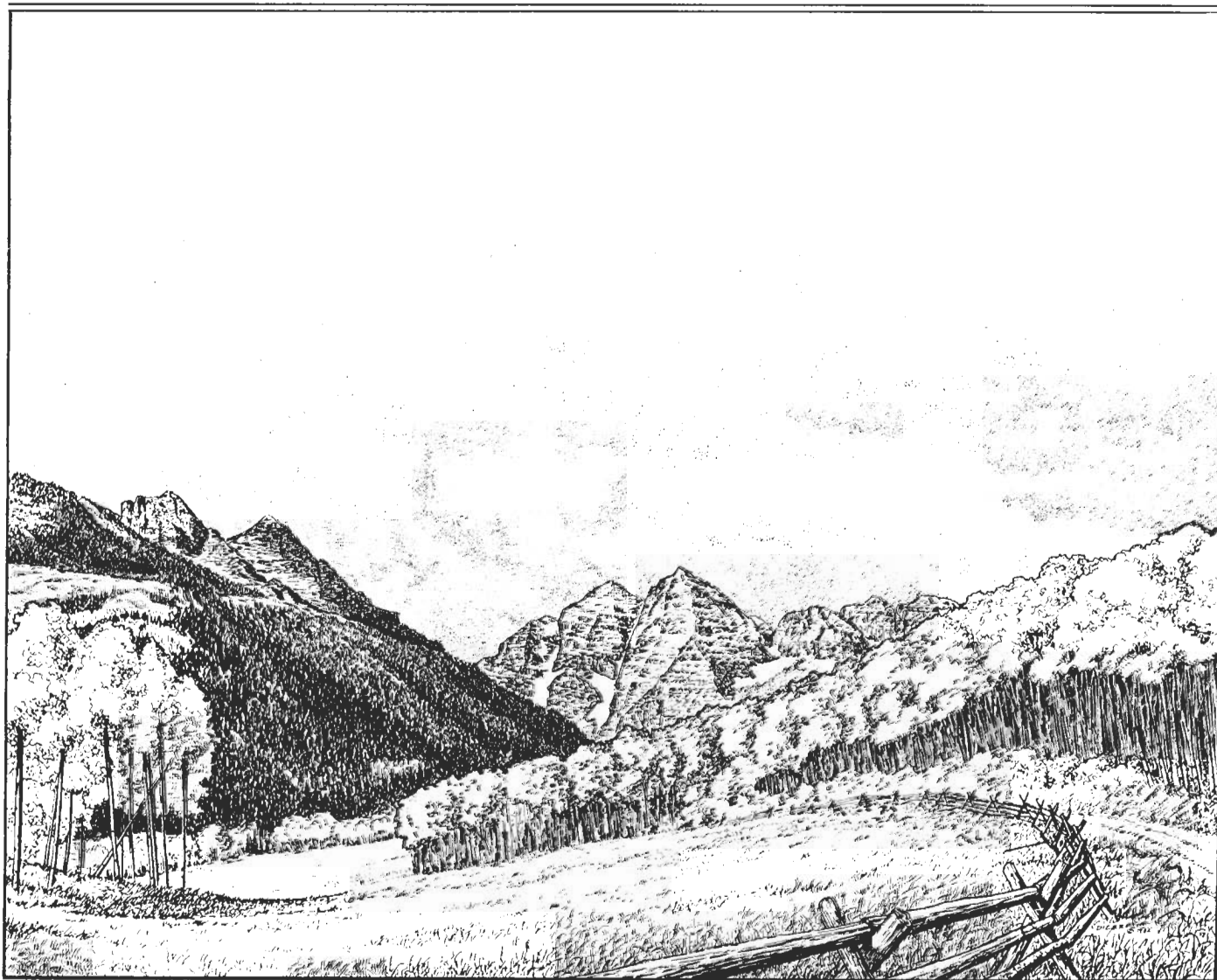
WILDERNESS, TECHNOLOGY, FORESTRY & AGRICULTURE

The Aim of **The Trumpeter** is to provide a diversity of perspectives on environmental relationships and Nature. By "diversity" we mean cross- and transdisciplinary reflections from both scholarly and nonscholarly sources. Our purpose is to investigate deep ecological philosophy as this manifests itself in the activities and lives of people working in different ways to come to a deeper and more harmonious relationship between self, community and Nature. **The Trumpeter** is dedicated to exploration of and contributions to a new ecological consciousness and sensibilities, and the practice of forms of life imbued with ecosophy (ecological harmony and wisdom). **Published Quarterly by LightStar Press, P.O. Box 5853, Stn B., Victoria, B.C., Canada V8R 6S8.**

BACK ISSUES: Vols. 1 - 5 are still available. Vol. I, presents basic ecophilosopical concepts and reading lists; Vol. 2 features a three issue focus on ecoagriculture; Vol. 3 has a three issue focus on wilderness; Vol. 4 features articles on love, sex, ecology of self, ecofeminism, magic, animals, place and ancient ecology; Vol. 5 features papers on parks, deep ecology, bioexuberance, sustainable development, technology, sense of place, Wittgenstien, and paganism. Each volume of back issues is $12 for volumes 1 & 2, $14.00 for 3, 4 & 5. Includes postage and handling, bookrate.

THE TRUMPETER
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EDITORIAL: BRINGING THE STRANDS TOGETHER

Alan R. Drengson

Many years ago a group of us in a boy's hiking club participated in the construction of a float for a forest festival parade. The man who supervised our efforts, and who supplied and drove the truck upon which the float was built, painted the signs we nailed to the final product. The float looked like a forest mound as it was covered with boughs and other greenery, which we picked in the surrounding forests. On each side of the float we attached a sign that read **THE GREEN TRAIL IS THE RIGHT TRAIL**. One of the themes of forest festivals was protection of the forests, and part of their educational message was what we each could do to prevent fires and protect the forests. This event took place in the late 1940's. At the time none of us realized how prophetic those signs were.

If we have learned anything about our most recent relationships to Nature, in the dawning Age of Ecology, it is that we cannot go on with business as usual. The greening of awareness that began with Earth Day in 1970 was set against an historical background of continuing regional environmental crises, with their readjustments of attitudes and practices, that stretched back to the dawn of history.

Some say the emergence of agriculture marked the most significant human break with Nature. Many myths from early civilization reveal intuitive knowledge of this rupture. The Old Testament story of Adam and Eve, e.g., can be read as such an ecological message. Once humans left the oneness with Nature of the Old Ways of life (Eden), they had to suffer hard labor and an uncertain food supply. Instead of timeless leisure and play in Nature, living off the surpluses of the Garden of Eden, they were forced to toil and wrest their living from the soil and flocks. Such visions of a pre-fall (preagricultural) paradise often have been accompanied by visions of post-fall historical life as a time of trials. In some circles it is thought that this time of trials will be

followed by a new era, a new dawn, a new age, a new Edenic state, a new paradise. Utopian visions pull at our imaginations, but today they centre around ecotopian dreams.

In retrospect, the ecological consciousness of the 1940's appears naive, and yet the agricultural and forestry practices of then were much sounder, ecologically, than those dominant today. The post war binge of further industrialization of forest and farm involved rapid movement away from agricultural and forestry practices of small scale. It introduced the large scale use of fossil fuels and petrochemicals; it has been a period ruled by short-term profits. Many of these post war practices have been mistaken. We now know that it is not necessary to level the forests to have forest products, nor is it necessary to poison and mine the soils to produce farm products. With new ecologically sound practices, we can have what we need, while we preserve and increase the richness and diversity of forests and soils.

The dust bowl generation in North America was forced to take stock of earlier practices, and during the recovery period there was progress toward ecologically sound management of farm and forest lands. During the post war period this was swept away by the torrent of change brought on by cheap oil and rapid economic expansion. There were many reasons why the ecologically sounder practices were abandoned. There seems little point now in agonizing over these details. Nonetheless, the lessons from the history of civilizations are obvious. Cultures which abuse their farm and forest lands ultimately falter and collapse. In North America we have in a short time razed forests, and degraded grass and crop lands upon which Nature built biological richness. We have been spending these riches with the abandon of drunken sailors on their last shore leave. The results are becoming painfully evident.

The interconnections between removal of forests, burning fossil and forest fuels, destruction of farm and grazing lands, extinction of species, the greenhouse effect, the death of forests from acid rain, and a host of other damages, should be plain. Given our context, it is hypocritical to bemoan the destruction of tropical forests by cut and burn methods, when we are doing essentially the same thing to our own lands and forests. Tropical forests must be saved, to be sure, but then so must all of the forests of the planet. Nothing will save the Earth from desertification and the greenhouse effect, except a dramatic change in energy consumption and in forestry and agricultural practices; there must be a world-wide effort at revegetation and reforestation of all damaged lands. The alternatives to the ecologically bad practices of the past and present are now well proven; they are already being practiced on a small scale. It is time to make an all-out effort to stop the damage we are doing, as well as to restore lands that are damaged. One key lies in changing our management philosophy and technology practices.

The actions we must take involve working on many levels at once, personal, local, regional, national, and international. We must eliminate waste, recycle resources, cut consumption levels of raw materials, eliminate pollutants, change life styles, improve social justice, work toward world peace, demilitarize human life, and develop new, more appropriate technology and energy practices. Ecological realities require dedicating ourselves to lives of nonviolence in all our relationships, with one another and with other beings. We must rapidly switch to new agriculture, new forestry, new mining, new fishing, and new technology practices, which will eliminate destruction of ecological communities and the ecosystems of the Earth. Switching to new ecologically sound methods in resource use and management, as well as to life styles that are conserving, will increase our total wealth, well being and security, for with a flourishing of life there will be less waste and pollution but more biological richness. At the same time we will be able to create more meaningful work. Such a shift, however, will require structural changes in our society, in both the public and the private sectors of the economy, since as things now stand there are strong incentives to liquidate forests and mine soils for short term gains.

Our appreciation for wild Nature must deepen so that we preserve as much wilderness as possible, not only for future human prosperity, enjoyment, and survival, but also out of love and respect for the creative power of Nature and Its myriads of beings. We each need to be ecosophers, to develop our own unique forms of wisdom, within our unique places. Our practices must grow in ecosophy as they lengthen in years.

In this issue of **The Trumpeter** many themes from past issues come together as part of the continuing unfolding of visions relevant to the dawning Age of Ecology and to the regreening of Earth and human life. Let us bring together these strands of wisdom that bear on our various practices, and on the arts of peace, social justice and structural reform. Ecosophy crosses all boundaries: ideological, political, economic, religious, and cultural. Ecosophies are the spiritual common ground on which all peoples and beings can meet. Let each of us sow seeds, plant trees, and care for other beings, nourish the Earth and each other, take up ways of life that are ecologically sound, support others in like efforts, and work for social and economic reform. Let us follow **The Green Trail**, because it **is the right trail**, the path of life.

WAYS TOWARD MOUNTAINS

David Rothenberg

I

What exactly are we reaching for when we speak the word 'mountain'? Are we naming a particular feature of the landscape, organizing a common experience of the land, or commenting on a quality within a nature that permeates all things? In the accounts which follow, we reflect on different ways of encountering mountains, and different ways of describing them. The idea of mountain that emerges is one of several discrete and valid meanings, some which encompass the others. What separates them is a change in the amount of emphasis given to the connection between the knower and the mountains, between humanity and nature.

By examining Petrarch's fourteenth century ascent of a mountain in southern France, we will find a desire to know a specific mountain which finds its greatest significance as an analogy to the human soul. A roughly contemporary Japanese Zen text reveals fluid mountains which are inseparable from our human selves. Following these, we shall speculate through memories and dreams to reach mountains which are present everywhere, as a quality or category which gives a natural structure to our world as we construct it.

Why look at mountains in this way? Beginning with a basic form we think to be in nature, we show that it only exists in a nature that encompasses our recollections and dreams, as well as the Earth's physical form, within and without.

II

On April 26, 1336, Petrarch ascended to the summit of Mount Ventoux near Avignon. His description of the ascent, written in a letter to his friend and confessor, the monk Dionysius in Paris, is famous for being the first modern account we have of a European climbing a high summit for pure pleasure alone. Petrarch intends to see more of the world by climbing the mountain. But when it comes time to recount the events, he entitles the letter "Concerning Some Personal Problems."[1] The problem which Petrarch comes to realize is that his very desire to pay attention to nature is a distraction from the true purpose of humankind -- contemplation of the soul. Petrarch goes out into nature, but finds only himself, for, he has not learned how to see outside the bounds of his inquiring mind.

Petrarch has lived in the vicinity of Mount Ventoux, the "Windy Summit," for years, but does not feel he knows it until he ascends to the summit. He writes: "My only motive was the wish to see what so great an elevation had to offer." To offer? What can a mountain **offer** us? This will be an important way to approach mountains -- to ask them for something, and try to receive what they give. Petrarch decides that to participate in the offering of the mountain means climbing to its summit and looking out from it upon the world.

> The mountain is a very steep and almost inaccessible mass of stony soil. But, as the poet has well said, "Remorseless toil conquers all."

The goal presents itself as imposing, but Petrarch is initially optimistic. He knows he will make it. Yet the route he chooses is slow and circuitous. His companions, namely his brother and two servants, take a more direct route up the ridge, while he tries an "easy, roundabout route through winding valleys." But he soon corrects himself -- there is a moral problem. He is only trying to avoid the the exertion of the ascent, but "no human ingenuity can alter the nature of things, or cause anything to reach a height by going down." He walks with an Aristotelian notion of nature, that it is **the way things are**, which cannot be altered or subverted.

Petrarch rapidly realizes the root of his frustration: an attempt to go against this nature. Getting tired after a few hours of unnatural route choice, he sits down and begins to leave nature, or simply let his thoughts drift from the material task at hand to the distant privileges of the human, that is, the ability to separate oneself from the immediate so as to be able to reflect upon it:

> After being frequently misled in this way, I finally sat down in a valley and transferred my winged thoughts from things corporeal to the immaterial, addressing myself as follows:-- "what thou hast repeatedly experienced today in the ascent of this mountain, happens to thee, as to many, in the journey toward the blessed life. But this is not so readily perceived by men, since the motions of the body are obvious and external while those of the soul are invisible and hidden.

In his weariness his thoughts drift to the inner mountains of the spiritual realm, so difficult to climb, and -- in his account -- so separate from the corporeal mountains of our world. Why must they be so distant? For, upon finally reaching the summit of the immediate mountain at hand, Petrarch is, for a moment, transfixed by its greatness:

> At first, owing to the unaccustomed quality of the air and the effect of the great sweep of view spread out before me, I stood like one dazed. I beheld the clouds under our feet, and what I had read of Athos and Olympus seemed less incredible as I myself witness the same things from a mountain of less fame.

Here Petrarch is at the verge of breaking with the authority of his time. His own experience of the mountain's offering seems so powerful that it challenges the life and presence of what he

has read, that is, it confronts the strength of myth and religion with an authority of experience equally strong. This is a power from a nature whose meaning is somewhat different from the 'way things are.' And Petrarch recognizes this, but only for a moment. The spiritual realm rapidly calls him back.

He catches himself, and reproaches his mind for thinking that experience could be more intense than authority; at the time, such sentiment seemed close to blasphemy. The worried Petrarch reaches into his rucksack for a book -- it just happens to be St. Augustine's **Confessions**. He opens it, apparently at random, to the tenth book. He reads to his brother:

> And men go about to wonder at the heights of the mountains, and the mighty waves of the sea, and the wide sweep of rivers, and the circuit of the ocean, and the revolution of the stars, **but they themselves they consider not**.

He angrily closes the book, and admonishes himself for not realizing long ago that there is "nothing wonderful except the soul, which, when great itself, finds nothing great outside itself. Then, in truth, I was satisfied I had seen enough of the mountain."

Nothing great outside itself -- Petrarch has opposed the true greatness of the soul to the apparent greatness of nature. It is this view that was honed into authority during the Middle Ages, and he is at the verge of escaping it by being able to look with wonder at the world around him. That is why Petrarch is often called the first modern man; he who stood on the wall between authority and experience.

But are we not still standing on the edge, having passed through an Enlightenment which taught us that nature is an objective to be recorded and investigated, while the human mind is an independent mystery apart from it? Though people in our time are not afraid of our wonder in the face of mountains, we still tend to consider our faces as very separate from these mountain faces.

The sun sets and the mountain shadows lengthen; Petrarch and his party descend from the mountain. But what have they seen? -- the tendency of the human mind towards closure, and distancing, from the world around us. The great human soul becomes closed to any natural soul, and builds its tendency to exploration of nature upon this fallacy. **Thus it cannot hope to discover anything but itself, wherever it goes**.

Petrarch returns to his village of Malaucene, eager to transcribe his discovery of the greatness of the soul before he forgets it. Or is it still the richness of the contact with nature that is to be preserved, regardless of the moralistic conclusions which it has led to? He is at the edge, and proved he gould glance towards the horizon. But what he knew kept him back.

How often have we had similar experiences -- adrift in the greatness of the natural world, yet unable to escape our own selves? How easy it is to simply decide we are more important. But this quickness is one of our limitations. There should be a way to penetrate our own experience of mountains, of nature, which allows us to question them directly as we question the objects of reason. There should be ways we can question ourselves and the mountains at the same time, using our language to speak through them, to move with them, not to move over them or to conquer them. It is in a Japanese text, nearly one hundred years older than Petrarch's attempt, that we find a different, initially paradoxical description of the mountains, a description that brings them into fullness of being only through our speaking of them and our identifying with them.

III

The **Sansuikyo**, or **Mountains and Rivers Sutra**, is the twenty-ninth book of the **Shobogenzo**, the collection of writings of the Japanese Zen master Dogen (1200-1253). It was given as a lecture in the hour of the rat (12-2 AM) on November 3, 1240, at the monastery Kannon Dori Kosho Horinji to an audience of monks and students.[2] It takes the form not of the recounting of a journey, but as a commentary on several notions from Ch'an literature, the original source material for Zen. Dogen tries to teach us to assess the mountains and rivers so that we can see them **for what they are**.

The present mountains and rivers are revealed to be actualizations -- material forms -- of the words of the ancient Buddhas. But the tone of the text is not so much descriptive as imperative. Dogen is telling us what to do. The mountains present a certain value, and must be related to in a particular way. They are perfect in themselves, and so must be respected. Through their persistent presence, we can access the powers of nature that spring from them:

> Because the virtues of the mountain are high and broad, the power to ride the clouds is always penetrated from the mountains; and the ability to follow the wind is inevitably liberated from the mountains.

High and broad: qualities we observe of the mountains, what we use to define the mountains. And yet why are these qualities called virtues? They are values in themselves that show the mountains are able to be what they are. Through attending them, we reach nature: we can follow it, we can float upon it. This power should not be thought of as exploitative: we do not so much tame nature as are tempered by it, if we attend to its values. We do not necessarily climb the mountains, but direct our intention towards them, and listen to them.

> ...The blue mountains are constantly walking. The stone woman gives birth to a child in the night." The mountains lack none of their proper virtues, hence, they are constantly at rest and constantly walking, We must devote ourselves to a detailed study of this virtue of walking. The walking of the mountains is like that of men: do not doubt that the mountains walk simply because they do not appear to walk like humans.... He who doubts that the mountains walk does not yet understand his own walking. It is not that he does not walk, but that he does not yet understand, has not made clear, his walking. He who would understand his own walking must also understand the walking of the blue mountains. The blue mountains are neither sentient nor insentient. Therefore, we can have no doubts about these blue mountains walking.

The mountains are alive. They give birth, and create life. This life, this movement, this walking, is **not** different from the movement which we as humans engage in. If we cannot see it, it is only because we are not perfect, we do not understand; we walk, but do not understand our own walking. If we did, we would see how it is like the walking of the mountains, though they do not **appear** to walk as we do. It is this vision of the common walking that advances our understanding. But we refuse to

believe it -- it is we who are lacking in virtues, we who are imperfect.

This much is akin to Petrarch's views, but he does not make the next leap: the mountains **are** perfect, beyond the limitations of the soul. They are perfect because they can calmly be at motion and at rest. Nature has no dialectic, for it alone contains both states; it is only we who need to identify the opposites, we who are driven by reason away from the fact that nature has already reconciled them. Is it **our** nature to be separated from nature in this way, and to be hidden from that which we seek? Petrarch says that it is our fortune to know the spiritual virtues. But the logic of Dogen says there are neither sentient nor insentient beings, until we choose to make the distinction. Even within ourselves the distinction is not an actual one, but only something we apply with analysis. Thus the mountains are, like our Selves, at motion, and at rest. We cannot doubt or uphold one at the expense of the other. That, too, is only the forced result of our tendency toward choice. Yet it is the "walking of the blue mountains, the walking of the self," that we should carefully investigate. Because, as Plato points out, the meaning of 'wisdom' is **"touching the motion or stream of things."**[3] The true may emerge only from a gentle grasp on the moving world which surrounds us.

But, the text continues, well aware that we common people doubt the statement "the blue mountains walk," and are surprised by ideas of "flowing mountains." Dogen is quick to point out the difference between the enlightened and the rest of us. We will quickly stop at the inadequacy of our perception and name these statements games of language, without realizing that what we may have come across is an inability to identify with certain beings of our world that cannot be said to be living or inert, aware or non-conscious. The paradox in words points out a path into the depth of the world.

The message of the **Mountains and Rivers Sutra** is that we must **try to understand**, even when words push against one another like the plates in a geologic fault. These words in their swells and ebbs point towards a recognition of something in mountains that is in us also. We must not try to break this cloud, but ride it. It is this wind we should follow, a current towards an understanding **with** nature.

> ...sticking to words and sticking to phrases is not the speech of liberation. There is [speech] which is free from such realms: it is "the blue mountains constantly walking," "the East Mountain moving over the water." We should give this detailed investigation.

Here is the central wisdom of the text: that the words which **hint at** something that seems **beyond explanation** are those which we should concentrate upon. For the speech of liberation will be transformative. It takes us beyond ourselves and to the stream. In the next sections, I will try to transform my own reflections and memories of mountains into words which aim at the same effect.

Dogen reports that the mountains have been home to great sages through the centuries, people who have made the mountains "their own chambers, their own body and mind." Through contact with these sages, the mountains have reached their present actualization. And he remarks that no one has met any wise ones who have become actualized, en-realed to the point of perfection, but only the actual realness of the mountains remains. The mountain sages are no more; there is only the sageness of

the summits themselves. So to understand what the word 'mountain' implies, we must go beyond its signification of a certain rise of the Earth, but to its sense, which can be present everywhere:

> As for mountains, there are mountains hidden in jewels; there are mountains hidden in marshes, mountains hidden in the sky; there are mountains hidden in mountains. There is a study of mountains hidden in hiddenness.

Looking for these hidden mountains, one is led to consider to what extent we can identify them or identify **with** them. We strain to consider what it would mean to have mountains walk -- we stretch our belief in the implications of language, not its mere capacity to signify. That is where knowing nature yearns through poetry: this is where a philosophy of nature must lie.

IV

So how are we to walk with the mountains? And to whom will it matter? The pragmatic questions of our time beat against still lingering mysteries. Just look at the mountain, feel it as it comes into view, or -- as you walk towards it or upon it -- consider everything about our apprehension of it. We may easily see the shape as the result of movement, it seems to testify towards a dynamic Earth, whose geologic upheavals have led to this end. But rather than through history, we must constitute the reality of the mountain through our sensation of its presence, and not as some kind of remnant or result apart from this.

Once on a bus in Boulder, Colorado, I saw above the window, in a space normally reserved for advertisements, a poem by David Ignatow. It read simply: **"I wish I could look at a mountain for what it is and not as a comment on my life."** (I forget who had sponsored this public message.) Through the windows of the bus were the slab sandstone peaks of the Flatirons, and the knowledge that the snowy Rockies lay up and invisible behind them. I wonder now how much of Ignatow's sentiment is the same as my chastisement of Petrarch, seeing that all he can get out of the mountain is self-reproachment for being lured away by the sins of the corporeal beauty of nature. Sure, look at the mountain for what it is. But is that even enough? I don't think that explains how the mountains could walk. We must make another step, to look at our lives as comments on the mountain. A binding that may begin as invisible, but which we should strive to see. The mountains, we remember, are hidden everywhere. To see them, we need to learn the quality that brings forth the idea and the presence of **mountain**.

So what qualities can we investigate, if not those of the solid, the big, the imposing, the silent, the now fixed result of past processes of Earthly metamorphosis at the scale of geological time? We have been asked to consider the mountains as moving, to move us away from an idea of them as fixed objects. The moving **processes** of them continue today, and only a limited vision sees them as fixed. Clouds move around and are formed through their presence. Waters flow swiftly down only because the mountain is there. Our walking changes as we ascend them -- shortness of breath, exertion, effort to ascend to a point where our vision is extended, moved outward to a horizon beyond that visible from the hidden place of sea level. The only way a mountain is encountered is through motion, when they suddenly appear after a long journey across the Plains. Our eyes reach upward, they try to scale the depth, and imagine and place their

height. The presence of the mountain means the horizon is closer -- the edge of our field of view wraps toward us as the previously invisible distance now can be seen. Yet mountains also contain illusion: they may seem bigger and closer, or farther and less massive than they actually are. And yet, sometimes cloud formations appear in the low sky that seem to be like mountains. Why? How can condensed water equal the solidity of rugged ground? The way they connect the ground to the open sky seems to imply an upward extension of the Earth, they make us wish the land yearned toward the air within our horizon. Somehow we too yearn for this connection, for it is clear that through mountains we are extended, we are made greater by our ability to know them -- this Dogen knew. But it also includes a danger, if the knowledge of mountains is subverted into conquest.

And yet, you may find what follows to be overly subjective, ostensibly the result of personal encounters with mountains and their nature. Can this reveal anything absolute about them, or is it merely another simple choice left by Western introversion? I am inspired to this method by a message from Dogen: that it is the self which immediately leads to selflessness.[4] And this selflessness is also described as something that is intimate and close to us. Through presenting my own limited experiences I hope to reveal some of the infinitude of mountain possibility.

<div align="center">V</div>

Last night I dreamed of mountains. We were skiing up towards a summit, on a familiar trail. Suddenly a lake appears and bars our path. A guard stands by. "Don't worry," he announces, "the snow is melting, the runoff is tremendously swift -- we're holding it back, but soon we will release it, the path will again open." Shortly the water gushes forth -- I remember the image of a liquid, temporally perceived glacier, streams of water and ice breaking by. On what is left of the path, it is possible to continue, knowing that we had just witnessed an event impossible in external nature, yet somehow credible within my internal perception of what it is that mountains have to offer. As the dreamclimb continues a ghost town is reached, crumbling, with a small museum of mountains. What is inside? Beyond, the snow is gone, it is all some kind of sandy pinnacle. We climb slowly, weighted by the dunes. In the end, on the purest of summits, I remember: it is now like a staircase in a tower, the view only emerges sporadically, as from windows at the four directions.

There were glimpses of geology, of the Earth moving. There was a room for the preserving of ideas of mountains, but it was unclear what was in it. I suspect all the images from the dream are to be contained in the museum. Though the peak was somehow pure and open, like a desert, the final ascent was likened to the climbing of a staircase. Whatever was seen was only offered through windows in enclosing walls. **Whatever visions we reach are by something bounded**. These visions -- the opening, and yet only through closing -- will recur in other dreams about mountains. They have not yet been exhausted, in the fragmentary way we have reached them.

What is the unfinished quality of mountains? In speaking of them we are led to scramble up, there is no end, no summit, for it is the ascending that is the mountain. The summit does not mark the end to this rising but only makes it possible. How the top seems besides the point! Unfinished, rising, pointless like philosophy -- simply another kind of walking across the Earth.

I sometimes have another, recurring dream of a wall atop a mountain. The wall contains a gate, someone stands by the gate. Passing through the gate, beyond the wall is a route to a place higher than the mountain, somewhere above the summit of the mountain. And there is always something that prevents me from going to this place.

Perhaps this is because I see some lack of logic in its existence, that I know that a mountain peak should be seen as the summit of something, that to go from it to a higher place is somehow unnatural. Or maybe I am simply blurring archetypal images of our understanding of the world together, in a place where they do not fit. Let us try to connect these basic images of 'mountain' and 'wall.' Our idea of mountain must emerge as the way it gathers up, from a base, to a summit, revealing the world from some kind of higher vantage. But yes: mountains everywhere, hidden in everything. I confront my dream-mountain with a wall at its apex, something which I cannot pass through. It may be just the gate to the understanding of the idea of mountain that is closed for me, or maybe I am seeing human life as a confrontation with walls, and the attempt to pass through them, superimposing this kind of being over a landscape brought to presence by mountain. I could be reenacting a feeling I get while contemplating mountains, or climbing them, or even living with them, **that all I do with them is present to them a wall**.

This I return to again and again. Because I still do not know how to pass through the gate, rather than merely ask questions about the other side.

Another dream I am unable to escape reaches back to my childhood expectations of mountains: that somewhere, perhaps very close to here, was a mountain higher than any presently known, but invisible to those who have not learned to see it. This too is a recurring idea, well known from Rene Daumal's **Mount Analogue**,[5] a surrealist French novel of 1944 which recounts the journey to a mountain emerging out of the South Seas, higher than any presently known to humanity, which must exist simply because the we think it; simply because the dream of the highest mountain recurs over and over again, even after our reputed measurement of Everest as the highest point on Earth.

Daumal's mountain is the result of what he calls analogical thinking; it stands for something else. Might it also be the highest mountain of spiritual enlightenment which is portrayed, whose summit must exist though no one has found it? What we want to say is that real mountains are analogical to this also, and are inseparable from our notions of ascent towards anything. The idea of climbing upwards comes from the Earth. There can be no "ascent towards the blessed life" without real mountains.

The mountains of dreams may also be analogies, though perhaps they show most clearly how any mountain is the constitution of ideas of mountains, and that any idea of mountain can be an analogy. It is a tool of interpretation that has at its origin a shape of the Earth, one that profoundly effects living beings who come in contact with it.

My own particular dream of the hitherto unknown highest summit placed it somewhere, I believe, in the Great Plains. It was the highest mountain in the continental United States, something over eighteen thousand feet, and I would ascent a particular route up its cliff face, over and over again. I can still visualize the particularities of the route, and even now it is accessible in my dreams. The summit is very flat and broad, and unlike the mountain with a wall, this one is not an apex but a broad upland, an

opening to various experiences which more often than not emerge in the rest of the dream. The difficulty of this mountain is reaching it. But once on its summit, there are no barriers, but untellable vistas over an extended, flat horizon. Here is a mountain which rises us above the surrounding land, opening up new possibilities. In its great height it is a little boy's wish, a place higher than anywhere known by anyone else! And its existence, albeit only in dreams, reflects a wish common to many -- the desire to ascend.

The three dreams illustrate conflicting aspects within ideas of mountain. There is an imaginary journey through mountain processes which has at its climax only limited vision through human, rectilinear constructs. There is an apex, a point, which presents only a barrier which moves us to focus on a way to cross it. And there is a mountain that lets us view things from above, whose summit is warm and inviting though all routes to it may be torturous. And these are mountains that could exist everywhere, or nowhere.

<div align="center">VI</div>

The French phenomenologist Maurice Merleau-Ponty sought to identify what it is that allows us to perceive certain entities as unities, in their immediate presence before reflection. Are the parts of a thing only bound together through the association of their interrelatedness during movement? No, says Merleau-Ponty, for how could we see as things aspects which we have not seen in motion? He writes: "...the mountain must present in its actual appearance some characteristic which gives ground for recognizing it as a thing."[6] It is this quality that we have been searching for, and Merleau-Ponty's very perplexity at its existence suggests that there is a kind of movement, a process, a 'walking' that the mountains do manifest, in their very state of being, as Dogen knew. The quality of mountains lies within the mountains -- we have not the power nor need to impose it. Recognizing this quality and its source ties ourselves and our perception to nature, in a way such that we will find it more primary to speak of mountain as quality than mountain as object.

And the quality is not something simply with us as we think and look. "To perceive," writes Merleau-Ponty, "is not to remember."[7] But it is to recognize the activities of our consciousness as a connection to the outside world. This is why we can search through our dreams for clues to the meanings of the mountain quality. This is why we should be receptive to the natural qualities which are there as they permeate our Selves.

Arne Naess has written of the greatness of mountains as something beyond the fact that they are very large. And he suggests that "the smaller we come to feel ourselves compared to the mountain, the nearer we come to participating in its greatness."[8] But with this humility comes the moment of identifying the qualities of mountains as present in many things. The qualities are accessible to us when we approach the wider Self of deep ecology,[9] or the selflessness of Dogen's Zen. And so it is that nature is what makes it possible for us to dream, to plan, and to envision change. But when we glimpse its range of variation, and see just how wide its categories permeate, we cannot make the mistake of retreating into ourselves, and turning the analogy wholly upon itself, retreating from the world as it is offered to us.

Notes

1. The letter is officially cataloged under the following heading: "To Dionigi da Bergo San Sepolcro, Concerning Some Personal Problems," Book IV, i, in **Rerum Familiarum Libri** (I-VIII), tr. Aldo S. Bernardo (Albany, NY: SUNY Press, 1975) p. 172-180. Numerous other translations also exist, and this particular letter is reprinted in most editions of Petrarch's selected correspondence.

2. Dogen, "Treasury of the True Dharma Eye: Book XXIX, The Mountains and Rivers Sutra," tr. by Carl Bielefeldt, in **The Mountain Spirit**, ed. Michael Tobias (Woodstock, NY: The Overlook Press, 1980), pp. 41-49. Another interesting, yet vastly different translation is "Mountains and Waters Sutra," trs. Arnold Kotler and Kazuaki Tanahashi, in **Moon in a Dewdrop: Writings of Zen Master Dogen**, ed. Kazuaki Tanahashi (San Francisco: North Point Press, 1985), pp. 108-113. Still another version is found in the only complete English edition of the writings of Dogen, Kosen Nishiyama and John Stevens, trans. **Dogen Zenji's Shobogenzo**, 4 vols. (Sendai, Japan: Daihokkaikaku, 1975-1983).

3. Cratylus 412b, tr. Benjamin Jowett, in **The Collected Dialogues of Plato**, ed. Edith Hamilton and Huntington Cairns (Princeton: Bollingen Series LXXI, 1961), p. 448.

4. See the section entitled "Anatomy of Non-Duality" in Kazuaki Tanahashi's introduction to **Moon in a Dewdrop**, pp. 16-18.

5. Rene Daumal, **Mount Analogue**, tr. Roger Shattuck (Boston: Shambhala Books, 1986).

6. Maurice Merleau-Ponty, **The Phenomenology of Perception**, tr. by Colin Smith (London: Routledge & Kegan Paul, 1962) p. 16.

7. Ibid, p. 22.

8. Arne Naess, "Modesty and the Conquest of Mountains" in **The Mountain Spirit**, ed. Michael Tobias (Woodstock, NY: The Overlook Press, 1980), p. 16.

9. See Arne Naess with David Rothenberg, **Ecology, Community, and Lifestyle: Outline of an Ecosophy**, (Cambridge: Cambridge University Press, 1988), Chaps. 3 and 7.

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WILD LOVE

Thomas H. Birch

"You must get your living by loving."
Thoreau ("Life Without Principle")

Wilderness preservationists are often castigated as socio-pathological misanthropes, and are said to be less concerned with the welfare of the members of their own human species than with the good of the nonhuman world. The genuine passion that pervades wilderness preservation often seems to support such criticisms. Wilderness advocates do spend enormous amounts of their lives to save wild land, and this priority does not leave much time for the normal social causes. The question whether wilderness preservation might be misanthropic must therefore be answered. We must even ask the further question whether the love for wilderness is consistent with love for our own species.

I want to suggest that, far from being pathologically misanthropic, the love for wilderness entails the deepest sort of love for one's own species. What might appear, on the surface, to be sociopathological behavior can appear so only to a culture that has itself become pathological in its understanding of love. While wilderness preservationists may show little love for a culture that systematically destroys wildness in nature and in humans, still, the preservationist's own love for wild nature leads to immersion in a power whose logic mandates the deepest love for all things, including self and one's own species. That is, escape from egoistic and homocentric love leads to a far deeper love of ourselves and of our own species than could ever be imagined by the mind of anthropocentric culture.

To develop the point, we need to make a distinction between Wild love and Tame love. **Tame love** seeks to control and dominate its "object," to possess it for certain of its features, with the goal of guaranteeing that the object will provide whatever it is that the Tame lover thinks is desirable from relating to it. Tame love is techno-love. It is in this alienated, managerial manner that the simplistically resource oriented human 'loves' nature, and too often other humans as well. Tame love is scared love, infantile, and self-centered. Worse, as Susan Griffin, in her **Pornography and Silence**, shows in painful and convincing detail, Tame love is finally pornographic, and seeks ultimately, in anger, to obliterate its object, because it cannot possibly control either the object or the power that originally enlivened relationship with the object.[1] What we may properly call imperialistic approaches to the world, approaches that seek to conquer and control what is wild, as is Eros, and evolution, and creation, Others, and Otherness, culminate in a **reductio ad absurdum** that is literally the death of the possibility of realizing the values, including love, that such approaches were meant to secure in the first place. This leads to the death of the world.

In opposition to Tame love, **Wild love** is an acknowledgement of Thoreau's maxim that "...in wildness is the preservation of the world." Thus, the Wild lover acts on the knowledge that the most elementary logic of love requires the existence, both originally and continuously, of the beloved, as a positive (non-imperial)

Other in its own right. A relation requires the existence of its **relata**. From the point of view of the Wild lover, what ought to be secure, but never beyond the point that things can be viably (practically-ethically) secured, is the continuous Otherness of what is loved, as well, of course, as the continuous, existence of the lover's own self. For without these othernesses, the oppositions which complement one another and which make one another possible, without this **yin** and **yang**, there simply can be no relationship.[2]

The Wild lover knows that nothing can be secured with guarantees--there can be no final certainties in loving--and the Wild lover loves this Otherness of the world also, this Otherness that denies the lover's own desire for guarantees, as, simultaneously, the world beneficently sponsors the Wild lover's own participation in desiring and loving, with all their attendant uncertainties. Wild love is not altruistic or self-less in a manner that implies self-denial. For the continuing participation of the self is just as indispensable as that of the Other to the maintenance and furtherance of the relationship of loving. Thus Wild love requires a love (a Wild love) of love itself, and consequently of all that it presupposes, all the parameters of its wildness. Wild love is thus love of the world as it has been given to us. Wildly loving this wild world must become our active practice, our "real work."

Thus the saving of wild land, so that it stays free to flourish into its own destinies, is an act of love not simply for the land itself, although it is that in part. More complexly, it is an act of love for the relationship of humans Wildly loving this wild land and for all that makes this loving possible. Inescapably it is thereby also an act of love toward humans too, because they are also integral to the possibility of the relationship. In loving Wild love itself the lover of wilderness is obligated, both logically and affectively, to the loving of self and species. One cannot love love without loving human beings, one of nature's most loving creatures (at least **in potentio**). Therefore, far from being inconsistent with love for humanity, wilderness preservation involves the deepest love for humanity, but a love that is part of the whole. It is a love for participation in the power that can knit humans and nature into vital unity.

To return to the allegation that wilderness preservation is misanthropic, we now can see that the allegation itself presupposes that love for Others is what we have here called "Tame love." Tame love seeks to colonize, dominate, subdue, and inevitably to exterminate the Others and the Otherness that are its objects, and thus to destroy the basis of relationship that is necessary for any love to be possible at all. The allegation thus collapses into its own misanthropic perversion of love, the perversion that is so sadly typical of our culture. In radical contrast, Wild love, and the attempt to save what makes Wild love possible, is perhaps the strongest and most fundamental way to actively love humans, nonhumans, and the world that together we all help to compose.

Notes

1. Susan Griffin, **Pornography and Silence**, Harper & Row, 1981. See especially the section titled "Illusion and Delusion: Culture's Desire to Replace Reality," pp. 120-127.

2. As Henry Bugbee has said, "We all stand only together, not only all men, but all things. To abandon things, and to abandon each other, is to be lost." Henry G. Bugbee, **The Inward Morning**, Bald Eagle Press, 1958, p. 159.

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NATURE AS SELF

Alan E. Wittbecker

Many ideas of nature are not objective or scientific, but they underlie thought. Their insights are embedded in language. The root word of both ecology and economics, for instance, is based on the Greek word for house; ecology is its study; economics is its management. House is used as a metaphor for nature. Similarly, nature can be seen as mother, father, sister, brother, and self; these words are applied in different ways to describe nature. Understanding attitudes towards nature, and the bases for them, can lead to a more benign ethics, to healthy human beings in healthy environments. Such an ethics is based on love and respect and that is, after all, the proper approach for relatives and selves.

Nature as Home

Adolf Portmann observed that insects and animals display a powerful attachment to places--an attachment best understood

in human terms as home. Human beings feel strongly about places. Several metaphors have been used to describe the human place on earth. The earth is a storehouse, property, a spaceship. But the earth is not a spaceship or property or storehouse; it is home. Victor Ferkiss proclaimed that: "The world and humanity are one entity, one system in equilibrium. Earth is humanity's only home; humanity is one people in relationship to the earth."

There is a wide variety of meanings of home. It is a place of family residence, the family social unit, habitat, and place of origin. The word 'home' comes from the Middle English word ("hom" and Old English "ham", Old Norwegian "heimr", Greek "kome", and Sanskrit "kayati") meaning village or home. Its spectrum of reference is enormous. The word is used to describe house, village, city, bioregion, cultural world, and the earth. Its content is also ambiguous. Home can hold a single person, family, relatives, pets, domestic food animals, neighbors, and others.

Living at home occurs simultaneously on different levels; the importance may shift from city to nation, or from nation to state, or from house to bioregion, or from state to habitat. Each level serves as a metaphor for the next. There are parallels between nature and a house, as the basis for home. Solar space is like the landscaping; wilderness is the foundation; conservation areas form the shell and provide services; and each bioregion is a unique room. The analogy cannot be carried too far, but it shows that a house is not, as Le Corbusier said, "a machine to live in." It is a matrix for home. Home is not just a house, either; it is a complex of significant events centered in place. It is the foundation of our individual identity on one level, and our role in the community, on another. What makes home different from house? Participation in the making of it, commitment to it. People invest parts of themselves in a place in making a home.

A home is a part of the environment claimed by feeling. Emotion creates an 'in-place'. All beings find and make a home. Humans, like plants and animals, identify greatly with local environments. (Maybe this is a function of the limbic system of the brain, a function we share with territorial mammals.) Being away from home results in nostalgia, a 'disease' identified by Johannes Hofer, a Swiss medical student, in 1678 to describe an illness characterized by insomnia, palpitations, stupor, fever, and persistent thought of home. The disease could result in death. While nostalgia is not considered in organic etiology by current medical science, the symptoms are still manifested psychologically and physically. The connotations of place have been stripped from the meaning of nostalgia, the use of the word has been trivialized, and the symptoms have been reassigned, but the disease still erupts, unnamed, and its effects are everywhere. For many, it is not possible to stay away from home indefinitely and still live. Thus far, the sense of place cannot be gleaned from an analysis of the nervous system. Yet a place shapes the nervous system, somehow. The relationship of human beings to nature is deeper than just home.

Nature as Mother and Father

Gary Snyder discerns an undercurrent in civilization since the late Paleolithic. He considers Buddhist Tantrism to be its finest and most modern statement: "that Mankind's mother is Nature and Nature should be tenderly respected; that man's life and destiny is growth and enlightenment in self-disciplined freedom;

that the divine has been made flesh and that flesh is divine; that we not only should but do love one another ... these values seem almost biologically essential to the survival of humanity."

Homer sang "of Gaia, universal mother,/firmly founded, the oldest of divinities." Goethe found that deep knowledge could only be sought in "the realm of the mothers." The idea of nature as mother forms the basis of a modern, scientific hypothesis, to explain how the planet exerts a living control of the atmospheric and hydrologic processes to maintain minimum conditions for life over long periods of time. Lovelock believes that there is a collective global mind (however unconscious) immanent in the cybernetic structure of the global system. He calls it Gaia, after the Greek earth goddess, as suggested by William Golding. When ecology strives to think of the planet dynamically and holistically, it returns to personification, "Mother Nature". Lovelock's Gaia is a metaphor designating a field of atmospheric study; technical analysis follows from the metaphor.

The hypothesis notes that: the average surface temperature of the earth has moderated, despite a gradual rise in solar energy; the concentration of the atmosphere is improbable, compared to the composition of Venus and Mars--it should be mostly carbon dioxide; each atmospheric gas is in the optimal proportion for a life-supporting function; the salinity of the ocean is far lower than it should be from runoff from land--the present percentage of salt in water could have been achieved after a mere eighty million years. Lovelock concludes that the chemical and climactic properties of the earth have always been optimal for life. Since this could not happened by chance, the explanation is Gaia, who he defines as: "a complex entity involving the Earth's biosphere, atmosphere, oceans, and soil; the totality constituting a cybernetic system that seeks an optimum physical and chemical environment for life on this planet."

The earth's biomasses, air, oceans, and lands form part of a giant system which is a single organism. Life exists as a consequence of the right material conditions. Life defines the material conditions needed for survival and then tries to maintain them. The earth's biosphere controls the temperature of the surface and the composition of the atmosphere, from major constituents to trace elements. The system has maintained control over instabilities for millions of years through a variety of responses. (Just as the human body maintains homeostasis.)

At a scientific level of thought, the Gaia hypothesis extends the fundamental ecological doctrine that all things in nature are densely, subtly, and systematically interrelated until they include humanity, ethically and mentally, as well as physically. The entire earth is envisioned as a unified entity, actively shaping the material conditions of the planet for the purpose of maximizing the survival and variety of living beings. Nature is the fundamental matrix (from the Latin "mater", meaning mother, maw, or void) for human development. Nature is the source of life, on which humanity depends. The matrix is historical. It has duration and it extends from the past into a future of following lives.

The metaphor of "Mother Nature" enables bonds of kinship and responsibility in human communities directed to the earth. However, the feeling of subordination to an indifferent mother could have a negative effect; Paul Shepard suggests that resentment, violence, and guilt might result. Effective metaphors require a level of maturity in individuals as well as in cultures. The metaphors are not literal. Nature may be indifferent, but permissible. The metaphor of mother does imply that nature is peace-

able and nurturing. Often, cooperation contributes as much as competition in shaping species.

But, life is violent as well as peaceable, and this is reflected in philosophies and myths, and violence is often associated with the image of 'father'. Heraklitus regarded conflict as the father of all things. Many archaic cultures, such as the Tukano Indians of the Northwest Amazon, addressed the sun as Father, the creator of earth and all life. Many peoples refer to their home territories as fatherlands. On local levels, animals and plants have 'fatherlands;' they live together and are sympatric (from the Latin word for father, used to mean occurring together). Not all species occur together in the same place. Sympatry describes only those that do. At the habitat level, allopatry (occurring apart) is "intelligent" use of available resources by animal communities. Large herbivores, such as elephants and rhinoceros, may choose poorer quality food and avoid competition with smaller animals and, thus, exploit an untapped food source. Many interactions between different species contribute to the mutual benefit of the members of community, as well as to the community itself. Humanity must be allopatric with most wild species and allow them to develop independently in their own places.

Nature as Sister and Brother

Saint Francis of Assisi, in 'The Canticle of Brother Sun,' addresses the Sun, Air, Fire, Wind, and Water as his brothers, the Moon and stars as his sisters; he praises the earth as his mother. American Indians, such as Black Elk and Seattle, referred to animals as brothers and sisters. All animals, 'two-legged and four-legged,' were equals. The phrase, "all our relatives", was used in prayers and rituals referring to plants and animals as well as to human kin. Science is only beginning to support this idea. Aldof Portmann shows that every form of life appears as a gestalt, developing in a specific place. All living forms create an image of their environment. Genetics provides the proper image for some--frogs, for instance, focus most closely on objects that have the same size and trajectory as flies. Others, such as coyotes, must learn what is valuable; young coyotes learn what prey is edible.

Animals have their own perceptual universes that are strange and fascinating. Jakob von Uexkull suggests that the unfamiliar world of animals can be represented with bubbles to denote the self-world or phenomenal world of an animal. According to von Uexkull, perceptual and effector worlds form a closed unit, the "umwelt": "Figuratively speaking each animal grasps its object with two arms of a forceps: receptor and effector. With the first it invests the object with perceptual meaning, with the second operational meaning."

The world--life-image--is what has meaning for an organism. It is a focus. The first principle of a life-image theory is that all animals from the simple to the complex are "fitted to their unique worlds with equal completeness." A simple world corresponds to a simple animal; a well-articulated world to a complex animal. Von Uexkull implies that the human world is only one of the many possible. Animals are not suboptimal beings relegated by evolution to second-rate habitats. They are optimally fitted to places that humans are not.

The theory of life-images is a basis for a new, genuinely non-anthropocentric metaphysics. Some of the pre-Socratics developed a nonanthropocentric world view. Zeno the Stoic preached "life in agreement with nature" as the goal of ethics. Chrysippus added that as individual natures were parts of the nature of the whole, therefore, life was to be in accord with human nature as well as nature. Francis of Assisi tried to unite the compassion of Christianity and the animistic sense of union with the natural world. Natural processes take on an expression of significance of their own without reference to humanity. All beings have an "ultrahuman" (coined by Richard Jeffries in John Fowles) value of their own. St. Francis tried to depose man from his monarchy and set up a democracy of all God's creatures. The Taoists saw that humans are indistinguishable from other creatures; if they seem distinguishable, it is only through feelings of self-importance. Lao Tzu turned the pyramid of human values upside down. He considered the laborer more successful than the aristocrat; cultivation of the inner life is more important than high status; physical enjoyment is more rewarding than constant acquisition. And, as there are more laborers than aristocrats, there is a net gain to the success of the community. Arne Naess offers a biospherical egalitarianism, where all beings have an equal right to life and fulfillment.

Nature is not anthropomorphic, in the image of man. Nor is it anthropocentric, centered around man. But, it is measured and valued by man, as, indeed, it is measured and valued by all beings. When humans evaluate ecological situations, preference is usually given to human values. But, there are other beings that are measuring their parts of habitats. There are other centers, and these centers are equals, brothers and sisters. (The terms derivative from brother and sister are more peripheral. The Latin terms for brother and sister yield 'fraternal' and 'cousin.' The Greek terms are twins, taken from the word for womb, and "delph," on which 'delphinium' and 'dolphin' are based.)

Nature as Self

Our bodies contain the ashes of stars; human cell structure is shared with trees; we share our bodies with bacteria, fungus, insects, many of which are beneficial--and even those not considered beneficial may have positive effects on our health. As Lewis Thomas shows, our human bodies are living communities, hosting amoeba in the blood, mitochondria in the cells, bacteria in the intestines. We are connected to the largest and smallest beings.

In fact, humanity is embedded in the earth, according to Maurice Merleau-Ponty. From the oldest language we know, the Indo-european tongue, we took the word for earth and turned it into humus and human ("dhghem"=earth-"humanus" in Latin-human in English). Yet, the word for man was shaped into man-image, world (Indo-European "wiros"=man-"weorold" in O. English-world in modern English). One word progresses from earth to human, the other from human to earth. We refer to the earth literally as world, 'man-image.' We cannot be any closer to the earth and its processes, since the parts are combined in us. We are indissolubly one with nature.

We have mistakenly concluded that our skin is the boundary to our selves. But, our intuition senses our interdependence with nature. We extend the boundaries of personality to other things and people. William James claimed that, beyond the body, the immediate family (father, mother, spouse, children) was part of the self. For Carl Jung, the 'Self' guided and integrated the whole of psychic life, conscious and unconscious. The concept of individuation, the process where a person discovers and evolves

her Self, is central to Jung's psychology. This Jungian Self is the true awareness of our selves.

We participate in relationships in a field of relationships. Because we are in the field, the study of nature is, to some extent, the study of ourselves and our effects on the field. The individual self is not a skin-encapsulated ego, but an organism/environment field. The organism is a point at which the field is focused.

Paul Shepard likens the human skin to a pond's surface. The skin's interpenetration enobles and extends the self--the beauty and complexity of nature are continuous with ourselves. We know subjectively that we are not separate from the earth, that all other beings are as necessary as humans to its functioning.

Perception of the body as landscape and of natural terrain as a body is as fundamental to psychology as it is to mythology. We depend completely on the natural environment, physically and psychologically. D.O. Hebb has conducted experiments that show the effects of a limited environment. Cut off from external stimuli, the mind becomes strange and distorted. Mental health can be related to the quality of the landscape, as Rene Dubos and others (such Passmore, Shepard, and McHarg) have done. The external world is needed to keep us alive and sane. This world is composed of remote occurrences, on polar icecaps and distant stars, as well as immediate personal events. The individual is woven into the world.

If nature is a body, then it has vital organs. Certainly parts of nature function like organs, circulating nutrients and minerals and cleaning wastes. Nature is the body of our species. We can do without some of it, but not without all of it, as we can live without one kidney, much of a liver, or arms or legs. Human beings could sell their 'spare' organs if they chose. Not to sell them, in fact, is to forego an advantage of the resources of our bodies in an economic sense. Most people don't sell, however, because feeling whole and healthy is more important than the temporary income. There is an important parallel with nature.

Nature as Itself

G. Spencer Brown understands a much wider concept of self. In describing the conception of form, Brown notes that the self-structed in order "to see itself". But, in order to do so, it must divide into one state that sees and another that is seen--it must become distinct from itself. In this sense, the world has divided and subdivided itself. Whenever another division is made, a self--Brown says a "universe"--comes into being. The skin of an organism only cuts off an inside from an outside. But, the skin is permeable.

The earth has innumerable modes of being that are not human modes. Our direct intuitions of nature tell us that the earth is infinitely strange; it is alien, even when gentle and beautiful. It seems often mysteriously impersonal, unconscious, immoral, hostile, awesome. J.B.S. Haldane recognized the strangeness of nature. "I have no doubt that in reality the future will be vastly more surprising than anything I can imagine. Now my own suspicion is that the universe is not only queerer than we suppose, but queerer than we can suppose." Perhaps the queerness results from sheer complexity. George Perkins Marsh believed that the equation of animal and vegetable life was "too complicated a problem for human intelligence to solve, and we can never know how wide a circle of disturbance we produce in the harmonies of nature..." Barry Commoner echoes them both: "not only is nature more complex than we think, but perhaps more

complex than we can ever think." In its immense complexity, nature seems wholly other, nonhuman, ultrahuman. It seems distant. So it is feared as unfathomable and uncontrollable. Nature seems contradictory and sinister, shaped by death, which we fear. We fear to understand, to be compassionate. And, fear casts out love and, with love, goodness, beauty, truth, and intelligence. Until all that remains is fear of other beings and the unknown; fear of the smiling science and technology that take away more than is given; fear of fellow human beings, who are trying to regain what was taken.

But, love casts out fear. In the **Upanishads** it is written that **"Who sees all beings in his own Self, and his own Self in all beings, loses all fear."** As fears and unconscious motives are understood, the awareness of all feelings intensifies. Feelings that are dualistic at one level--fear and courage, pride and humility--are combined at a higher level. Unconditional love blends many feelings that cannot be understood at an intellectual level. Erich Fromm identifies four elements in loving: Care, the active concern for life and development; Responsibility, the desire to respond to others needs; Respect (meaning to look at), to recognize others' uniqueness; and Knowledge, combining objectivity with participation and intimate identification. These elements define a loving relationship. The inexhaustibility of a being or of relationships constitutes much of the nature of love. Human beings are compelled to seek other beings and love is the only approach. Seeking in their hearts with wisdom, the sages in the **Rig Veda** (X. 129) found that love was the first seed of the soul. Nature has evolved the seeds, as Pope understood. "beholde chain of Love/Combining all below and all above." Love exists in the conversation between human beings and other beings. Conversation is not limited to two individuals or to the present.

In the sense of living together (the word "symbiosis" means 'living together' from the Greek; ethics means 'doing together' from the Sanskrit) love is ethical. Abraham Maslow presents "love-knowledge" as unlimited. It is a path to objectivity with greater perception, which provides kinds of knowledge not available to nonlovers. (Maslow cites his work with monkeys. Lorenz, Fox, Schaller, and Van Lowick-Goodall have found it to be true. A good teacher, parent, scientist, or friend functions this way.) Love creates an openness to experience, without judgement. Beings unfold. Love expands the awareness of self and other beings. Its intimacy permits distance. Its duration reaches future generations of beings. Love personalizes the universe, but keeps it free (the word 'free' is from the German, "freier," meaning to love or to woo).

We cannot approach beings as they are through our personal and economic interests, but only on their own terms, in relation, through respect and love. Any other approach separates us from other beings and truncates our aesthetic responses with boundaries. The word animal means endowed with spirit (from the Latin "animus"). Our spirituality places sacredness in everything. We are part of the cycle, woven into a poetic, mythic unity. But, the unity may not be comfortable, and nature is not a father or mother or any entity of our wishing. It merely is. We are and dwell in metaphors in it. These personal metaphors are as true as the metaphors of machines or atoms, and these metaphors are a useful counterbalance to the scientific image of nature as objectified data.

Myths and metaphors are modes for conveying ecological wisdom; they are less concerned with survival than the survival

value of a good fit. Myths provide equilibrium between self-restraint and self-expression, between self-protection and self-restriction. Myths limit human cultures, so that other beings (brothers and sisters) can make homes in places (father and mother) within the body of the earth. Wisdom cannot depend on perfect knowledge, which does not exist. Humans must act "as if" (in Hans Vaihinger's term) they were wise, circumspectly, with caution and respect--as if they were healthy, as if nature was their very self.

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CONTINUING REFLECTIONS ON TECHNOLOGY

LIMITS TO TECHNOCRATIC CONSCIOUSNESS: INFORMATION TECHNOLOGY AND TERRORISM AS EXAMPLE

Perry R. Morrison

Introduction

Whatever its basis, at present there appears to be an overwhelming urge in our society to apply information technology to a large range of problems occurring in all aspects of life. Indeed, part of the technocratic consciousness that now grips modern society seems to involve a belief that technological solutions can be constructed for all conceivable difficulties, regardless of the essential nature of the problems involved. Many members of the artificial intelligence community, for instance, regard the application of expert system technology to the management of human affairs in such areas as local government and judicial decision-making to be a viable alternative to what they view as the unsystematic, unreliable, and haphazard human processes that currently dominate decision-making in these fields.[1] Similarly, it has been intimated on a number of occasions, that because of the limited decision-making capabilities of human military commanders, the U.S. Strategic Defense Initiative ("Star Wars") will necessarily involve the construction of semi-autonomous systems for the control of a space-based strategic defense.[2]

However, such examples illustrate a fundamental misperception on the part of those who would fund, design, and implement such systems: The problems that these systems are intended to solve are not technological in nature and therefore are not amendable to technological solutions. While it is appropriate to propose a technological solution to a technological problem, such as the calculation of fortnightly wages or the navigation of a space probe, it is not appropriate to construct technological solutions to nontechnological problems, to those that intrinsically involve human values and an understanding of human experience and human limitations.

Aside from the practical difficulties often associated with such proposals, it is quite clear why this should be so. To construct a satisfactory system of any kind, one must understand the processes for which the intended system will substitute. Clearly, we have a reasonably good idea of what constitutes a good navigational system, or what qualities an efficient payroll system might have. Equally, though, despite the best efforts of a century of experimental psychology, we do not know how human judges arrive at fair and equitable judgments, or even what "fair" and "equitable" really mean for most people, let alone how such values might be implemented in a computer-based judicial system. Similarly, the basic problems that "Star Wars" attempts to address is not that nuclear warheads fall intermittently from space as some form of natural disaster, but that such warheads

are directed to destroy the United States by **human intent**. That is to say, proponents of Star Wars seem to be supposing that inbound nuclear warheads are some inescapable fact of life that needs to be combatted, while ignoring the fact that such an event is, even if directed by computers, the result of human activity, thought, and decision. The problem that prompted Star Wars is the problem of human aggression and the untenable practice in the nuclear era of using armed conflict as an extension of political and economic policy.[3] As such, and to the extent that a solution is possible at all, then it does not lie in any technological artifact, but in an understanding of the human condition and human interaction.

Indeed, it is precisely because our understanding of human beings and their problems appears so impoverished in comparison with our understanding and control of the nonhuman world, that we reflexively seek to apply the latter to all problems, regardless of their nature. Technological solutions look very appealing because they offer specific and implementable "answers;" they save us the effort of looking at problems from new vantage points. But this same shortsightedness prevents us from recognizing the limitations of technology in its application to human problems. Moreover, although it may be true that certain problems are quite intractable (such as conflicts based in ideology), and that it is therefore legitimate to contain them by technological means, despite the prevailing technocratic confidence, such responses can never be regarded as solutions. While even human solutions to some human problems may have little chance of success, they do at least offer the chance of resolution, whereas technological fixes to human problems, even at their best, can merely offer amelioration.

I preface this paper with these comments so that what follows may be given some greater perspective. Although the extended example of information technology as an irresistible "cure" for criminal and terrorist activities may appear as an isolated issue, it is in fact bound up in the processes already described and serves as a disturbing illustration of Western society's potentially dangerous and persistent habit of viewing its and other societies' problems through the lens of technology.[4]

Terrorism: The Growing Menace

In some circles, the early 1980s will be remembered as the period in which international terrorism unequivocally demonstrated its capacity to strike with unbelievable ferocity and with distressing impunity and disregard for the efforts of security forces.[5] In this period occurred the Iranian embassy siege in London, the TWA hostage drama, the Achille Lauro hijacking, the bombing of the U.S. marine barracks in Beirut, an attempt to wipe out the British conservative government, the killing of the South Korean Prime Minister, and perhaps the destruction of an Air India 747. In December 1985, machine gun and grenade attacks at Rome and Vienna airports left several people dead; in early 1986 four TWA passengers were killed when a hand luggage bomb cause a depressurization that sucked them from the cabin. On 18 April 1984, an English policewoman was killed by Libyan diplomatic staff in front of the Libyan People's Bureau in London; also in that year, 59 passengers were killed when Egyptian commandos stormed a hijacked jet in Cyprus. On several occasions, airport baggage handlers were killed by bombs intended to explode in the air.

Indeed, in its May 4 1986 issue, the **Guardian Weekly**[6] reported the following events in a single **week** of terrorist activity:

- A bomb in Oxford Street, London, badly damaged a British Airways office shared with American Express and American Airlines.
- An attempt was made by a Provisional IRA member to place an 800lb bomb intended for British security forces near the border in Northern Ireland. Seamus McElwaine, aged 28, was surprised and killed by British undercover soldiers.
- A British tourist, Paul Appleby, aged 28, was killed in a lane in Jerusalem near the Garden Tomb, believed by some to be the burial place of Christ. The Abu Nidal group later claimed responsibility.
- A car bomb believed to have been planted by Basque separatists destroyed a Land-Rover carrying Spanish Civil Guardsmen, killing five of its occupants and blasting a hole in the wall of a nearby maternity clinic.
- The Arab Revolutionary Front claimed responsibility for an explosion that wrecked the American Express offices in Lyons and damaged the offices of the U.S. company, Control Data. Less than 24 hours before, in the presence of his 10-year-old daughter, Kenneth Marston, the British managing director of the American company, Black and Decker, was gunned down by a masked man.
- A bomb damaged the entrance to the British Bank of the Middle East in Muslim West Beirut. An unknown group called Group 219 FA claimed responsibility.
- Sikh terrorists murdered a Congress Party member of parliament in India and made an attempt on the life of a militant Hindu leader. In this same week, two gunmen shot dead the Congress politician Sant Singh, at dawn in his home. Later, five terrorists sprayed the crowded Amritsar bazaar with automatic weapons, narrowly missing Surinder Kumar Billa, the president of the Hindu Rashtriya Sangatha. His bodyguard was killed and two other Hindus were seriously wounded.

Terrorism and the Technological Embrace

Clearly, terrorism is an international concern of the highest priority. Intelligence and security forces have sometimes experienced remarkable successes in apprehending intending terrorists or preventing acts of terrorism. The 1985 IRA Summer bomb offensive in Britain, for instance, was largely negated by the appropriate use of acquired information. Yet, such successes appear to be few and far apart. More often, terrorists seem to be able to easily elude intelligence efforts and defeat security measures in order to cause injury and loss of life.

The inadequacy of current security measures and techniques to deal with the upsurge of terrorism stems from several initial points. First, the efficacy of military special operations style interventions appears to be declining. The success of such efforts is critically dependent upon the ignorance of the terrorist perpetrators, yet there has been considerable publicity given to new weapons and tactics. "Stun" grenades, for instance, are now commonly used in attempts to storm hijack scenes and overpower terrorists. Similarly, the "psychology of the siege" and the techniques that negotiators use in these situations have been exposed to both the public and terrorists in various media efforts and hijack case studies. I would therefore conclude that there

must now be diminished confidence in resolving a terrorist/hostage crisis by swift military intervention or by protracted negotiation or delaying tactics. Moreover, it is almost universally agreed that, whenever possible, the most successful outcome is achieved when terrorist situations are pre- empted or avoided by judicious use of intelligence information. It is easier to arrest people, when they are not armed or holding hostages than when they are.

Because of this altered climate, there is undoubtedly a growing motivation on the part of governments and security forces to augment their capacity to prevent terrorist activities. A large component of these initiatives will involve the use of computers and communications technology for data gathering, storage, and analysis. I believe that, for most nations and especially for those in the "firing line" of international terrorism, the lure of high technology to pursue such purposes is irresistible, particularly when its application involves such ostensibly noble aims as protecting people and property from criminal attacks.

In fact, this is the essence of the technological embrace that seems to mesmerise our current thinking: When faced with an apparently intractable human problem, our habitual response is to seek the building of a technological system or artifact. The superficiality of this thinking in the information age limits us to the level of gadgetry and gee-whizzery, rather than allows us to confront the nature of a problem, acknowledge its complexity and difficulty, and progress toward efforts at the human level. Yet, not only are such technological solutions attractive to policy makers, by virtue of their superficiality, but this very quality also leads us to de-emphasize their associated costs. For instance, given the possibility of death, injury, and large- scale loss of property, the price that the public pays in terms of infringements of privacy and the isolated human costs associated with citizen surveillance and database records can appear paltry in comparison. What I hope to demonstrate in this paper is both that these costs are far from insignificant and that, in any case, the technological response to the terrorist problem can only be regarded as a partial solution, at best.

A Case Study of Surveillance in the "Interest" of the People

At this point, it may seem that I am embarking upon the conventional "Big Brother" forecast. Although there may be substantial overlap between some of my points and others that have been made in a number of recent publications,[7] I hope to demonstrate that the need to solve the terrorist dilemma provides a strong motivation for precisely the sorts of technologies and practices that some of these authors have feared, and that some of the dangers inherent in their widespread use are made more real as a result. Perhaps the most illustrative examples are those where the initial aims and purposes of the information- gathering activity have clearly been perverted by intent or by default, and have resulted in enormous harm to individuals who have found it difficult or even impossible to achieve rectification or compensation.

Such a case is recounted in **The File**,[8] by Peter Kimball, a former Professor of Journalism at Columbia University. Kimball's personal file at the U.S. Federal Bureau of Investigation, when released under the Freedom of Information Act, revealed that for more than 30 years he had been classified as an undesirable citizen and a communist sympathizer, as a communist "too clever" to be found holding a party card. This classification resulted from the combination and embellishment of two incidents early in his life.

The first occurred when he applied for a government position shortly following his release from the Marine Corps at the end of World War II. One of the referees he nominated had very briefly questioned his political views; but that referee had made no mention of communism or of any other school or flavor of political thought. The second event was his rejection of the government position after it had been offered, so that he could take up a more promising position with a leading American newspaper. In his book, Kimball shows how, over a 30 year period, these events and subsequent inquiries to elucidate the reasons for his rejection of the position, were combined and magnified to the extent that his file received the attention of J. Edgar Hoover, and his later applications for senior government posts, academic appointments, and even passports, were substantially affected.

Kimball's book provides an interesting account of an individual's protracted and ultimately futile struggle with bureaucratic indifference and inertia. In particular, it details how the quizzical comment of an elderly right-wing referee could be snowballed into a massive document proclaiming Kimball to be a "dangerous national security risk of doubtful loyalty to the U.S. government and its institutions." Subsequent discussions with those individuals who were allegedly interviewed by the FBI revealed that there was deliberate distortion or suppression of individuals' testimonials and other evidence, in order to preserve the file's early and presumably unalterable theme. Most importantly, Kimball had never been made aware that such allegations were being made against him, let along given the opportunity to defend himself publicly. It was only as an elderly man that he discovered the nature of his personal file and, even now, on the verge of death, he remains uncleared, although certain agencies have expressed a willingness to destroy their records due to their lack of current relevance.

A Recent History of Surveillance in the "Interest" of the People

At this point, the reader may still be unconvinced of the tendency of democratic nations such as the United States to monitor the activities of large numbers of its citizenry. The Kimball case seems an isolated incident, quite removed in time. But this is far from the truth. The Kennedy administration, for instance, initiated a far-reaching effort to keep track of civil rights activists such as Martin Luther King. During the Johnson administration, concern about race riots, civil-rights demonstrations, and anti-war protests prompted the President to order the army to increase its surveillance activities, thereby creating files on about 100,000 individuals and an equivalent number of organizations. The CIA was also involved in this exercise. In Richard Nixon's term of office, he was accused of having violated the law by obtaining the computerized tax files of many of his political enemies and was unsuccessful in his attempt to require all television sets sold in the United States to be equipped with a device that would allow them to be turned on from a central location.

The largest amount of surveillance in the United States has been carried out by the National Security Agency (NSA). Most of the NSA annual budget of $4 billion is allocated to the procurement of the latest in computing and surveillance technol-

ogy. It is reputed to have the most advanced computing capability in the world, enough to intercept and analyze perhaps 70% of all telephone, telex, data, and radio transmissions generated on Earth. In 1971, the agency decided it needed a high-temperature incinerator to dispose of the masses of printouts and secret documents generated every day in the course of its activities. The specification required the unit to be capable of destroying at least six tons an hour and not less than 36 tons in any eight-hour shift, such is the size of the agency's activities.[9]

Contributing Factors and Resultant Dangers in the Automation of Surveillance

1. Human/Computer Error in Computer-Based Surveillance

Although these sorts of capabilities appear impressively error-free, it must be borne in mind that the targets of these activities are real people who must deal with the consequences of any inadequacies. Consider the following cases:

On Friday, 9 November 1979, three young Frenchmen filled their car with gasoline at a service station in Etampes, a small town in the vicinity of Paris. The owner of the service station noticed that the license plate was patched together with pieces of tape and became suspicious, especially after the check they offered seemed to have a scrawled signature on its face. He took note of the license number and contacted the police after they left. A routine interrogation of their database revealed to police that the car had been stolen and a patrol car was duly dispatched to intercept. They caught up with the car while it was stopped at a red light and two officers in plain clothes jumped out, one holding a machine gun, the other a .357 magnum revolver. The only uniformed officer remained inside the car. The subsequent events are not quite clear, but it is known that the officer with the magnum revolver opened fire on one of the men; the bullet pierced the windscreen and hit the occupant just under the nose. The other two young men were then informed that their assailants were police (not gangsters) and they were handcuffed while an ambulance came to assist their injured friend.

Later investigation placed the whole incident in a somewhat different light. One of the three men had purchased the car quite legally, ten days before. It was true that it had once been stolen, but that was in 1976 and it had since been recovered by the insurance company which then sold it to the firm from which the man purchased it legally. The primary cause of this incident was a failure to update the computer file covering this vehicle, to reflect the change in status and ownership. The police records still labeled it as stolen and the police reacted as if they were dealing with bona fide and therefore potentially dangerous criminals.[10]

A second example of misplaced confidence in computer-based records is provided by the experience of a U.S. citizen whose wallet was stolen by a criminal who subsequently adopted his identity. The thief was later involved in a robbery/murder and through the circumstances of the case, his adopted identity (although not his real identity) became known to the Los Angeles Police Department. This information was duly stored in their database and when the legitimate owner of the identity was later stopped for a routine traffic violation, the computer indicated he was a prime murder suspect and he was immediately arrested. He spent a few days in jail until the full details were revealed.

At first, this incident may be regarded as a tolerable error; however, even after the confusion of identities had been discovered, this individual was repeatedly arrested (five times in 14 months) on the basis of the same incorrect data records. After extensive frustration, he managed to obtain a letter from the local chief of police indicating that he was not a **real** murder suspect and that the database records were wrong. Although the letter was sufficient for the local situation, experience revealed that it held little weight when he travelled interstate. Only after a protracted court battle was the record expunged.[11]

These examples illustrate the problems associated with the use of computer-based data storage and retrieval. Not only is there the problem of magnitude - that is, the sheer amount of detail that computer-based information systems are expected to deal with infallibly - but there remains the difficulty of providing systems that are easy to update, efficient, and complete in their retrieval of information, and that also possess adequate security procedures to prevent infringements. In satisfying these conflicting goals, there must be severe compromises and it is doubtful that any system can, in any sense, be said to achieve all of them.[12]

Such errors are endemic to any information-gathering system - whether it is computerized or not - simply because of the necessity for human involvement. No future technology will provide magical, error-free systems that sift and file flawlessly. Quite apart from the new class of errors that arise from the interaction of humans and computer-based information systems, it is clear that computers which are less than human in their intelligence are incapable in these circumstances of making valid assessments of human behavior, intent, or character. Ultimately, it is humans who must determine the significance, validity and utility of any information acquired, and this function is independent of technology. Mistakes will be made, if only because of the fundamental requirements for human decision-making at a number of levels. One danger of information technology as a solution to terrorist threats, therefore, is that its promise of gathering and analysing enormous amounts of data may lead to the widespread application of such technologies to encompass the daily lives of larger proportions of the citizenry, and may necessitate that such human errors, exacerbated by the complexities of computer-based gathering, storage, and analysis,[13] will involve greater numbers of individuals. For this, the technological talisman remains impotent.

2. Public Attitudes and Human Judgment

From this evidence, it should be clear that even democratically elected governments and their agencies have been guilty of surveilling both their own and other nations' citizens and that such practices have been augmented as the capabilities of technology have increased, despite their generation of sometimes tragic errors. However, even the amount of monitoring currently being carried out is trivial when compared with its possible extent and it is important to note that, apart from economic considerations, it is primarily the tide of public opinion that prevents more extensive and hence identifiable surveillance from occurring.

In many countries, citizens already willingly accept significant levels of surveillance from commercial and private interest groups as well as from government. Hidden or exposed cameras watch us in banks; store detectives watch us as we shop; our credit history is available to those who would lend us money for

whatever purpose. Generally, we accept such surveillance because we believe it protects the innocent and inhibits lawbreakers. And this belief may be one significant factor in allowing greater level of surveillance to exist. People may gladly proffer personal information or accept intrusions into their lives, if they believe that this is the price to be paid for protection from the unscrupulous.

A large proportion of society also holds the naive and simplistic view that if one is perfectly honest and law-abiding, then one has nothing to fear from the gathering of information and monitoring of activities; that is, the only people who could possibly suffer from the application of widespread surveillance are those who are obviously breaking the law or otherwise acting in an unacceptable manner. The Kimball case clearly demonstrates this to be false. Not only do humans - the actual "consumers" of information - make errors and compound them (as do the human-generated programs that run on computer-based information systems), but they also operate under belief and value systems that may conflict with or misconstrue the information to be interpreted. Hence, support for the Campaign for Nuclear Disarmament may be viewed variously as support for the aim of a nuclear-free, peaceful world, or an interest in undermining the nuclear balance and promoting Soviet superiority in weaponry.

Information does not exist in an ethereal vacuum, somehow independent and pure (i.e., there is no objective truth). Humans will, in the interpretation of such information, bring to bear their accumulated experience, including the values and attitudes they have developed or acquired. This knowledge, coupled with the lack of context accompanying (particularly automated) surveillance data, has the potential for distorting minor or insignificant information out of all proportion. For instance, the fact that my library's database reveals that I once had an avid desire to read Marxist literature may ring the alarm bells of intelligence agencies. However, they may be less interested if they discovered the added context that I merely borrowed the books (never read them) so that I could leave them lying around to impress a girlfriend majoring in political science, or that the books were intended to help write my thesis which was actually a refutation of Marxist principles.

Presumably, human agents are used to help gather this background context, yet a human's ability to interpret any evidence and rationalize it to fit preconceived notions is very large, as anyone who has experienced or studied the basis of prejudice and labeling can attest.[14] Indeed, the literature on prejudice and labeling indicates that early classifications are exceedingly difficult to shake and that massive subsequent evidence is required before initial views, often formed on the flimsiest of evidence, are overturned.[15] Hence, as the example in the previous paragraph showed, one's early courting behaviour may not only label one as a communist sympathizer, but in addition, all subsequent investigations are forced to deal with and come to terms with this early verdict. It is even more distressing if one considers that the secrecy of such judgments may never, as in the case of Peter Kimball, allow one to present the substantive evidence necessary to refute their validity.

3. When is a Surveillance System Not a Surveillance System?
A further aspect of human judgment and belief which has a role to play in the establishment and augmentation of surveillance is the inability of individuals, even those crucially aware

of human rights issues, to envisage the possible eventual uses of apparently innocuous technological developments. Technologies may initially be introduced for clearly harmless purposes, yet may later be turned to the pursuit of surveillance goals. For example, portable devices that allow one to inspect the contents of letters without opening them[16] have the potential of saving lives by identifying letter bombs before they are opened; however, it is just as easy with this device to survey the written contents of letters without leaving any evidence of having done so. Similarly, as a step toward controlling chronic traffic congestion, Hong Kong authorities have moved toward the implementation of a monitoring system that would electronically "tag" individual cars and trace their movements so that a proportionate car commuting tax can be levied. This system would hopefully have the effect of discouraging car movements and encourage the use of public transport; but given the motivation, it is equally possible for this system to be perverted to the purpose of gathering detailed information about individuals' movements and social contacts.

The development of "universal" speech recognition by computers, or their ability to recognize isolated (but eventually connected) words from a large array of human speakers, has been heralded as an immensely beneficial form of human-computer communication. Those who support this view argue that it will allow the complete automation of telephone communications; operators can be replaced with computers that understand the vocabulary required for placement of telephone calls. Or fighter pilots under the stress of high-speed maneuvers could speak to their aircraft, rather than initiate painful control movements; surgeons and engineers could consult video- or audio-based manuals, even when their hands were full of instruments. More than one authority[17] has noted the potential that this development has for the monitoring of radio or telephone conversations. At present, it is enormously expensive in terms of manpower to monitor large numbers of radio and telephone conversations, but computer-based systems that scanned telephone conversations randomly in the search for key words such as "bomb" or "blow up," or any of a dozen euphemisms, could be seen as an efficient and cost-effective means of performing broad-based initial surveillance before embarking on more detailed follow-up. Such malleability of technology to suit purposes for which it was never intended represents an avenue through which surveillance schemes can be implemented without public outcry.

4. Abuse and Legislative Impotence
Certainly the functions of government surveillance and intelligence agencies in all countries would be more happily performed, if they were sanctioned both by the will of the people and simultaneously remained within the existing legal framework. By default or by design, it would appear, however, that few of the NSA's known activities, for example, might breach existing laws, primarily because of legislative obsolescence and inadequacy. For instance, in the United States, it is illegal for a third party to place an electronic listening device on a telephone, although government agents can do so under restricted conditions with a warrant. However, this same 1968 wiretap law says nothing about nonvoice communication. No restrictions are placed on digital or microwave transmissions. Therefore, the monitoring of digitized telephone lines would appear to be legal in the United States as would also monitoring microwave beams, infrared links or computer lines. It is also

technically possible to eavesdrop on computational processes by monitoring the electromagnetic emissions that computers make, and presumably this too has no penalty attached.[18]

In the face of inadequate legislation, and given a record of covert surveillance, it is difficult to imagine that U.S. intelligence organizations would refrain from exploiting this situation in order to limit the effectiveness of terror campaigns. Even in Britain, where the Data Protection Act requires all organizations or individuals holding personal information in computer files to be registered with a centralized policing body, it is estimated that at least 300,000 users have failed to do so. It remains to be seen how this body can police data it does not know about,[19] including the untouchable files of MI5 and New Scotland Yard.

5. Saving the People from Themselves and Each Other

In the event of greater, publicly sanctioned surveillance for the purposes of national security, the same sort of reasoning would probably be widely applied to the detection and monitoring of other, more ordinary criminal activities, such as the identification of tax cheats and those fraudulently claiming welfare payments. Habitual drunk drivers (who, like terrorists, kill innocents at random) might be required to undergo regular breathalyzer tests, with the results stored on their probation/parole records. Indeed, to prevent drug abuse or alcohol addiction, it is not a far cry from surveillance for national security purposes to the requirement that drug prescription records be available for inspection, or for credit card alcohol purchases to be totalled. After all, drug dependence of all forms represents a huge expense to developed nations in terms of medical costs, rehabilitation, family breakdown, suicide, violence, and crime.

Such systems could be of use in the apprehension and monitoring of those who commit crimes of violence. An example of this is the recent development and application in the state of New Mexico, of tamper-proof anklets that allow criminals to be monitored within the precincts of their home, thereby allowing them to be detained without having to incarcerate them.[20] This solution has potential benefits in terms of cost, prevention of prison overcrowding, isolation of "lesser" criminals from hardened criminals, and the provision of acceptable living conditions. Variations on this theme could involve devices that do not restrict known criminals' movements, but simply log periodically their approximate position and record it for possible investigative purposes.

On the face of it, these applications also appear benign and seem to reflect the laudable aims of not only protecting the majority from the unacceptable practices of a minority, but even allowing these transgressors a restricted lifestyle to aid their rehabilitation. Yet, these proposals assume a degree of infallibility in (a) the correctness, relevance, and adequacy of the information gathered in such schemes, (b) the correctness, currency, and accuracy of the information stored, and (c) a degree of objective impartiality in the interpretation of information that is not warranted on the basis of the evidence cited here.

6. Signal Detection Theory

Having noted these difficulties in the design and use of present computer-based intelligence services, and given the technologists' confidence that such problems are (ultimately) technologically resolvable, it is appropriate to question whether any conceivable intelligence gathering/manipulating system or human - computer conglomerate can function perfectly; that is, to the extent that the fundamental rights of individuals are protected and innocents are not unjustly persecuted. The short answer to this is "no" and it is important to emphasize that this unqualified answer remains equally valid for all systems (human or computer-based or both) involved in decision-making. Its basis lies in an outgrowth of information theory known as signal detection theory (or SDT).[21]

The essence of the SDT approach is to assume that information (or a signal such as, say, guilt or innocence) occurs against a background of noise (say, misleading or contextless information, or even deliberate lies). In identifying whether or not a signal exists (e.g., whether someone is guilty), SDT requires an individual or decision-making system (even a thermostat, for example) to assess the strength of the signal (i.e., the evidence in favor of a particular decision) against the level of noise that exists. In addition, the decision-maker must evaluate the costs and benefits associated with any particular decision, given the true state of affairs.

As a concrete example, consider a physician, faced with the results of an X-ray, who must decide whether a particular condition exists and whether surgery should be performed or observation continued. In doing this, the physician must consider the strength of the signal indicating a pathological state (symptoms, clues from the X-ray, frequency in the general population, etc.) against the noise that clouds the identification of such a state (ambiguities of many X-rays, vagueness in patient's symptoms, no known medical history for the patient, etc.). In determining the diagnosis, the physician is also faced with an evaluation of the costs and benefits associated with performing surgery or continuing observation in the event that the patient either is or is not suffering from the suspected illness. If the patient is actually healthy and deemed to be such by the physician, then there are quite obvious benefits such as the avoidance of a general anaesthetic and perhaps a protracted and painful recovery. Similarly, the benefits of deciding to operate when the patient is in fact in need of the procedure are quite obvious. However, in the remaining decision/event combinations, it is apparent that costs rather than benefits accrue. Should the patient be ill and the doctor decides not to operate, or the patient is not ill and the doctor does operate, then some degree of harm is done. Obviously, the costs of **not** operating when the patient is genuinely ill are the most serious - even potentially catastrophic - and generally in medical situations the costs of inappropriately performing a therapeutic or remedial act are minor when compared to this option. It is quite likely in these circumstances, therefore, that given any small amount of evidence, the procedure will be performed. For the physician, the ratio of a signal's strength to its associated noise need only be quite low before it is deemed to be real.

However, in other situations this may not be so. For instance, in the 1950s, the detection of inbound Soviet nuclear warheads depended on the vigilance of U.S. radar operators. Here the costs and benefits associated with decision/event combinations were markedly different. Should an operator have incorrectly identified the presence of nuclear warheads on his radarscope, then the cost associated with this identification are too awful to contemplate. Should he have correctly identified inbound weapons, then there would possibly have been a minor benefit in air raid warnings and civil defense alerts. Should he have missed the presence of weapons when they were actually on the way, then

U.S. weapons would have been destroyed without retaliating, and (to the extent that nuclear wars can be won) the Soviet Union might have been considered the winner. Finally, should the operator have continued to determine correctly the absence of weapons (as actually occurred), then incalculable costs could have been avoided. In these two different examples (medicine vs. national defense), the criteria for judgment are vastly different. While one may regard a small amount of evidence to be sufficient to undertake a surgical procedure, the criterion (signal strength vs. noise strength) needed to declare nuclear war must be much more stringent.

The point of this rather abstract discussion is that SDT allows the categorization of decision/event combinations and the identification of the costs and benefits associated with decision-making in noisy (i.e., confusing) environments. The four categories that SDT proposes are: HITS, MISSES, CORRECT REJECTIONS, and FALSE ALARMS. When an event or signal is real (the person **is** sick, or weapons **are** there) and the decision-maker decides that, indeed, the event is real, then a HIT occurs. If the event is real but the decision-maker (perhaps because of the presence of noise) decides that there is in fact no signal or event, then that is termed a MISS. Should the observer decide that an event is real, when in fact it is spurious, then in SDT terminology, this is a FALSE ALARM. And in the event of the signal not being extant and the observer deciding that it is not, then this is termed a CORRECT REJECTION. Plainly, HITS and CORRECT REJECTIONS usually accrue benefits (or at least they accrue no costs), while MISSES and FALSE ALARMS are generally associated with costs. Also, in SDT nomenclature, the ratio of strength-to-noise that an observer needs before he or she is willing to admit the existence of an event is termed the **criterion** or decision rule. In certain situations, the criterion needed before a signal is believed to exist can vary from the suggestive to the extremely stringent, and it is generally the pattern of costs and benefits which will determine where an observer will place his or her criterion in terms of signal vs. noise.

The most valuable aspect of this form of analysis, however, is in revealing that the percentages of false alarms and hits are directly related, such that the more events one is willing to regard as true signals (e.g., the number of people one labels as subversive), then the more false alarms will occur (i.e., the greater the number of people unjustly accused). This is equivalent to saying that the more correct rejections one aims for, the more misses will be incurred as a result. The setting of the hit and false alarm rates therefore depends upon one's placement of the criterion in terms of signal strength against noise strength. The only situation in which false alarms will not occur is when the signal and noise distributions do not overlap - that is, when one can clearly identify a source as noise or signal. In most real life situations though, this certainly does not occur and signal and noise distributions tend to overlap considerably. For example, one may read more Marxist literature than the average communist, but remain opposed to communism, or one may read the Bible and pledge allegiance daily in one's outward behaviour, yet remain committed to communist principles. Indeed, one has only to think of the everyday applications of SDT to realize how nonsensical it is to regard most decision process as free of error. In selecting the brightest students for our universities, for instance, we reject suitable candidates who appear to be unsuitable (misses), we endorse unsuitable candidates because the evidence we have supports this (false alarms), we correctly identify suitable students (hits) and correctly identify incapable ones as well (correct rejections). Despite the criterion we set in terms of grades, costs still accrue. Because the distribution of grades overlap, the grades of some of the actually better students are in the region of those of the poorer ones, and vice versa. Even in this relatively "objective" situation, human costs are evident. Yet in the more "noisy" environment of our everyday lives, decision-making must appear much more dangerous and uncertain. It is naive to expect such limitations to be remedied by technology, for each new source of information carries with it an associated and unavoidable distribution of noise. These limitations are a result of the ambiguity of human society and cannot be eliminated by any technological development. It is entirely up to those administering surveillance programs to judge the costs and benefits involved and thereby the rate of justice and injustice that is to be meted out. Inevitably, as surveillance efforts increase, these rates convert into greater numbers of people and the value of catching greater numbers of miscreants versus the cost of incarcerating greater numbers of innocents must be weighed.

7. High Technology Terrorism

An established military dictum is that for every weapon there eventually appears a defense and vice versa. When applied to terrorism, it would seem obvious that terrorist groups would respond to high technology countermeasures with the use of high technology defensive measures and weaponry. Should the Western powers come to depend upon the use of surveillance and database technologies to thwart terrorist efforts, therefore, one can envisage that certain responses might ensue. These might include: the use of disinformation or planting of conflicting data; or direct attacks on the storage media themselves, either physically (e.g., by destroying network nodes or affecting their power supply) or electronically, perhaps by attempting to enter the computer systems remotely and corrupting or erasing data and programs. One might also expect that this means of attack could be directed at the computers that control key social functions, systems controlling power and water supplies, traffic lights, police, ambulance, or military communications. Some observers even fear that computer-mediated democratic elections might be interfered with.[22]

8. Summary

In integrating this evidence, I would argue that the circumstances I have outlined, while hopefully not fulfilling an Orwellian prophecy, certainly provide cause for concern. There is a strong motivation on the part of both Western governments and their agencies to contain criminal and terrorist acts, even, in the case of the United States, to the extent of armed intervention. However, although these responses may serve some immediate purposes, it is more likely that a long-term solution will be attempted by harnessing information technology to pre-empt and contain terrorism. Should terrorist efforts spread to the continental United States, then, given the inadequacy of current legislation, some increase in surveillance type activities will probably ensue. Moreover, the sanctioning-by-default allowed by public attitudes - involving the beliefs that only wrongdoers need fear surveillance and that the loss of privacy is a small price for one's safety - may facilitate the acceptability of these surveillance developments. And the introduction and conversion of ap-

parently innocuous technologies to surveillance purposes may avoid public controversy.

As I have outlined above, however, decision-making processes in real world situations cannot, in theoretical and practical terms, and despite technological developments, be error free. The necessity for human evaluation of surveillance data also brings to bear prejudices and values that can lead to the application of invalid labels that cannot be disputed because they are not public. Furthermore, the augmentation of surveillance for the purposes of restricting terrorist operations bears with it the implication that other forms of criminal activity should be curtailed in a similar manner. In terms of the claim that skilled and well-intentioned individuals may limit the utility and efficacy of surveillance by penetrating systems to expose and corrupt data and programs, it can only be said that in the face of a nation's best expertise, such claims are unlikely to be substantiated. Resorting to technological countermeasures to terrorism will necessitate that terrorists come to terms with this technology and revamp their tactics to reply in kind.

Discussion

Terrorism arises out of human conflict from a variety of sources (political, religious, racial, economic, and historical) and out of the failure or inappropriateness of existing processes in resolving longstanding disputes and grievances. Terrorism appears to be a result of frustrated efforts to achieve conflict resolution and manifests itself as an alternative (though probably counterproductive) mechanism for achieving these ends.

For some conflicts, the desired solution is patently unreasonable (such as the genocide of a particular religious order or culture) or impossible, and it may indeed be true that in such circumstances, a negotiated human solution is very unlikely. To this extent, it is not unreasonable to propose technological measures for containment of the problem, taking into consideration the side effects and costs that may accompany these initiatives. However, as I have argued in this article, it is incorrect to propose that such endeavors constitute **solutions** to these problems.[23] The blanket responses of eliminating terrorism by technological means or of protecting a nation from nuclear war by constructing a missile defense, cannot be regarded as solutions to the factors that precipitate terrorism or to the problem of human aggression in the nuclear era.

Admittedly, such an analysis offers no proposal for how to resolve the problem. Yet it would seem sufficient, as an initial step, to determine the inappropriateness and futility of attempting to solve this problem in one homogeneous lump, by technological means alone. Addressing such problems as terrorism at the human level will not inevitably lead to their resolution. The history of human conflict is replete with instances where such methods have failed. Nevertheless, while human efforts (compromise, negotiation, intermediaries, etc.) may indeed fail, they offer the real possibility of providing solutions.[24] Technological efforts can only offer amelioration, never resolution.

The possibility remains, therefore, that components of the terrorist problems are resolvable through continuing human efforts at conflict resolution. But based on the evidence that has been presented, the success of such efforts is compromised by the dominant technocratic consciousness and its reflexive reaching for familiar off-the-shelf solutions.

In a broader sense, of course, I am not really discussing here the problems associated with dealing with terrorism, or even what difficulties a particular type of solution may invite. Rather, my example was intended to highlight the need to recognize a class of problems, now of an international order, which may or may not have arisen out of technological developments, but which demand an initial nontechnical analysis, if they are to be resolved - for example, the global destruction of species, the nuclear arms race, the uncontrolled exploitation of natural resources, and the blatant inequities that exist throughout the world in terms of basic human needs.

For each of these global crises, it is possible to identify on a worldwide basis the often monumental efforts being made to seek their resolution. Yet most of these efforts are being directed along technological lines. To protect civilization from nuclear war, we build a nuclear umbrella; to prevent destruction of species, we use artificial insemination in captivity; to feed the third world, we provide super-grains, fertilizers, and vasectomies. As human beings, we seem reluctant to acknowledge that war originates with **humans**, that species die because of environmental exploitation driven by short-term **human** goals, and that the third world starves not through the inferiority of native grains, the quality of arable land, or lack of contraception, but through historical and continued Western exploitation, intervention, and manipulation.[25]

Many writers have offered explanations of this phenomena. The computer scientist Joseph Weizenbaum,[26] attributes it to "nothing but" thinking - man is **nothing but** a machine; the nervous system is **nothing but** a telephone exchange; the mind is **nothing but** a program. By reducing complexity to more cognitively comfortable levels, analysts not only diminish a problem's apparent difficulty, but also transform it from a technologically unanswerable question to yet another design/engineering task. Hence, the fact that a large percentage of the world's population is malnourished is transformed from a complex political and economic problem cause by a history of Western exploitation[27] to the more comfortable and technologically familiar problem of growing more food. Moreover, once this transformation has taken place, the technocratic mentality focuses exclusively on the dimensions of the redefined task, to the extent that moral and ethical responsibilities or involvement are minimized or even abrogated. Under this interpretation, then, the terrorist problem merely represents the most recent example of a complex human problem undergoing its transformation to a less cognitively dissonant technological form.

The range of problems for which technology once proved so powerful in overcoming are diminishing in terms of their importance. Given that science and technology have largely resolved the problems of survival, sickness, and labor (if not in worldwide practice then at least in principle), than what major problems remain are those that have a fundamental human basis and which therefore have proved difficult for technology to address. A reflexive resort to technocratic thinking in these circumstances therefore assumes a special significance. Although I am loath to generalize from the behavior of "lower" animals, I believe an observation of experimental psychologists in animal behavior offers some insight. When rats are exposed to painful levels of electric current, they frantically seek avenues of escape, but very frequently stop to engage in "diversionary" behaviors. They groom themselves, play with objects, eat, and defecate as if in the process they are able to deny the reality of their situation. It

may also be that in the presence of apparently unavoidable pain, stereotypic activities provide some degree of reassurance. Let us hope that in the continuing presence of such global crises as terrorism, we can desist from the stereotypic technocratic thinking that has characterized past efforts. While it may indeed be reassuring, comfortably shortsighted, and even morally escapist to do so, eventually we may have to confront an even more frightening scenario: a very large number of rats in a very painful and steadily shrinking cage.

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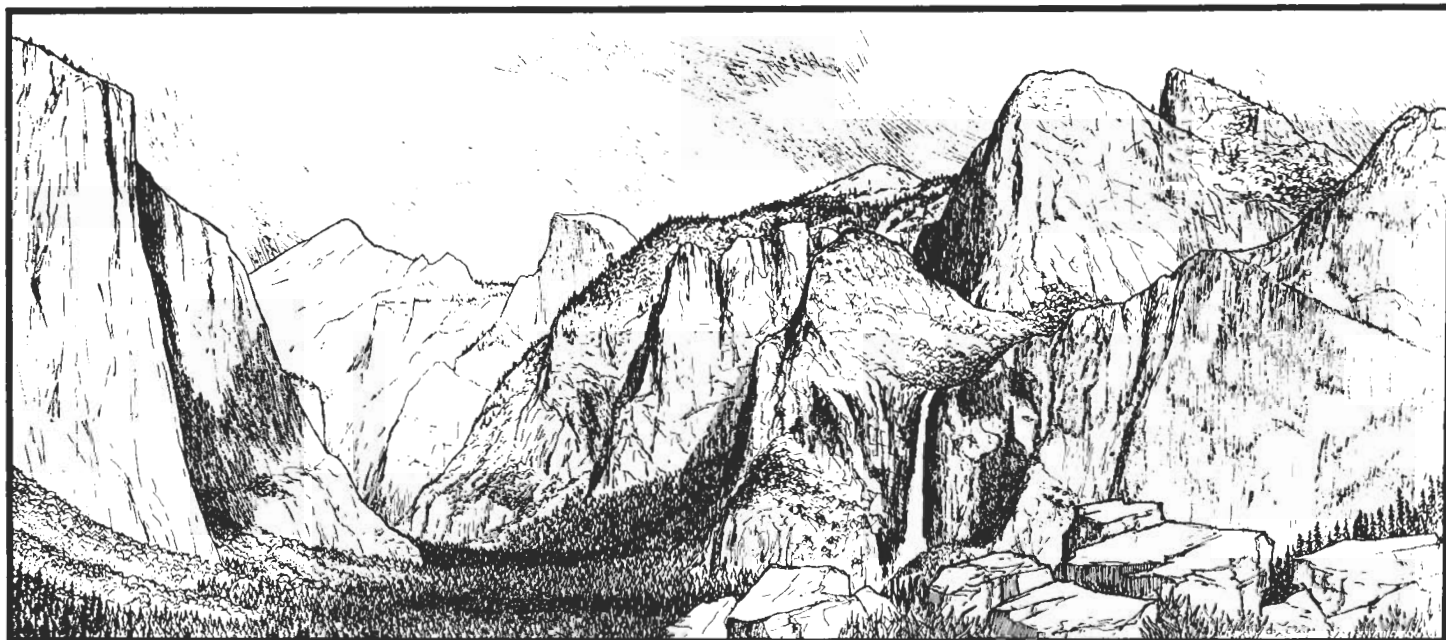
MASTER IDEAS IN A WORLD OF DATA

C.A. Bowers

There is much in Theodore Roszak's new book (**The Cult of Information: The Folklore of Computers and the True Art of Thinking**, Pantheon Books, 1986), that will strengthen the view that those who pioneered the development of computer technology, as well as those who are now advancing the technology, are **not** necessarily the most knowledgeable about what they have created. The ideologues working within the lower echelon of the new guild have attempted to prevent this insight from emerging by using their control over the definition of "computer literacy" as a basis for determining who has the right to participate in the discourse. Understanding computers means, according to them, how to operate the machine and how to program. Roszak's argument (along with the contribution of Joseph Weizenbaum and Hubert and Stuart Dreyfus) enables us to recognize that the gatekeepers of the new technology have confused computer **literacy** with what might more accurately be labeled computer **mechanics**. Literacy involves being able to decode the meaning of symbols and can be extended to mean being able to "read" the meanings in the interplay of cultural patterns and human activity--including how the development of computers has altered our experience. Without introducing his readers to any of the mechanical procedures necessary for using a computer, Roszak takes us a long way down the road toward a more meaningful understanding of genuine computer literacy. He does this by challenging the widely held and heavily promoted idea that computers represent a distinct and inevitable stage in human evolution, an idea that is really an article of faith used to justify a tunnel-vision approach to further technological development. Given this view of reality, any serious examination of how the use of computers alters the fabric of cultural life seems totally unnecessary--perhaps even reactionary.

A central feature of Roszak's argument is that the computer, as a symbol-processing device, reproduces in our experience a **particular** form of thinking. As he puts it, "Embodied in the machine there is an idea of what the mind is and how it works" (p. 217). Thus, the development of the computer must be understood as the extension of a particular epistemological tradition in Western thought, i.e., the Cartesian view that knowledge must be able to meet the test of being made explicit, measurable, and amenable to procedural organization. The attempt to translate all human experience into algorithmic procedures, as well as all the facile rhetoric that shifts between viewing the mind as a machine and the machine as a super mind, must now be viewed through a different set of lenses. Regardless of the power of the computer to store and process data, it is **not** neutral. By making this illusion explicit, other significant questions arise about what other aspects of the culture (social, political, economic, educational) are amplified and/or reduced through the use of this technology. Although Roszak does not fully address the question of how the computer represents a new form of cultural imperialism (for example, will the computer alter the philosophical underpinnings of Japanese and Chinese culture?), he succeeds in clarify-ing how the use of the computer strengthens specific social practices and ideological orientations within the areas of work, education, and politics.

But before touching on the aspects of Roszak's analysis that clearly bring out the inherently political nature of the computer, it is essential to identify how, in his view, human intelligence differs from the symbolic operations performed by the machine. This is basic both to how Roszak interprets the influence of the computer in other areas of cultural life, and to understanding aspects of his analysis that are, it seems to me, problematic.

According to Roszak, the desire to create a machine capable of artificial intelligence, the cult of information fostered by the computer's great speed in retrieving and processing data, and the language usage that now blurs the distinction between the mind and the computer, are all based on a **misconception** of how the mind works in the real world. His basic argument with what he views as the information-processing model of thought replicated in the computer can be summarized in terms of two major points. First, while granting that the human mind can organize experience into bits of information and can--in certain situations--engage in effective problem solving by following a procedural-data- processing pattern of thinking (similar to what the computer does), Roszak argues that our normal thought processes are both far more complex **and** fundamentally different. Humans think in **gestalts**, and this involves interpreting and giving meaning to ideas and data in terms of what Roszak terms **master ideas** (the deep interpretive frameworks that others have variously called paradigms, root metaphors, world views) that are derived from our cultural group and modified through individual experience. In contrast, computers process data (which may reflect the master idea or conceptual template of the programmer), but they are **not** able to make judgments that take account of the appropriate interplay of context, master idea, immediate task at hand, and ongoing existential project of being a particular person.

Roszak's second point is that as the computer can only "think" with what others have programmed into it, or in terms of its self-programming capabilities, it can process only **explicit** forms of knowledge. In contrast, most of human activity involves the use of what we might think of as **tacit** knowledge: making breakfast, communicating messages through body language, driving a car, telling a joke, reading a book, and so forth. The epistemological tradition that extends from Plato through Descartes and down to the present computer advocate has failed to grasp that we are able to cope with the explicit and more problematic aspects of experience because the background of tacit knowledge remains at the taken-for-granted level; that is, it remains part of our "natural attitude." (The analysis of tacit knowledge in Mary Douglas's **Implicit Meanings** and Michael Oakshott's **Rationalism in Politics** are eloquent sources of support for this part of Roszak's argument.)

Both tacit knowledge and human judgment involve a continuity in the re-enactment of ancestral knowledge that we more conventionally understand as culture. The patterns and archetypal images that provide the scaffolding of everyday experience thus cannot be compared with the computer-supplied information that many claim will guide modern consciousness into a new era. Thinking and data-based decision making, like apples and screwdrivers, cannot really be compared because the latter, in denying the importance of a historical dimension of consciousness (of tradition, of culture) fosters a conceptual form of nihilism. That is, reliance on data alters our sense of time by denying that the past, and thus the authority of memory, can provide perspective on how the present relates to the future. This relativizing of authority is further strengthened by the tendency to relate data with individual empowerment. By giving authority to data within a competitive social context that makes a virtue of politicizing all aspects of our intellectual and moral traditions, everything becomes a matter of perspective. But this does not necessarily lead to a passive form of nihilism where everything becomes equal to everything else. Those individuals who have the power to manipulate the data (which is a de-contextualized form of knowledge) provide a new sense of direction that integrates experience into the patterns of a more purposive rational society. Within this period of social transition, the computer thus provides the new conceptual basis of authority that is to replace the mind educated to the master ideas that reflect the moral insights and vision that are the sediment of collective human experience.

But the making of information into a "God-term" of our era is only one of Roszak's concerns. His other concerns relate to the direction of social change that is fostered by our uncritical use of computers.

As I wish to devote space to showing where Roszak's analysis needs to be revised and extended, I will touch only on the major political threats that he sees. In the chapter titled "In the Wrong Hands," Roszak makes a strong case that fundamental decisions affecting the quality of life in the work place, classroom, and polis are being decided by technocrats concerned with cost effectiveness, accountability, and collecting the data bases necessary for social management. Because they touch on our most basic political rights, these decisions, Roszak argues, should really be decided in the political arena through open and informed debate. As evidence of the distortions in the fabric of our political and social life caused by the control of special interest groups over the use of the new technology, Roszak cites the example of five governmental agencies holding somewhere between two and four billion overlapping files on U.S. citizens, as well as other agencies in both the public and private sectors that routinely share data on the lives of people about whom judgments are made. In addition to the threat to privacy involved here, the computers are distorting the political process by being used by image-conscious politicians, pollsters, and media pundits who are substituting the binary logic of the computer for a discussion of ideas and moral issues.

No less disturbing, according to Roszak, is the manner in which computer programs, designed to run our most dangerous technologies and to provide for crisis management, are created and later modified by teams of programmers. While a program gives the appearance of state-of-the-art rationality, it embodies the different assumptions and personal preferences of the people who created it. But over time, and through successive modifications, the program may become incomprehensible in that the reasoning of the original programmers cannot be understood. In this case, the program will continue to organize data in accordance with assumptions that may be completely out of touch with current realities.

Roszak's discussion of computer use in the work place and the classroom illuminates the disturbing interplay of ideology, economic self-interest on the part of specific groups, media hype, and just plain ignorance. The de-skilling and de-employment of the worker, along with total scrutiny of worker performance for the purpose of increasing productivity, are further examples of how computers and politics intersect **without** significant public debate. The myth of progressive technological innovation and the authority given to raw data have served to obfuscate the most basic political choices that are a concomitant aspect of computer use.

However, it is Roszak's treatment of the educational uses of computers that really gets at the source of the confusion about the basic distinction between information and ideas; and, his analysis does **not** leave the reader with a sense of optimism that educators will help students encounter the elements of our intellectual heritage essential for thinking about the place computers should be accorded in our cultural life. In taking on LOGO, the program developed by Seymour Papert and the one most widely embraced by educators for its ability to promote individual thinking, Roszak, performs an important service for the educational establishment. After taking the reader through a careful analysis of the difference between the "procedural thinking" fostered by this celebrated program and the rich interplay of metaphorical language, master ideas, and personal experience-- the ingredients of "normal" thought processes--Roszak illuminates the basic fact that has escaped the attention of most others; namely, that regardless of whether LOGO is used to teach poetry, art, or geometry, it "comes down to fingers stroking a keyboard, a mind working out a program" (p. 78). Despite the higher values with which it is mistakenly associated, procedural thinking simply cannot be compared with the holistic thinking that allows us to integrate insight, memory, tacit knowledge, contextual pattern, metaphorical understanding, and aesthetic awareness into everyday problem solving.

The Cult of Information is indeed one of the most important books in the growing literature on computers. But there are parts of the analysis that, in my opinion, are in need of revision, if we are to take seriously the task of giving the new information-processing technology a more subordinate place in our lives. The first problem I had was with Roszak's use of political categories. Although he may simply have been following popular conventions in labeling the profit-motivated promoters of the information society as "conservatives," Roszak creates a problem that remains unresolved in the last section of the book where he identifies the intellectual traditions that can be used to challenge the Cartesian paradigm upon which the new technology has been built. The degradation of the word **conservative** by intellectuals, as well as its corruption by the Radical Right, serves to obscure the connections between current social practices and values and the ideological traditions (the master ideas) out of which they grew. For example, the group Roszak labels as conservatives actually reflects the mind-set of classical **liberalism**--a point he indirectly makes in his discussion of the Utilitarians as forerunners of data based decision making.

By emphasizing the epistemological lineage that connects computer technology with the Cartesian paradigm, rather than with its ideological continuities, few readers will be led to puzzle about how liberalism, as the parent ideology, could have given rise to a technocratic form of liberalism that now threatens the traditions of political liberalism. The shift from a concern with a moral order and an organic sense of community to a more mechanistic world view established, through a strange mix of values and assumptions about individualism, competition, and progress, the basis for a new social-political order that fostered the political empowerment of those who possess a **technicist** mind-set. It is fairly easy to take a position with regard to the inadequacies of the Cartesian paradigm, but more difficult to critically examine the conceptual foundations of liberalism itself--particularly in an era of binary thinking.

Computers, more than any other technology, point to the crisis that now characterizes liberal ideology. Instead of incorrectly linking conservatism with the hype and profit-power orientation of people promoting the cult of information, Roszak could have helped put in focus the **crisis of liberalism** by identifying the issues and values that have been the primary concern of conservative thinkers: the problems of reconciling the needs of the individual with those of the community, change with tradition, experience with rationality, the root metaphors of science with the needs of the human spirit. To put it more directly, the philosophical conservatives (as distinct from the economic, temperamental, and economic varieties) represent an intellectual tradition that provides a basis for **critiquing**, in addition to instances of blatant misuse, the hubris of the technocrat who equates innovation with progress and flattens our symbolic world to the one-dimensionality of data. For example, Burke's view of culture as organic rather than a set of social variables that can easily be re-engineered, Madison's concern about the relationship between power and human nature, Arendt's argument that memory is a fundamental aspect of the individual's political authority, and the bioregional concerns of such contemporary conservatives as Wendell Berry and Gary Snyder should all be part of a discussion of the master ideas that could meaningfully guide our use of computers, i.e., to help define a position distinct from that of the liberal-technocrat.

The double bind in which Roszak places himself is rooted more deeply than the simple misuse of political metaphors. The double bind is that he lays claim to the same epistemic traditions (the Enlightenment view of individualism, rational process, and progress) that gave rise to the political and technological practices that he criticizes. His view of the individual and the rational process reflects traditional liberal assumptions about language as a neutral conduit for the expansion of ideas (Locke) and the way in which critical reflection gives authority to individual judgment (Kant).

For example, in writing about students taking charge of their own lives "in the presence of a noble standard," Roszak warns against "idols of the tribe that can tyrannize the young mind."

He also states that "the students must make up their own minds, judge, and choose" (p. 215-16). Although I am inclined to agree with Roszak's value orientation, particularly when confronted by my more technicist-minded colleagues, the goals of empowerment must **not** be based on epistemic traditions that, in eliminating the tension between individualism and community, and critical reflection and the authority of living traditions, foster the relativism associated with nihilism. Roszak's own perceptive analysis of the role that metaphorical thinking played in the development of computers themselves shows that language is **not** simply a conduit for the expression of ideas. As both Nietzsche and Sapir clearly understood, language reproduces in thought the epistemic patterns (including the mythologies) of the language community. Thus, the "idols of the tribe" and the shaping process of indoctrination cannot be as easily categorized as Roszak's liberal assumptions lead us to believe.

Another example of how Roszak's own emancipatory ideals support the position he wants to criticize relates to the conduit view of language that has been adopted by computer programmers. They also assume that individuals are autonomous entities who think more effectively when given information; Roszak wants to give them **ideas**. If he had started with the recognition of how the language of a cultural group provides the conceptual guidance system for the individual, he could have extended his critique by clarifying how computer programs, like textbooks, continue to reify knowledge and reinforce the myth that language is a conduit for the expression of individual ideas (as opposed to Heidegger's position that "language speaks us" while we speak the language). He could have also moved toward a **middle** ideological ground where the concerns of philosophical conservatives and the achievements of liberalism can be viewed as complementary.

Roszak has made a significant contribution in helping to shift the discussion of computers out of the purely technical realm by clarifying the symbolic and political processes involved. At a deeper level, his own liberal framework points to the need to situate our analysis of this new technology within a broader discourse--one that is sensitive to the orality-literacy debate initiated by Walter Ong and Jack Goody (computers are part of the tradition of print), the arguments that connect individualism and critical reflection with nihilism, and the evidence that suggests that ecologically sensitive cultures share few of our Enlightenment assumptions. To reiterate one of Roszak's main points, it is the **master ideas** (including Roszak's own) rather than the data that require our most serious attention.

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TOWARDS A THEORY OF SUSTAINABILITY

Norman Jacob

In this essay I seek to develop further the ideas that I originally expressed in **Towards a Sustainable Forestry** (NRC March 1987). I draw upon the workshop **Changing our Relationship with Nature** which I presented with David Bouvier and Scott Carley (UBC November 1988). The ideas expressed here are incomplete and in the process of development. As such it is fitting that I begin at the source from which our ideas of change and constancy emerge.

Sustainability and Change

At the beginning of classical western philosophy there arises a fundamental difference of perception about the nature of reality. One view holds that things as they occur in our world are imperfect reflections of unchanging ideal forms that are more truly 'real'. There is an essential reality that supercedes temporal existence. Being is primary. Another view holds instead that things as they occur in our world are temporary expressions of a process that exists in this world. We are led to search for the significance of things in the internal processes that generate them. Becoming is primary. Where we stand with respect to this ancient difference of perception, it seems to me, has a significant bearing on how we approach the question of sustainability.

I hold the view that change is our fundamental reality. This leads me to ask: what natural processes are sustainable? What artificial processes may be made sustainable? I am dissuaded from asking: what artifacts which humans have produced may be made sustainable?, or what quantities of resources may be extracted sustainably? The process view tells us that things we make perish and that flows of things that come to us, sooner or later, diminish. A static view of sustainability derives from the above essentialist view of reality, in which being is primary and explanations and authority are sought externally. The understanding which I adopt here is not based on this static view.

The static view leads us in search of utopias, automata, perpetual movers and other steady states. Various schemes of that sort thrive in our society. Consider atomic power with its promise of clean, cheap, bountiful energy or the green revolution, which was to multiply food production in undeveloped nations. The sustained yield concept in its various formulations must count among these, since it also promises limitless production without reproduction. What follows provides a basis for assessing such notions of sustainability as sustained yields of timber and sustainable economic growth.

There are two ways in which I approach discussions of sustainability. One charts a course through a devolving world, which by our very living in it, we run down. It is based upon a view of equilibrium systems and suggests that we seek, as it were, to 'surf on entropy'. Another navigates through an evolving and self-organizing universe. It is based upon a contrasting view, of far-from-equilibrium systems, and suggests that we try to anticipate, as it were, the course of 'the river' which we ourselves are. We may call these the 'change downward' and 'change upward' orientations to sustainability. Although both originate from the same ancient understanding of change the kind of changes they suggest we should anticipate are fundamentally different.

Change Downward

What I term the 'change downward' view of sustainability is based upon the second law of thermodynamics, which states that systems closed to the in- or outflow of energy tend to a uniform distribution of energy. The energy within such systems becomes progressively less available for the purpose of doing work. Although the **quantity** of energy remains the same, the **quality** of energy is degraded. We may say that such systems **evolve** to a state of high entropy.

A corollary to the second law, suggested by the development economist Nicholas Georgescu-Roegen, provides the core of my change downward view of sustainability. He stated in **The Entropy Law and the Economic Process** (ELEP 1971) that systems closed to the in- or outflow of materials tend to a uniform distribution of materials. Our planet, although open to the inflow of solar energy and outflow of terrestrial heat, is closed to the in- and outflow of materials. Ecosystems and organisms, it seems, share this property with our planet, to the extent that they are also material-closed energy-open systems.

There are substantial reasons for taking seriously the view proposed by Georgescu-Roegen. We observe that soils are depleted through the production of food. Metals and other materials are unrecoverably distributed through the manufacturing of products. This diminution of material wealth is not due entirely to imperfections in our agricultural or industrial practices. The regenerative function of ecosystems and our recycling of products can never be 100% efficient. There will be a continued need for farmers to fertilize their fields (artificially or organically) and for manufacturers of metal products to add new iron to the scrap they have salvaged from used cars. Ecosystems will run down, cultures will decline and human beings will die. These are certain outcomes, not probabilities.

This view of sustainability points to a fundamental difference between agriculture and industry. Agriculture is limited by the low entropy we capture from the sun, whereas industry is limited by the low entropy we take from our planet. Adding a second production line to a factory, for example, can double the output of cars, but adding an equal amount of machinery to that already working on a field will not double the output of wheat. To some extent we can speed up agricultural output by mining our soil or adding to it minerals we have mined elsewhere; but the solar insolation which ultimately produces our food is fixed. No additions of labour, materials, stored solar or other terrestrial energies can improve agricultural productivity beyond the limits imposed on agriculture by the sun.

The change downward view gives the concept of sustainability a strange twist. In view of the entropic depletion that the planet, ecosystems, cultures and organisms undergo, the questions we normally ask seem nonsensical. What meanings can terms such as 'sustainable human population' or 'sustainable rate of harvest' have in a world which is inevitably running itself down? What can 'renewable' mean? The view of sustainability that is suggested to us by equilibrium thermodynamics says that renewable resources as such do not exist. 'Renewability' becomes a relative concept with important ethical implications. We are led to ask not what flow of resources may be made sustainable?, but rather, as Georgescu-Roegen posed the question (ELEP p. 20): what 'life quantity' is 'optimum'? If what concerns us is the determination of 'optimum life quantity' then the meanings we give the terms 'life quantity' and 'optimum' become crucial. Is life quantity to include humans only or other life also? 'Optimality' becomes a highly problematical concept. The formulation of sustainability as an optimization problem disintegrates. Is it our human destiny (if we are to speak of destiny at all) to go out with a flash, or to linger on stretching out our existence as far as possible? We are confronted by fundamental philosophical questions about the meaning and purpose of human existence.

The change downward view of sustainability seems capable of providing negative prescriptions for how we may live sustainably. To 'surf on entropy' suggests that we remain 'adaptive' to change, but this adaptiveness is relatively restrained. The general orientation of change is downward. Knowledge that the wave we ride will weaken as it reaches the shore may suggest that we try to stay out on the ocean as long as possible. Perhaps we ought not to run to shore as quickly as we are able, although that might provide the most spectacular ride. What ought to be the relation, for example, between frugality and prodigality in our concept of sustainability? The change downward view already suggests that we look beyond optimization for our understanding of sustainability.

Yet our world is a prodigiously productive place. The abundance of life we observe on our planet cannot be entirely explained by this downward view of change. Georgescu-Roegen's principle of 'entropic indeterminateness,' which is the basis of my change downward view, does not explain the change that I have called 'change upward'. He introduced a second principle that he called 'the emergence of novelty by combination'. This became a central concept of mine in **Towards a Sustainable Forestry** (TSF). There I describe 'novelty' as "the fountain of emerging qualities" where "entirely new forms and functions come forth, out of matter, life and mind that are uniquely distinct from what existed previously and are unforeseeable from the most complete knowledge we may have of presently given processes and relations." (TSF p. 13)

Georgescu-Roegen provided many examples of 'the emergence of novelty by combination,' upon which my concept of 'novelty' is based. The simplest case is of hydrogen and oxygen combining to form water. The properties of water are indeterminable from the most complete knowledge we may have of its constituents. A more complex case is of horn shapes encountered among antelopes. There occur important exceptions to any scheme which would predict the shape of horns on the basis of what may be known, for example, of teeth or feet. Economic development is a further instance of complex novelty. The evolutionary path that undeveloped nations follow is

necessarily a departure from the path that European cultures followed in their industrialization. One may not duplicate the other. The concept of novelty is an attempt to recognize the existence of **emergent** qualities peculiar to change upward.

We come to the question of how the creative side of qualitative change is to be sustained. Without the notion of novelty the perspective I have just described becomes static and nonsustaining. Movement in one direction, although movement, becomes a kind of stasis, a slow death. The concept of novelty provides an upward balance to this downward change. As Erich Jantsch expressed it in his book **The Self-Organizing Universe** (1980 p. 52), novelty is the complement of confirmation. Without either, life is not sustained. Recent conceptual and empirical studies of far-from-equilibrium systems are rich in the understandings they offer of qualitative change 'upward'. These perceptions form the basis of the view of sustainability which I am about to describe.

Change Upward

What I term the 'change upward' view is based upon understandings that have been gained from what are variously called dissipative structures, self-organizing systems and autopoietic systems. Work begun by Ilya Prigogine and others, in the area of dissipative chemical and biological systems, has extended our appreciation of ecological and cultural organizations. A theory of sustainability, it seems to me, must accomodate these understandings.

One example of far-from-equilibrium systems that has become a metaphor for our changing relationship with nature is the Gaia Hypothesis of James Lovelock and Lynn Margulis. Our planet is teaming with life not by accident, or because life finds the planet a good place, but because **life created a place that was good for life**. Our planet is not a rock in the galaxy that life accidentally inhabited, but is itself alive like other forms of life of which it consists. Ecosystems are alive in the same sense. Ecosystems are organizations like the organisms of which they consist.

I said earlier that our planet is open to the influx of solar energy. This is significant. The energy that is constantly passing through our planet drives its biophysical processes. All the life that exists here, and that helped to make this the habitable place that it is, is constantly transforming itself. The planet, its ecosystems, and organisms are in a constant state of self-organization. As such they are constantly reproducing and reinterpreting themselves. Even at the level of unicellular organisms there occurs a kind of dialogue between system and environment that helps to maintain the organism. Maturana and Francisco Varela have originated a conception of life that I believe is significant for any conception we may evolve of sustainability. Their concept of 'autopoietic' systems (Greek for 'self-producing') is a concept of **self-sustaining** systems.

I am not aware that Prigogine, Jantsch, Maturana and Varela and other explorers of this idea have entered the fray over sustainable development, but it seems to me that they should. Their ideas have the potential of positively transforming sustainable development into a force for social self-organization. Were they to consider the implications of their ideas for sustainable development, it seems to me that they would at least give it qualified encouragement. The concept of sustainable development offers at least a recognition of evolution.

This view holds that the only kind of sustainability that is possible is a sustainable development. Cultures evolve. Thus, sustaining cultures must mean that we allow cultures that we wish to sustain to continue in their own development. Ecological systems evolve. Thus, sustaining ecosystems must mean that we permit ecosystems that we wish to sustain to continue in their evolution. Perhaps it is time even that humans actively design for the continuing evolution of their cultures and ecosystems.

Yet the evolutionary view does not necessitate growth. We ought to differentiate between 'development proper' and 'pure growth' as Georgescu-Roegen has done in ELEP (p. 294). The originators and popularizers of the concept of sustainable development (e.g. the World Commission on Environment and Development and The National Task Force on Environment and Economy) seem not to view the two as being fundamentally different and this should concerns us. Although both development proper and pure growth are kinds of economic development, the former is essential to the sustaining of life, while the latter is not. Based on the concept of creative change upward, I have here outlined, growth may in fact impede sustainable development.

To-Sustain and Not-to-Sustain

G. Spencer-Brown placed distinction at the centre of his **calculus of indications (Laws of Form** 1969). He viewed distinction as being the primary act of our being. It is in this spirit that I have begun this essay. In the opening statement concerning the two classical views of reality, being and becoming, I drew my first distinction. Thus I indicate my valuing of a process view. In the premiss that the concept of sustainability may be viewed in two ways, change downward and change upward, another distinction was drawn. The subsequent discussion has developed against the background of a static world view.

A different kind of distinction concerning sustainability is that between what will be sustained and what will not be sustained, between that which will be developed and that which will not be developed. Nothing is sustained without our making distinctions about what we sustain.

Evolution is a balance between the sustaining of some paths of development and the nonsustaining of other paths. Nothing is sustained or developed without other things not being sustained or developed. Only in a world which was constantly growing would we not be faced with the necessity of making 'choices' between kinds of development. The 'selection' of development paths may be more or less cooperative, more or less competitive, but irrefutably necessitates distinction.

Distinction leads naturally to separation. This has been indicated, for instance in past issues of **The Trumpeter**, as the source of our present state of nonsustainability. The primary threat to our survival, it has been well argued, is due to our perceived separation from other beings and the natural world. I feel this too. At the same time I cannot imagine a way of being that would not engage me in the act of making distinctions. But distinction is a cognitive act, not a statement of objective fact. Distinction is about drawing lines between what we attend to and what we do not, between foreground and background. Distinction has to do with the **perception** of our situation.

Perception, it seems, goes along with distinction. These two primary acts of being must be recognized as we explore sustainability. The primacy of perception/distinction is of practical importance for sustainability. We must make distinctions between what we will sustain/develop and what we will not sustain/develop. In thus distinguishing we will necessarily create 'blind spots' of many forms. It is certain that as we perceive some things and choose to sustain them, other things we will not perceive and choose not to sustain.

Time and Sustained ...

I began by stating the distinction which was made very early in western philosophy between being and becoming. The one view held that unchanging forms were primary. These forms are outside of time. In this view of the world, time was ultimately an unnecessary supposition. Another view held instead that a changing existence was primary. Existence preceded essence. In this view of the world time is central.

A philosophy **out of time**, we may say, has developed over the past few centuries. The automata of the middle ages and the mechanistic philosophy which came to us with the age of reason, through Newtonian and Einsteinian physics, have found in the essentialist philosophy their primary orientation. In these views of the world, which grew out of the being doctrine, there was no need for time. Time was an unnecessary construct. Without a direction to time, which it was to obtain with the law of entropy, qualitative, irreversible change could be ignored.

A philosophy **in time**, however, developed concurrently with the above philosophy. In this minor, but significant tradition, the organic and life philosophy of the earlier 20th Century finds its orientation. The quantum mechanics of the early part of this century, and the understandings of self-organizing systems and cognitive biology of the late 20th Century, find in it their primary orientation. Modern science, in a sense, returns to the philosophy of Heraclitus. The self-organizing systems-biology may be viewed as an elaboration on the process philosophy of Bergson and Whitehead.

The philosophy out of time has helped to form the kinds of agriculture, forestry, economics and other technological practices we have today. The determination of yields in forestry, for example, is rooted in the timeless view of reality. These methods are part of the continuum which links Plato's concept of the ideal political state, and its resurrections, through history with Bacon's idea of nature, which must be put to the rack to extract from it its unchanging truths. The clearcut of forestry, in which we again and again seek the **tabula rasa** of zero history, is part of this tradition, in which we repeatedly attempt to erase ineradicable time. The concepts of sustained timber yield, sustained financial yield, and sustained economic growth are all efforts at denying the existence of time. (I elaborate on the above forestry concepts in TSF.)

In place of time we have points on a ruler, as it were. Quality is taken out of time. Hence, at best an ordinal concept is reduced to cardinal measure. Land, soil, water are taken out of the equations of economics. Thus we have the Ricardian land, an unchanging basis for economic development. We have an agriculture which will produce more and more from less land. We have forest lands, which according to conventional forestry, will regenerate trees rotation after rotation, faster and faster, out of thin air.

Evolution is reduced to a mechanical process without place for chance or novelty. As a leading representative of the 19th Century mechanistic viewpoint, Henri Poincaire, (as David quotes him in his afterward to TSF) said: "What is important to remem-

ber is that the manner of inferring the past from the present does not differ from that of inferring the future from the present." (TSF p. 77) We may know the future the same as we know the past. The assumption is that it is only a matter of time until we have the equations by which the future can be known as well as we know the past. Evolution, in the sense that Poincare and other mechanists have used the term, is in fact a misnomer. For them, there is no evolution in the sense of a **creative** process. In this peculiar way of looking at the world, there can only be locomotion. As Georgescu-Roegen said: "Mechanics knows only locomotion, and locomotion is both reversible and qualitiless." (ELEP p. 1)

The consequence for economists of this perspective is that change downward of land, soil, air and water may be ignored. They are considered 'free'. Thus, foresters, for example, may ignore the entropic degradation of land (change downward) that is the result of logging. They are able to suggest that the fibre they harvest from the forests consists of materials taken from the air, which does not necessitate a depreciation of the quality of the soil. Such foresters also ignore change upward - creative evolution of the forest, evolution in an ecological, cultural and genetic sense. The 'normal' forest of conventional foresters and the 'perfect' market of economists are timeless, qualitiless and mechanical reconstructions of a timeful, qualitative and organic world.

Optimization, Satisfaction and Sustainability

In a qualitiless world devoid of novelty and without change, it is easy to speak of efficient utilization of resources. In a predictable mechanical world, it is easy to say what is **best**. This is, after all, an objective world, a static world. Perspective/distinction (i.e. space) and the irreversible quality of change (i.e. time) do not enter the picture. And because there is no such perspective, we have experts who supposedly 'tell it like it is' instead of 'telling it as they see it'. 'Objectivity' is our object instead of a goal that is more humble, a subjectivity that is at best a clear perspective from one point of view.

We can allegedly have a 'sustained yield' of a resource that is best or most efficient since quality has been removed from time. But how do foresters or other resource managers know what is best or most efficient? Conventional foresters will point to a culmination of mean annual increment (cmai). Wood growth will decline after the cmai hence, conventional foresters argue, cutting at the cmai is most efficient. Economists point to a structurally similar concept, marginal utility. Profits will decline after the point of marginal return hence, economists argue, curtailing production at the margin of utility is most efficient.

Forest economists have a different measure of efficiency. They suggest an economic rotation that substitutes an economic efficiency for a wood material-based efficiency. Unfortunately, time and perspective still do not enter the picture. Forests may be cut at a rate that exceeds renewable levels, and this rate will often far exceed levels of renewability established by annual allowable cut (aac) calculations. Forestry debates usually muddle about at this level of analysis whereas ethical and epistemological ramifications of the concept of 'renewability' ought to be the focus. But whichever side is taken, usually the same assumptions apply. The views upheld assume a mechanical, timeless, steady state world.

But efficient for what? For how long? For whom? Sustainable for what? For how long? For whom? These are all questions that remain relatively unasked, even within the very confined static, mechanical, timeless viewpoint. These questions certainly remain unanswered.

After the second world war efficiency was transmuted and became optimality. Computational machines and systems techniques permitted the searching of many more possibilities than trial and error or 'best solution' methods had allowed. But beyond this development of powerful optimization techniques, the computer itself became a metaphor for how we understand economics, forestry and many other sciences and disciplines. Optimization became an extension of efficiency and the search for 'best'.

There is still our perspective to contend with. When we optimize for one situation, we do not optimize for another. In a locomotive world (i.e. same way forwards as backwards), there remains some sense in seeking the optimum. But, in a truly evolving world serious questions are raised about the very idea of optimization. How can we optimize or choose the best, in a world in which there is novelty and chance, and in which the ground beneath us (i.e. our ontological reality) shifts as well?? We cannot rationally determine where we are going!! Optimization becomes a very limited tool, in fact self-limiting. Herbert Simon, a pioneer in the field of operations research (i.e. the science of optimization), met this difficulty with a technique he called 'satisficing'. In **Reason in Human Affairs** (1983 p. 85) he writes:

> In the face of even moderate uncertainty, it seems almost hopeless to strive for 'optimal' courses of action. When conflicts in values exist, as they almost always do, it is not even clear how 'optimal' is to be defined. But all is not lost. Reconciling alternative points of view and different weightings of values becomes somewhat easier if we adopt a **satisficing** point of view: if we look for **good enough** solutions rather than insisting that only the best solutions will do.

In our development of a process orientation to sustainability, it seems that a counter to the static nonevolutionary view of optimization is desirable. I have begun to use the concept of 'satisficing' in a way that relates to Simon's concept. I intend something similar, but my meaning is rooted more in the self-organizing systems biology I sketched earlier. In my presentation at the workshop **Changing our Relationship with Nature** I began to develop an understanding of 'satisficing' based on recent understandings of autonomous systems:

> [T]here is much evidence to suggest that autonomous systems, at least, do not optimize themselves, neither are they optimized from the outside. Maturana and Varela point to the confusion that has been caused by Darwin's unfortunate use of the term 'natural selection'. In **The Tree of Knowledge** (1988) these biologists explore the coupling that occurs between autopoietic systems and their environments. 'Natural drift' is the term they use to describe this process. In their view, there is no optimization of specific characteristics at the expense of other traits, there is no optimization of an organism at the expense of its environment. The idea of optimization is totally foreign to the evolution of natural systems. These systems, rather than optimizing, **satisfy**!

In a world in which the future is uncertain, whether due to lack of information or intrinsic limitations, 'best' is not always best!

Sometimes doing what is satisfactory, doing what will suffice, or even what is mediocre (meeting the needs of the present?), is a lot better than the 'optimum'. This view suggests to me the following slogan: Just because you're best doesn't mean you're going to come out in front. If you're best, but in the wrong thing, then you may come out worse for your insistence on being best.

Where to?

The metaphors of the blind man and the white water canoeist come to mind. The blind man may not see what is ahead, but he can feel with his cane and hear with his ears. The canoeist may not be able to see what is ahead, or underneath him, but must go ahead anyway. The blind man or the canoeist are metaphors for the dilemma that faces sustainable development. In an evolving world, can we really rationally plan where to go? I think not, at leasst not in the way we have done it before. The future is not rational in that sense. Our rational faculties will fail us in this endeavour.

In response to the limitations of reason, deep ecologists and others have begun to explore old myths that have guided long-lived cultures before. But the ground upon which past and present myths grew has changed and thus using old myths to plan for the future may also fail us. Thus, we need to reach for some evolutionary trans-rational consciousness that is yet to emerge. Erich Jantsch, Ken Wilber and Jean Gebser have all explored along these lines.

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THE NEW FORESTRY AND POST MODERN AGRICULTURES

ENDS AND MEANS: RESTORATION AND THE FUTURE OF LAND MANAGEMENT

Chris Maser

When Bill Jordan asked me to write a paper expressing some of my thoughts on ecological restoration, I had no idea just how difficult it would be. Restoration, in truth, is the beginning of a revolution in thinking, so forgive me gentle reader, if I find it difficult to define a revolution in a few pages.

Because we in Western culture are plagued by linear, rational thinking, self-imposed constraints of time, and an unrelenting desire for instant gratification, we spend most of our time looking for new areas of the world and new kinds of natural resources to exploit, and gearing our science and technology to more efficiently wring the wealth out of those dwindling resources.

As a culture, we would do well to take a long look in the rearview mirror at the degraded world we are leaving in our frantic wake. Perhaps, as a result of that closer look, we might risk changing our minds about always seeking the unspoiled, which we then despoil; we might recognize a vast world waiting to be repaired or restored in such a way as to once again yield up its riches.

And if we would take the time to examine how and why we treat **one another** as we do, we might find that the intense competition that we take for granted as the natural way to approach our natural resources is merely a product of our thinking, and one we would do well to change. Our thoughts about how things are and have to be, are stuck in our minds with the adhesive called fear - fear of change, fear of loss - an adhesive born out of self-centeredness. To dissolve the adhesive, we have to become **other-centered**, to step outside ourselves and work for the welfare of others, thereby increasing our own welfare, but without focusing our attention on it. Restoration obviously carries us in this direction. But realizing its full value will not be easy - simple perhaps, but not easy.

Simplicity and ease are not synonymous. For example, changing our thinking is simple, but it is not easy because each of us has many years invested in developing and defending the mechanisms we have used to cope with life. Taken together, these amount to our habitual thought and belief systems.

Restoration is a radical challenge to our old paradigm of land management. To better understand why we think as we do and why restoration challenges us, a brief historical perspective is in order.

When our forefathers landed in the New World, they beheld a vast, rich, wild continent, but they did not see the land - only the products of millennial processes, such as fertile soil, forage for livestock, timber, clean water, clean air and abundant game animals. These products seemed both unlimited and free for the taking.

These people, coming from the pastoral scenes of Europe, saw not a land to be nurtured but a wild, untamed continent to be conquered. Why? Because they came from "civilized" countries and felt that they had been rudely thrust into an "uncivilized" continent inhabited by savages and wild beasts. In line with a perfectly human tendency, their first inclination was to survive

and then to seek that which was familiar and comfortable by trying to recreate from memory, as much as possible, the familiar.

These sturdy forebears brought science and technology to the New World and relied on them, as they had in the past, to solve their social problems. What they failed to understand, however, is that science and technology are human tools, and as such are only as constructive or destructive, as conservative or exploitative as their users are. Science and technology have no sensitivity, make no judgements, have no conscience. It is neither scientific endeavors nor technological advances that affect the land; what ultimately affects the land are the thoughts and values of the people who use the tools.

Over the decades and centuries, our ancestors spoke grandly of "clearing the land" and of "busting the sod." They extolled the virtues of "harnessing rivers" and of "taming the wilds." They begrudged the predators a right to life, and in the process became the most voracious predators the earth has ever hosted. And yet they only did the best they knew how, in their time and their place in history. How could they have done otherwise?

We stand today at a different time and a different place in history. We are present **now**, and we are making history. Yet even we fail to understand and to accept that the **world** functions perfectly, and that it is only our **perception** of how the world functions that is imperfect. What distorts our perception is that we focus only on that portion of the world we intend to exploit - the products, and we ignore, even disdain, the ecological processes that produce those products. We think we can have more and more of everything, if only we can control Nature, manage Her, as it were. In so doing, we save the pieces we value and discard those we don't. We are thus simultaneously simplifying and disarticulating the biosphere by purposefully discarding and accidentally losing pieces of it. We are redesigning the world, but without the benefit of Nature's blueprint.

In short, we focus so narrowly on the **products** that we are destroying the **processes that produce them**. For example, trees do not make a forest. Trees are but the "final product" by which we define a forest as a forest. Focussing narrowly on the product, however, we literally do not see the forest for the trees.

The point is that we in Western culture have become so linear in our thinking, and so rational in our knowledge, that we have forgotten that everything is defined by its relation to everything else. In the end, we must both understand and accept that everything - **everything** - is a relationship that precisely fits into every other relationship and is constantly changing. The paradox is that the only constant in life is change, and that everything is in the process of becoming something else.

As human beings of Western culture, the way we deal with and fit into this pattern of constantly changing relationships is by thinking. Thus we must recognize that any human influence on the land or in the biosphere - positive or negative - is a product of our own thoughts because our thoughts, after all, precede and control our actions, and we do nothing without first having the thought to do it. This means that the problem of pollution, for example, is neither in the forest nor in the stream but in our minds (the cause); the problem only **manifests** itself (the effect) in the forest or in the stream. We cannot, therefore, find a solution through science, or technology, or land management activities without changing our thinking, because all these things that lie outside of ourselves are the result of our thoughts. The only possible solutions to our problems lie within us, and until we turn the searchlight inward to our own souls, and change our thinking, our attitudes, and our motives, we will only compound our problems.

The key to and the value of restoration, therefore, is in the thought process it implies. But what kind of thinking does restoration imply? And how does this thinking differ from earlier, exploitative thinking?

Restoration is the thought and act of putting something back in a prior position, place or condition. That much is clear enough. But why should we humans bother putting something back the way it was? Why try to go backward in time, when society's push is forward, always forward, faster and faster? The answer draws on two paradoxes: backward is sometimes forward and slower is sometimes faster.

First, in our drive to maximize the harvest of Nature's bounty, we strive only for a sustained yield of products, and we are intensively altering more and more acres to that end. **We cannot have a sustainable yield of anything, however, until we first have a sustainable ecosystem to produce the yield.** In practice, we tend to think it a tragic economic waste if Nature's products, such as woodfiber or forage for livestock, are not somehow used by humans but are allowed to recycle in the ecosystem. And because of our paranoia over "lost profits" - defined as economic waste - we extract far more from the ecosystem than we replace. We will, for example, invest capital in another crop, but we will not invest capital to maintain the health of the ecosystem that produces the crop. This scenario is in the tradition of our Western culture, and through it much of the biosphere has been and is being degraded.

This brings us directly to the value of restoration as a means of changing the way we think and a means of changing the way we relate to the ecosystem we inhabit. Basically, restoration helps us understand how a given portion of the ecosystem functions: as we put it back together, as we go backward in time to reconstruct what was, we learn how to sustain the system's processes, and its ability to produce the products we desire now and in the future.

Similarly, restoration helps us to understand the limitations of a given portion of the ecosystem. As we put it back together, as we slow down and take the time to reconstruct what was, we learn how fast we can push the system to produce products on a sustainable basis without impairing it.

Thus, the very process of restoring the land to health is the process through which we become attuned with Nature and, through Nature, with ourselves. Restoration, therefore, is both the means and the end, for as we learn how to restore the land, we heal the ecosystem, and as we heal the ecosystem, we heal ourselves. We also simultaneously restore both our options for products and amenities from the land and the options of future generations. This is crucial because our moral obligation as human beings is to maintain options for future generations.

Today's decisions not only will determine the options of tomorrow but also will write the history of yesterday. We have far more knowledge of the world in which we live than did our forefathers, and we therefore have far greater opportunities and responsibilities than they did, because we are no longer an isolated continent but part of a global society. And if humanity is to survive, we must both understand and accept that we have but a single ecosystem that simultaneously produces all the products of the world, including us. To this end, restoration must become the heart and soul of management.

A KINDER, GENTLER FORESTRY IN OUR FUTURE: THE RISE OF ALTERNATIVE FORESTRY

Jerry Franklin

What do I see as essential to Oregon's forests in 2010?

I see a kinder and gentler forestry. I see a forestry which is probably less efficient on a per unit basis of producing wood fiber, but a forestry which accommodates a whole range of ecological values while yielding at the same time economic benefits.

What we've tended to do, conceptually and literally, is try to divide our forests into commodity lands and the preserved lands, to divide the baby into parts.

The commodity lands are presumably to be managed "intensively," based on short-term economics and a very limited view of ecological values.

Preserved lands, on the other hand, are presumably to be totally withdrawn from timber harvest.... Total preservation often seems to be--to some people at least--the only response to foresters' inabilities to convincingly address long-term and ecological values.

As an ecologist, I view this as an undesirable solution. Society wants and needs commodities from its forest lands. But society also clearly wants amenities and other values maintained. We can see this, for example, in their concern for biological diversity and threatened and endangered species. It's also clear that they want a longer view rather than a short-term view. Hence, the increasing concern with the issue of sustainable productivity. I think that a lot of us in society, maybe the majority of us, want options maintained in the face of uncertainty.... A good example of this is the uncertainty of global climatic change.

Given these societal objectives, what I see as at least one desirable solution, is what I call a **new forestry**, a forestry which effectively addresses both commodity and ecological values and is applied in one form or another to a majority of our forest lands.

What do I see as some of the elements of this new forestry? One major element is something that the group I work with is calling the development and application of alternative silvicultural systems. Alternative silvicultural systems use ecological principles to create managed forest stands and landscapes...

Conceptually, silviculture is the manipulation of forests for the production of any set of goods and services. But in fact, standard silvicultural systems have actually focused on how to remove wood products and reforestation. The perspective of these traditional systems which we know as clearcut, shelterwood, and selection, are relatively limited since they are concerned primarily with re-establishment of trees and not necessarily a complex forest ecosystem. Traditional silviculture has attempted to incorporate new objectives, such as providing for standing dead trees and down wood for wildlife, but this has been done piecemeal since the philosophical and technical bases for systematically incorporating such findings tend to be lacking. What's happened is a forestry--which was very soundly based ecologically given the time in which it evolved in Europe--that just hasn't kept up with our developing understanding of forest ecosystems and how they work....

Maintaining or rapidly redeveloping complex forest ecosystems (in effect systems with functional and structural diversity) is the object of alternative silvicultural systems--not just re-establishing trees. Management is designed either to retain elements of this diversity or to provide for their reintroduction. Hence, biological legacies, what is being left behind on the site, becomes the prescriptive focus rather than the material that's being removed. The objective becomes one of assuring that many forest elements are perpetuated and not just crop trees....

The issue is not how big an area is cut, or how often it's cut, but what's really important is what's being left behind at each harvest operation.

Elements of alternative silviculture at the stand level includes retention of more organisms and structures in stands at the time of harvest. An example is to retain some of the large green trees for their various functional values, including provision of habitat for organisms ranging from microbes to vertebrates. Another common example is providing for a sustained yield of coarse woody debris, large standing dead trees and downlogs, because they are so important in their ecological function and in providing for the diversity of organisms. Creation of stands of mixed composition and structure can be a valuable stand level objective. Keeping structurally and functionally complex riparian stands can assure appropriate inputs to streams, providing the structural and food base for aquatic ecosystems.

I've been talking about stands. Now let's talk about landscapes for a moment. Considerations of alternative silviculture at the landscape level include thinking about patch sizes and arrangements, cumulative impacts of treatments, and the role of natural or semi-natural patches and corridors. We select patch sizes which fulfill management objectives, including provision of habitat for forest species that require interior forest conditions.

Amounts, types and the multiple effects of stand edges are a major consideration. The connectedness among the natural and semi-natural patches--for example, spotted owl reserves, streamside corridors, areas of unstable soil, natural research areas-- the relationship between those kinds of patches and the managed

landscape are a concern. This mutualistic relationship between the commodity or intensively managed land areas and the natural areas, we've tended to ignore or view as negative. Yet the exchanges or flows between those patches are extremely important to the welfare of both kinds of land.

Any management that we can do that reduces the contrast between those lands, facilitating movements of materials and organisms, is going to benefit both. Consider biological diversity specifically. We aren't going to be able to deal with (it) exclusively with the use of set-asides--not even primarily through the use of set asides. Maintaining biological diversity has to be integrated into the management of commodity lands because they dominate and always will dominant our landscapes.

The limited acreage and increased isolation of reserved areas--whether they are national parks, wilderness or an ecological reserve--and the vulnerability of these areas to global change are further reasons why silvicultural systems which incorporate diversity are absolutely essential.

About the Author: **Jerry Franklin**, a member of the faculty of the College of Forest Resources at the University of Washington, discussed the future of forestry at Oregon's Forests in 2010, a conference sponsored by Congressman Peter DeFazio and State Representative David Dix, in Eugene, Oregon, on February 11, 1989. He is a former Director of the Andrews Experimental Forest, has authored many articles on old growth and forest ecology, and has served as a Forest Service Research Scientist for over 30 years. He is also the Bloedel Professor of Ecosystem Analysis in the College of Forest Resources at the University of Washington in Seattle. This article is excerpted from his remarks at the 2010 Conference.

WHOLISTIC FOREST USE

Herb Hammond

Wholistic forest use means wise use and protection of forests throughout the full spectrum of human interactions with them. Forests are diverse, interconnected webs, and we must focus on sustaining the whole (all life forms), not on the production of any one part (e.g. timber). We must begin to respect and manage forest **ecosystems**, rather than focusing our activities to produce forest **commodities**. All parts of a forest have important purposes and must be respected and protected. People are part of forests. Forests provide air and water; moderate our climate; furnish homes and food for fish, wildlife, and people; provide spiritual renewal for all living organisms; and are an important part of human economies. When people change one part of the forest, all parts are affected. Thus, we must interact with forests in a careful, caring manner that protects all forest functions and components.

Wholistic forest use is built on the foundation of an understanding and an appreciation of the life, vitality, and complexity of the forest ecosystem. These concepts are new and revolutionary to the world of industrial forestry. A small group of progressive foresters and ecologists has realized that we do not begin to understand the ways in which the forest ecosystem works. The system is too complex and operates on all scales, from the microscopic, and indeed the atomic, to the macro scales of geology and global climate. Based on these premises, wholistic forest use must be humble regarding the role of humans in forests, and it must combine science and philosophy/wisdom to develop new ways of interacting with forests.

Wholistic forest use will protect all aspects of the forest ecosystem during and after human activities in forests. There is no "scientific" proof, in the narrow sense of the word, that this is necessary. The forest system is too complex to fully study, so it cannot be "proven" that complete, intact ecosystems are vital for forest survival. Wholistic forest use, requiring protection of the forest ecosystem, is based on the philosophy that **functioning** ecosystems are the foundation of life and must be preserved. Although this approach may not be "scientifically proven", wisdom and rational considerations based on an appreciation for the complexity of the forest--in which all things are interrelated and interdependent, tell us that this wholistic philosophy is valid.

Wholistic forest use respects the spiritual values of forests--the sense of wonder and the beauty that all of us have felt and seen in intact, natural forests. These values are often ignored or denied by conventional forestry, which does not find a place for them, while pursuing short term profits.

I accept that biological interdependence and complex, poorly understood ecosystems are the norm, as do my Native friends who helped me to understand this. Many members of the forestry establishment reject the importance of this premise, expressing doubt that wisdom can be blended with the scientific methods. Ideas without "scientific proof" are not well received. For example, I am opposed to the use of chemical pesticides in the view that any agent which indiscriminately destroys life is harmful to the ecosystem. Yet conventional forestry does not recognize pesticide problems, unless a particular form of "valuable" life (e.g. salmon) can be **indisputably** shown to be harmed in large numbers. If microscopic or macroscopic organisms, whose functions are unknown, are destroyed, that is considered an "acceptable risk." It is believed that technology will find solutions for these problems in the future.

Wholistic forest use involves a new way of thinking. People must see themselves as **part of** the forest. People need to move away from current exploitive relationships with forests, where the objectives are to **simplify** the forest to produce primarily timber. This simplification of an inherently diverse, stable, natural system creates ecological instabilities and an unnatural "forest" made up of vulnerable plantations of trees. Accordingly, we are left with a simplified economy, which, like the tree plantation, lacks the diversity to be stable or sustainable.

A change in our priorities is required, if we are to adopt a wholistic forest approach. Native cultures have provided me with the following priorities, which I have transferred to my concepts of wholistic forest use:

Priority One: Love the forest. Appreciate the forest. Give thanks to the forest that sustains us.

Priority Two: Protect the forest and use it wisely for vital human needs.

Priority Three: Trade or barter the excess of forest goods which are not required for needs, thereby practicing sustainable economics.

These three priorities for wholistic use of forests are significantly different from, perhaps the opposite of, the priorities of modern society, where short term economics are dominant. Use of trees is the second priority, but protecting the forest is of much less importance than acquiring the trees as logs. The spiritual values of the forest are largely ignored, or reserved for conversations labelled "idealistic." We must change this way of thinking and acting, before the forests that sustain us are gone.

Two different sets of ethics, values, and worldviews are at issue, when wholistic forest use is compared to conventional forestry. Given the converging crises of climate change, ozone layer depletion, toxic wastes, acid rain, desertification, overpopulation, soil depletion, and ecological collapse, I feel a conservational, cautious philosophy, applied at a local level, is the correct approach to a practical land ethic and a sustainable culture. Truly protecting all parts of a forest is the only means we have of sustaining the the whole forest and hence the human species.

Foresters have been manipulating complex forest ecosystems for several hundred years, based on the assumption that they could somehow "manage" (manipulate) a system which they do not even understand. The results have been catastrophic. Due to their natural resilience and only recent exploitation, the forests in Western Canada have only now begun to break down. In previously forested areas like the Sahara Desert, the Mediterranean, parts of Asia, and some islands in the Caribbean, forests ceased to exist long ago as a result of human exploitation. In Europe, simplified forest plantations are succumbing to acid deposition from social and industrial pollution. The vulnerability of these tree plantations is likely due to their pollution stressed conditions and by their lack of genetic and species diversity.

Modern forestry has refused to accept that there could be parallels between these historic events and current practices, and it has continued to "manage" the forest, believing that technology could overcome these biological realities. However, forestry now increasingly assumes an aura of crisis control. As forests reach the end of their resilience, the natural checks and balances of healthy functioning ecosystems break down, to be replaced by the chaos of insect and disease infestations, unexplained forest die-offs, poor growth, and reforestation failures. **These events are the signs of a severely stressed ecosystem**. Canadian forests (including those in British Columbia), and, more prominently, European forests, which Canadians often use as a model of forestry excellence, show signs of forest stress. Some of these problems are caused by environmental pollution from sources beyond forest users' direct control. However, modern industrial forestry is taking few measures to address factors which **are** within its control, in order to protect the health of our remaining forests, so that they can better survive in a deteriorating global environment. As forests become more and more stressed, in our changing global environment, we must work within the constraints of the forest ecosystem, recognizing ourselves as part of this system, rather than an arrogant force that demands that the forest meet our needs and wants beyond all else. Wholistic forest use embodies this new way of thinking about our role in forests.

Wholistic forest use means working to assure, within our very limited understanding, that suitable and sufficient habitats are left for **all** forest plant and animal species (both macroscopic and microscopic), when we extract the products that we need. We cannot continue to dismiss as irrelevant events such as the loss of soil life forms after clearcutting and slashburning. These life forms manufacture important soil nutrients which all plants require to grow; they form cooperative relationships with tree roots, which are necessary to extract water and nutrients from the soil. However, this interdependence is not seriously considered in industrial forestry practices. The wholistic view is that only through accepting the importance of **all** forest life forms, and by preserving **forest diversity**, can we preserve forests.

Wholistic forest use sustains development of human communities. This approach starts with a complete field-based inventory of natural, social and economic factors. From this inventory a wholistic forest use plan is prepared. The plan gives priority to the protection of natural factors, recognizing that healthy ecosystems are the basis for healthy economies and societies. Forests sustain us, we do not sustain them. Providing a diversity of uses that do not degrade the forest will protect them for our long term benefit. Current "integrated forest management plans" do not usually meet these criteria and are timber biased, placing short-term monetary profits from timber extraction ahead of more diverse sustainable patterns of forest use.

Wholistic forest use proposes that we zone forests, for a variety of activities, on a watershed by watershed basis. Timber extraction is only considered as one possible forest use, and it is recognized as having potentially large negative impacts on the future growth of trees and on other forest uses, such as fish and wildlife habitat, trapping, and tourism. Wholistic forest use recommends that we abandon harsh practices such as clearcutting, slash burning, pesticide and herbicide application, and highgrading (removal of only the best timber). Where timber extraction is determined to be an acceptable use of a forest, selective logging methods are used and all logged trees are utilized, regardless of quality or size. Substantial parts of a forest, usually entire watersheds, are zoned or planned for such non-timber uses as cultural and spiritual, water supply, fish and wildlife needs, soil protection, trapping, and various forms of tourism. Some of these uses have dollar values, others do not. All of these uses are vital for human needs and some for the survival of the Earth.

The modern reality of money and jobs from timber extraction in forests is not ignored by wholistic forest use. Fewer trees are cut down with wholistic forest use than in conventional practices. However, an approximately equivalent number of timber oriented jobs can be created in wholistic forest use by making more products from each tree logged and through other labour-intensive practices. Other forest activities possible with wholistic forest use such as tourism, service businesses, water production, trapping, and fish and wildlife harvesting, result in more total sustainable employment opportunities, with wholistic forest use, than with conventional forestry.

Under conventional forest management, communities bear the environmental and social costs of exploiting their timber resources, while residents of the major milling centres and distant

stock-holders reap most of the benefits. Large scale clearcutting practiced by conventional forestry produces revenue only once in approximately 200 years, and it forecloses on sustainable forest uses such as trapping, guiding, fishing lodges, ranching, and cultural heritage. By contrast, wholistic forest use means diverse, community-controlled, forest use. A sustainable economy is developed through revenue received each year from forest land supporting diverse activities.

As our forests disappear, we all should become increasingly nervous about our own survival. Wholistic forest use offers a practical, moderate solution to the self-destructive timber bias which afflicts British Columbia and world forests. Segments of society which feel threatened by the **balanced** use of forests, as proposed by wholistic forestry, must become reconciled to this new balance. We must all come to love and respect the world's forests.

About the Author: **Herb Hammond** runs an ecosystem-forestry consulting firm called **Silva**, located at R.R. #1, Winlaw, B.C. V0G 2J0. He is working on a book entitled **Forests Forever?: The Case for Wholistic Forest Use**, which will be published by the Western Canada Wilderness Committee sometime by Christmas of 1989. Although the word "holistic" is not spelled with a "w," He prefers to use the spelling "wholistic" to characterize his approach to ecologically sound forest use. For this reason, we have retained his spelling.

NATURAL SELECTION FOREST FARMING

Orville Camp

Background

I came into forest farming through the back door. In 1967 I bought 160 acres of logged-over forest land in Selma, Oregon. Everything marketable had been stripped off--it looked like a giant bomb had been dropped on it. All that was left were a few scraggly trees, some stumps and brush, and skid roads running up and down the hills. As a forest it was a disaster, but I was looking at it as a subdivision. I figured I could clean it up to subdivide and make a handsome profit.

To make it look a little better I did some thinning and pruning, cleared and burned some brush, and put some new roads in. By 1971 I noticed a remarkable improvement in some of the stands I had thinned. Whereas the trees had previously averaged about 8" annual vertical growth, they had suddenly jumped to about 24" vertical growth! I liked the results so I continued the program. I liked it so much I decided not to subdivide.

By 1978 my forest was beginning to look healthy. The sick trees had either died or recovered, and the smaller trees were now of some value. I had completed over 100 acres of precommercial thinning, and had begun to take out some logs using the same kind of program. By the winter of 1982-83, in addition to logs, we took our nearly 500 cords of firewood--and the health of the forest was steadily improving!

I received a lot of encouragement from local, private, nonindustrial, forest owners looking to try something on their land other than monocultural tree farming. Private nonindustrial forest land owners have been searching a long time for a simple, logical, economical and ecological approach to forest management. My program is successful, so it was suggested that I write about it so that others could benefit from my knowledge and experience. Many forest farmers in my area are now practicing Natural Selection Forest Management on their own lands.

Although I could have made a lot of money from subdividing my property, what good would the money be if I could not buy back what a forest has to offer? Most dedicated forest farmers I know feel the same way.

I had an opportunity to rape the land, sell out, and leave. I didn't. While such a course by one individual might have seemed insignificant, the cumulative effects of many people pursuing that course would be disastrous. I assumed my responsibility for wise conservation and I call on you reading this article to do the same.

Natural Selection Forestry vs. Tree Farming

Our forests are in trouble. Poor management and conservation practices have the public up in arms. People can see that something is wrong. Forests, perhaps our greatest renewable natural resource, have not been renewing. Conservation is supposed to mean the wise use of the Earth and its resources. It's high time for us to get wise.

Nearly half of my home state of Oregon, about 30.7 million acres, is covered with forests. Of this, over 75%, or some 24 million acres, are capable of growing commercial timber. (Commercial forest land by state law means conifer or softwood timber forests growing timber such as Douglas fir.)

Oregon's forest products are valued at some $5 billion annually and employ more than 90,000 people; they have furnished the building materials for one out of every six homes built in the U.S.; and they have been far and away the state's most valuable economic asset.

Yet, even though Oregon's forests have one of the highest timber producing potentials per acre on earth, **timber shortages and declines are expected**. Studies of Oregon's future timber supply forecast a decline in harvest volume over the next 30 years. In fact, unless there are changes in current policies and procedures, the harvest level in western Oregon, where most of the timber is located, is expected to decline **up to 22%** by the year 2000. Similar declines are forecast for other states.

Our leaders, rather than examining **why** this situation exists and what can be done about it, are instead now trying to develop and attract other (mostly "high-technology") industries--which to stay alive are dependent on resources from other places. As a state, indeed as a nation, our real wealth depends upon our natural resources, so it is not hard to understand why our quality of life is rapidly deteriorating. These leaders say we must "diversity" our economy to buffer ourselves against the ups and downs of the forest industry. Hogwash! Forests are what we have here! Our forests have more potential diversity than all the other industries under consideration combined! **Let's diversify the forest industry!**

Nearly 61% of Oregon's commercial woodlands are managed for the public by government agencies. Most of the public timberlands are classified as National Forests and are managed by the U.S. Forest Service. A large amount of public land is also managed by the Bureau of Land Management. The state, counties and cities manage smaller percentages. Only 39% of this land belongs to private owners, and of this the majority, or 21%, is owned by the timber products industry, leaving 18% for the private nonindustrial sector spread out among 25,000 landowners.

The timber industry, with its extensive network of laws, taxes, schools, etc., has been somewhat like a big dinosaur. At its present level of development, it has been very slow to try new kinds of solutions--even in the face of old kinds of problems. It is the private nonindustrial sector, the forest farmers, you and I, who can demonstrate an alternative, holistic approach to healthy forestry. We can exemplify a different method, and a different spirit, on our forest farms.

We must realize that the forests are not just trees to be managed, but rather a complex ecosystem which includes humans. Even though participants in this ecosystem, we are not aware of most relationships within it; many that we are aware of we do not un-

derstand and, quite possibly, never will. Still, the more knowledgeable we become, the better our forests can be managed.

When we substantially alter or remove any part of the ecosystem, we open the door to a series of troubles. When we try to correct a problem with unnatural methods, we open the door to even more problems, which multiply with each unnatural check, until everything is quite out of control. Then we lose our forests.

It may take many years for this chain of effects to run its course (trees can take 100 years or longer to completely die) and so we may not see it or recognize it for a while, but it does take place. Today in our forests the unnatural massive use of chemicals, and the impacts of poor harvesting techniques, allow us to see these effects: deterioration in the quality of our water, loss of wildlife, the increasing spread of unchecked insect and disease problems, destruction of predator habitats, the continuous failure to get forest land back into production...the list runs on and on. And, because the forest environment deteriorates, so does the human environment.

Natural Selection Forest Management, as presented here, is an all-age, all-species management system, which could open the door to a much more complete and responsible forest management system by the entire industry. How well the forest ecosystem can be maintained, or improved while harvesting and managing, is limited only by the knowledge and understanding one has of the forest ecosystem and the ecological succession of the forest. Natural Selection Forest Management should economically maintain or improve the ecosystem, and thus increase the sustained yield per acre. This, in turn, would improve both our economy and our environment.

It is important to note that Natural Selection Forest Management is not just a "tree farm" management system; rather, it is a system of "forest farm" (or ecosystem) management, and there is a world of difference between the two! A tree farm is managed primarily for trees as a specialized crop and the ecosystem is usually addressed only as necessary to support the growing of that specialized crop, just like hay or any other agricultural product. With Natural Selection Forest Management, the health of the total forest ecosystem is addressed as the priority. Emphasis may be placed on certain more valuable products for human use, but the checks and balances of the ecosystem remain the priority.

Tree Farming vs. Forest Farming

Conventional Forest Management	Natural Selection Forest Management
trees as cash crop	many income-producing products
agricultural production model	forest ecosystem model
short-term	sustainable
man in charge of needs	Nature in charge of needs
burning & chemicals used	no burning usually, no use of chemicals
clearcuts	selective harvesting
single age stands	all age stands
single or few species	all species

Natural Selection Forest Management uses natural selection methods for harvesting various products. The products we har-

vest to serve our needs are the ones selected by Nature for removal. This is the only time-tested and proven method of sustainable forestry.

As business people we are, of course, interested in profit, but we in the Northwest need not be blinded by the timber industry's insistence on conifers as the only profitable product in the forest. A properly tended forest yields many useful products: lumber, firewood, hardwood for furniture, poles, fenceposts, mushrooms, huckleberry brush, etc. It has other uses as well--recreation, education, wildlife habitat, etc. A well- managed forest farm can be profitable to the owner and at the same time provide an environment of great pleasure. It is the hope of this author that you will find this information and philosophy useful in the sensible and profitable management of your forest, and that the forest ecosystem will thrive not only in your forest and in mine but in all the great forests of this country and of the world. In order to better understand natural selection management it is necessary to have an understanding of what a forest is.

The Living Forest

What is a forest? We normally think of forests as large areas of land covered with trees, but they are much more than this. A forest includes many smaller plants such as shrubs, mosses, wildflowers, fungi, and microscopic plants. In addition, many kinds of animals make their home in the forest, including birds, insects, reptiles, and mammals. Millions of life-forms exist in the forest. Most of them cannot survive in any other environment.

Forest Structure

Every forest has various layers of plants. The five basic ones, from the highest to the lowest, are the canopy, the understory, the shrub layer, the herb layer, and the forest floor.

The tops of the tallest dominant trees in the forest make up the **canopy**. This layer receives full sunlight. As a result, it produces more food than does any other layer. Many birds, animals, fungi and insects live in the canopy, where they take advantage of this food.

Shorter trees that grow beneath the canopy form the **understory**. The understory trees receive less sunlight than do the trees of the canopy, and therefore produce less food. Some trees in the understory may eventually join the canopy layer. Others, such as the yew tree, to grow well may require the special climate created as a result of the canopy. However, the understory provides sufficient food as well as shelter for many kinds of forest wildlife.

The **shrub layer** consists mainly of woody plants which, unlike trees, have more than one stem. Shrubs do not grow as tall as trees. Many kinds of birds and insects live in the shrub layer. A forest with an open canopy and understory tends to have a much heavier shrub layer than one with a dense canopy.

Small, soft-stemmed plants, such as ferns, grasses, wildflowers, and tree seedlings make up the **herb layer**. This layer receives limited sunlight, but even in forests with dense layers above, enough sunlight reaches the ground to support some herb growth. The herb layer is the home of forest animals that live on the ground, such as insects, mice, snakes, deer, bears, and coyotes.

The **forest floor** includes the soil, and serves as the dumping area for all of the forest layers above. It is covered with animal

droppings, leaves, twigs, and dead plants and animals. The forest floor is home for an incredible number of small living organisms such as earthworms, fungi, insects, bacteria, and other microscopic life. These organisms break down or decompose the waste materials into basic chemical nutrients necessary for new plant growth; they depend upon the upper layers for food and for the moderation of climate necessary to sustain them.

Each layer of the forest structure serves to modify physical influences such as light intensity, light quality, temperature, wind velocity, relative humidity and evaporation rate as they filter down through the forest canopy, the understory, the shrub layer, the herb layer, and finally into the soil on the forest floor. At the top, the forest canopy receives the full force of weather. At the bottom, in the soil, light is absent and the temperature and moisture are relatively stable in contrast to higher forest layers.

Each forest layer creates its own climate which determines the kinds of green plants that can live there. The food, shelter, and habitat provided by those green plants will in turn determine the number and kinds of other species that can live there. The climate, therefore, within each forest layer, and throughout all the layers, is the major controlling factor in determining the species representation and population of all plants and animals.

A **population** is a group of individuals of the same species that live within a given location. Individuals of more than one species interacting, in a unique way, in a given location constitute a **community**. Communities may form within each layer of the forest structure; for example, the herb community is made up of mammals, tree seedlings, reptiles, insects, etc., and the forest floor community is comprised of earthworms, fungi, bacteria, etc.

We can think of a population as, say, all the people living in a neighborhood; whereas a community would include not only all the people but also their houses, food sources, pets, plants, etc. in that neighborhood. Both the human and the forest communities are constantly changing in appearance (think of the forest in autumn or in spring), but both have structures and functions which can be studied and described, and which are unique attributes of the group. Each also has a unique (ecologists call it "peculiar") organization of plant and animal life which, while distinct, is also dependent on adjoining communities and the major community, just like neighborhoods in a city.

When a forest community is relatively self-sustaining and self-regulating, it is called a **major community**. Within a major forest community are innumerable smaller communities which, while not themselves self-sustaining, combine to make up a major community. For example, a hole in a decaying log may represent a community, which is also part of a larger forest layer community (the herb layer community), which is also part of the five layers of the forest community which together make up a still larger community on an acre of ground, with unique climate, soil, and water conditions. Now consider that it may take thousands or even millions of acres of forest to become a major community!

Combine all these communities within all the living and non-living things in a given place and you can see we have one of the most complex levels of organization in nature, a **forest ecosystem**, not a single species tree plantation.

A forest ecosystem can be divided into six main parts, based on the relationship of energy and food in the system. (1) The **sun** supplies the energy necessary to sustain all forms of life on Earth. (2) **Abiotic substances**, or nonliving factors such as sunlight, climate, soil, and water are needed to support (3) **primary producers**, or green plants, which change the light energy of the sun into chemical energy in plant protoplasm (cell material). This energy is transferred in the form of food. Then, (4) **primary consumers**, (animals, for example) eat the plant and change the chemical energy again into animal protoplasm. It changes again if the animal dies and its body rots, and bacteria and other small organisms in the soil break down the compounds into simple nutrients. These go back into the soil, and growing plants take them in through their roots as food. Or, a primary consumer, such as a mouse, may be eaten by a (5) **secondary consumer**, such as a hawk. When a forest's condition is deteriorating, secondary consumers are usually the first to go. When the last animal in the food chain dies, (6) **decomposers**, such as bacteria and fungi, break down its body into simple nutrients. Decomposers also break down dead plants. The nutrients from the decomposing bodies and plants then go back into the soil and are used again by plants and other animals.

One of the most important laws of Nature is that energy can neither be created nor destroyed. In other words, you can't get something out of nothing--nor can you get nothing out of something! When a gopher eats a garden plant, the plant vanishes from sight, but the energy that was the plant does not vanish from the Earth. When the gopher, in turn, is eaten by a hawk, the gopher is gone, but the energy that was the gopher does not disappear. The life energy that the gopher embodied continues in a new form, in this case the form of the hawk. This series of stages that energy goes through in the form of food is called a **food chain**. Some energy is "lost" (to the atmosphere) in the form of heat, as it passes down the chain. Therefore, the volume of primary consumers, for example, is much less than the volume of plants needed to support them.

A food chain may follow many different pathways. Few ecosystems have a simple linear food chain. Forest ecosystems are made up of many different producers, consumers, and decomposers. Energy passes from one to another through many different food chains. This network of food chains is called a **food web**. The more diverse and complex the food web, the more stable (unchanging) the ecosystem. This is why a forest community consisting of a wide variety of plants and animals will remain more consistent in its structure than one in which a harvesting program has removed much of this variety.

The Three Essentials: Climate, Soil & Water

As a forest develops, it continuously changes the climate, soil, and water available and therefore the kinds of plants and animals that can live there. This series of changes is known as **ecological forest succession**. It may take millions of years for a forest to evolve into the forms we find in our forests today.

In the forest, all plants and animals are interdependent to various degrees. We too, are dependent on the forests, not only for our economy, but for our environment and our enjoyment as well.

Forest climate is the key to forest health. As described earlier, forest climate (which includes light intensity, light quality, temperature, wind velocity, relative humidity and evaporation rate) is affected by many factors. The forest farmer doesn't have much influence on the climate above the forest canopy, but below the canopy various forest practices can make a difference. Poor harvesting methods, for example, can severely alter the

forest climate, and have a devastating impact on both the balance of nature and on the ability of the forest community to sustain many different forms of life. Removal of even a single tree can have a significant impact on forest climate, depending on its position in the forest structure. When a plant is selected for harvesting, or when a large number of plants are harvested, the forest farmer must be careful not to change the forest climate to such an extent that it upsets the checks and balances of Nature.

The forest climate also affects the soil and its ability to support the various plants and animals of the forest community. Decomposers are the plants and animals, chiefly fungi and bacteria, that live by extracting energy from the decaying tissues of dead plants and animals. In the process they release simple chemical compounds, making them available to plants. These nutrients are essential for green plants. The ability of the soil to sustain green plants and animals depends upon the ability of these decomposers to continue supplying the needed nutrients. These decomposers, in turn, are dependent on the forest climate for their survival.

Water, so essential for every living thing, is stored in the soil, in the air, in plants and in animals. The forest climate affects each individual's ability to store moisture, and so in turn it affects the ability of forest plants and animals to survive drought. The forest farmer's harvesting process must leave the forest climate in a condition which enables the forest ecosystem to store sufficient moisture to sustain itself.

All of the living and non-living things in the forest have some kind of water storage ability. Together they store tremendous amounts of water for long periods of time. This serves to sustain the forest through periods of drought. There are many ways that plants and animals can store water. Plants, for example, store it in their stems and leaves, in the soil with their roots, on the forest floor in dead wood, and in addition they help keep it from evaporating by substantially cooling the area below the canopy on hot summer days.

The Four Basic Needs of Forest Plants and Animals

All living organisms in the forest have certain basic needs which must be met to ensure their survival as individuals and as species. These needs apply equally to forest plants (trees, shrubs, flowers, etc.) and to forest animals. The four basic needs are food, habitat, shelter and reproduction.

Food

All forest plants and animals must have food for nourishment, yet only green plants can make their own food. They capture sunlight with chlorophyll, which enables carbon dioxide from the air to unite with water and minerals from the soil to create food. The oxygen they give off is the source of the atmospheric oxygen we breathe. Therefore, all other plants (like mushrooms, for example) and animals ultimately depend upon green plants for their food.

Habitat

The habitat of an organism is the place where it lives, or where you would go to look for it. It is its address. Habitat can also refer to the place occupied by an entire community. Every habitat limits both the kinds and the number of things that live there, but a natural habitat may satisfy the needs of many kinds of plants and animals.

Shelter

Animals must have a place for rest and recuperation, a place that is protected or sheltered from their enemies or from a harsh environment. Most forest plants also need protection or shelter during part or all of their lives.

Reproduction

Reproduction is the process by which we create more of our own kind. The survival of all species of life forms depends on reproduction.

Climate and weather have both long- and short-term effects on such things as courtship behavior, mating time, egg-laying, and development in the immature stages of life. Most higher forms of plant life are pollinated by environmental agents, such as wind or insects.

These four basic needs provide a strong argument for preserving snags. Snags are used for protection from weather, communications (singing, drumming, calling), resting, roosting, food storage, exterior nesting, cavity nesting, and hunting perches. In Oregon and Washington at least 74 species use snags for reproduction, at least 44 species use snags for feeding, and at least 187 species (of birds, mammals, amphibians and reptiles) use dead and down logs for cover, feeding, reproduction or other survival needs.

Natural Selection

Natural selection in the forest is a process in nature by which the organisms best suited to their environment are the ones most likely to survive. Charlie Darwin called this process "survival of the fittest." The theory of natural selection is based on the great variation among individuals of a species, even closely related individuals. In most cases, no two members are exactly alike. Each has a unique combination of such traits as size, shape, color, and ability to withstand temperature extremes. Most of these traits are inherited. Plants and animals produce many offspring, some of which die before they can reproduce. Natural selection is the process in nature that determines which members of a species (or, which traits in a species) will survive and continue and which will not.

In the forest the necessities of life--sunlight, space, food, water, etc.--are in limited supply, so living organisms must constantly compete for them. They must also struggle against such dangers as animals that prey on them, or unfavorable weather. Some individuals have combinations of traits that help them in the struggle for life, while others have traits that are less suitable for a particular environment. Those with favorable traits, according to natural selection, are most likely to survive, reproduce, and pass on those traits to their young. Those individuals less able to compete are likely to die prematurely, or to produce fewer or inferior offspring. Consequently, the favorable traits survive, while the unfavorable ones eventually die out.

Forest succession and natural selection both involve survival of the fittest. Forest succession, however, is a term used to reflect both changes in population size and the elimination and/or introduction of populations as a result of a changing environment within the forest community. It involves a sequence of communities replacing communities. When the populations of different species stabilize, which may take millions of years, the forest is referred to as a climax forest.

The Balance of Nature

In any given area of the forest you will find many kinds of plants and animals. As discussed earlier, within any one of these areas all the members of one species make up a population. The size of each population stays fairly stable, unless some disaster alters conditions in the area. Ecologists refer to this stability of population size, in relation to other populations, the **balance of nature**.

Any change in one part of a natural community, such as an increase or decrease in the population of a species of plant or animal, causes reactions in other parts of the community. Most of the time, these reactions work to restore the balance. Human intervention based on ignorance of the community interrelationships is one of the most common causes of upsetting the natural balance.

Impediments to Natural Selection Forestry

Understanding the forest as a living ecosystem, with its own set of natural checks and balances, is the first step toward sensible management of forest land. Once you begin to see the forest as a whole and observe its complex interdependencies, you quickly see the ecological inadequacy of harvesting trees on the basis of a monoculture, clear-cut model. **Preserving the whole forest environment becomes a primary goal, not only to benefit ecological health, but also because it is more profitable in the long-term**. Using all of the products the forest has to offer spreads the profitable harvests over a diversity of goods, and it therefore protects the forest environment and keeps it intact. If forest products are harvested according to Natural Selection Forest Management, then the forest itself can be used in a variety of ways.

Our forests are indeed our greatest natural resource, and therefore we clearly have a responsibility to protect them. As forest farmers we can also make a difference in the way public forests are managed, and it is important that we do so.

Congress passed the Multiple-Use, Sustained Yield Act on June 12, 1960. Some 29 years later, however, we see that government foresters are looking primarily at sustained **timber** yield rather than at sustained **forests**. They cannot hope to sustain forests, if timber is the main emphasis and the rest of the forest is considered incidental. **The emphasis should be on sustained forests, with timber as only one of many products**. Only then could the end result be a sustained yield for timber. Likewise, if our forests were genuinely managed for multiple use--managed for all forest products and forest uses--both forest needs and human needs would be better served.

My home state of Oregon has to date only taken advantage of two of its forests' many products and uses: (1) the conifer trees and their related products, and (2) recreation and tourism. All the other forest products are left for the most part untapped, and most are even destroyed by burning or the massive use of chemicals. This is a foolish and destructive situation we find ourselves in.

Who is responsible for this situation? Unfortunately, there are confusing definitions of forestry practices, which have led to laws prejudiced in favor of the big timber industry. Present- day taxation rates put an unjust hardship on the small forest farmer. Forestry schools train tree plantation managers for the timber industry, not foresters for the forest and multiple forest use. Land use planning needs to be directed towards the preservation of forest land to prevent widespread real estate development from destroying our invaluable natural forests. Present management practices on public forest lands are both impractical and destructive, and they also affect privately owned forests.

Perhaps one of the greatest threats to private forest farming today is the real estate speculators and developers. They make a lot of money at the expense of private forestry, and the public, by converting forest lands into developments that consume those resources, while adversely impacting adjoining forests. If the developments continue as in the past, it is only a matter of time before there will be no more private forestry.

In Oregon the creation of the State Land Conservation and Development Commission (LCDC) was an attempt to preserve natural resources such as forests. However, the LCDC has not been able to adequately define forestry, let alone administer a policy. The real estate people have conducted an enormous campaign aimed at discrediting the LCDC in Oregon, arguing that the LCDC exists to strip away the rights of the public, rather than to preserve those rights. Yet it is interesting to note that in land use planning the restrictions necessary for preserving our rights (to life, liberty, and the pursuit of happiness) are always greater on residential development lands than on forest resource lands. In fact, when forest resource lands are converted to residential development lands, individuals necessarily lose some of their personal rights, except the right to further develop land! The right to manage a forest, like other personal rights, becomes secondary to the right to develop property for other uses (e.g. housing), and so any forest management that may become a nuisance to adjoining property owners, such as the sound of equipment noises, is no longer allowed.

In the county where I live, for example, most of the land is forest land, and the real estate speculators and developers are running rampant over the forest. Much of our forest land has perhaps more potential diversity of natural forest products than almost any forest land in the nation--yet it is being removed (cut, paved, developed) on a mass scale.

Private non-industrial forest farmers have not been able to compete against the short-term profit drive of the real estate speculators and developers, who include the private non- industrial forest owners out to sell their land (and when they sell, they can often make more quick money by subdividing and developing). The LCDC has been the forest farmer's only ally, but the developers and promoters have used their big bucks to render LCDC largely ineffective, leaving the private non-industrial forest farmers--you and me--to fight development with our own time and money. If we win, it will be years before we realize the benefits. If the speculators and developers of our forest resource lands win, we and the public will all lose.

How effective land use planning is at protecting forest land from development for other uses will depend on local, state, and national policies, including tax policies at all levels. I do not believe, based on my own experience, that it can be adequately accomplished on any one level. It requires a good working relationship among all these levels. The whole reason for planning seems to be circumvented by special interest groups, if any one level is not doing its part.

The history of forests in other countries has shown that people can indeed wipe out an entire forest, leaving only a desert and widespread poverty. If we are to achieve a more positive outcome, we must first practice good forestry on our own private lands. Then we must begin to educate others concerned with

forestry, to tell them what we have learned about these forestry practices, to demonstrate their worth. Organizations of forest farmers, such as the **Forest Farm Association** based in southern Oregon, are invaluable to us. It is only with the spread of an ecological understanding among foresters, and of the management practices that result from this understanding, that we can save our forests for all living beings, as well as for our own future profit and enjoyment.

Conclusions

If Natural Selection Forest Management were widely adopted, it could change our society's concepts of forests and forest management. We could learn to "see the forest through the trees."

The implications of natural selection harvesting and the other ecological methods of forest farming go beyond one's private business. Our public forests are in need of better management practices than those that industrial and public foresters have used in the past. Many of those forestry methods still common with the Bureau of Land Management and the U.S. Forest Service are destructive to the forest environment and therefore to an economy centered around timber and the forests. Some of these practices, along with their short-comings and remedies, are listed below:

(1) Monoculturally based operations treat the forest as a tree farm, following an agricultural model. At harvest, the trees may be cut down like a crop of hay. By the time the area is replanted, a year or more of growing time has been lost, and many more years will pass before it can produce its potential yield of fibre per acre. However, we know that there is less competition in any given area between trees of different species than there is between trees of the same species. A natural forest, where different species are growing, will therefore produce more gross fibre than the same area planted as a monocultural operation. I believe that on the average, Natural Selection Forest Management could easily achieve twice the yield of a standard monocultural operation and still leave the forest ecosystem intact.

(2) Slash-burning is the most usual method for removing the debris left in the wake of logging operations from the forest floor and for minimizing fire hazard, this not only costs time and money, but destroys many valuable materials usable by the forest, or as sellable products. With Natural Selection Forest Management we can remove slash down to 2" for firewood or other useful purposes. Any remaining slash the decomposers of the forest floor remove for us. This improves the soil and eliminates both the expense of burning and the hazard of fire.

(3) The massive use of herbicides and pesticides in our forests is costly and dangerous not only to the forest and its many life forms but to human health as well. When we consider the forest as an ecosystem, we can see that herbicides and pesticides have no place there. If a forest is healthy and has been properly harvested, using natural selection management techniques, it should not require any herbicides or pesticides, as nature keeps an adequate system of checks and balances.

(4) Reforestation costs in public forests are enormous. According to the National Forest Service, the cost of reforestation in Washington and Oregon (in 1884) was $382 per acre. In some regions of the country, it then could run as high as $893, and it it can run even higher today. In addition, reforestation is often not successful on land that has been severely damaged, such as clear-cut areas. Natural Selection Forest Management, **by keeping an all-age stand**, lets Nature plant the seedlings. It maintains the whole forest ecosystem, with its many communities, and its diverse productive processes.

(5) Many conventional forest management tools cause severe environmental damage, which could be greatly reduced by the methods of natural selection forestry outlined in my book. [See the author note and book review article. Ed.] For instance, small-scale harvesting equipment can cause less erosion and stream pollution than large-scale equipment, and thus can more easily maintain the forest's ability to function as a healthy organism. Natural selection management practices could eliminate these thorns in the side of public foresters. **The diversity of the forest ecosystem is the key to the stability of the forest and is the key to the stability of the timber industry as well**. The reduction or elimination of management costs for reforestation and the use of chemicals would reduce the budget (our tax money) and free money for hiring people to fill jobs created by increased product diversity and the methods of Natural Selection Forest Management, thereby providing stable employment for forest workers and the forest products industries.

If natural selection harvesting practices and other methods of forest farming were to reach into our public forests as well as nonindustrial private ones, our total forest ecosystem would become healthy as well as productive. The importance of good stewardship is obvious to forest farmers. They must learn enough about the **particular** forest they are managing to enable them to make intelligent site-specific management decisions. What about stewardship on our public lands?

Sound ecological stewardship of public lands should become the norm. No forester I know likes to manage the forest from a desk in a city office. They, too, prefer to be in the forest because they like the forest. And no one, much less the taxpayer, can afford to have government foresters spend most of their time driving down the road just to get to and from the forest. Under the stewardship concept of management of public land, each forester would be assigned a parcel of land, say perhaps 2000 acres (more or less depending on its productivity), to live on and caretake. Perhaps some areas might be leased to private foresters. In any case, the resident forest stewards would make all the necessary management prescriptions, lay out sales, compete with other forest managers, and, in short, be responsible for this land in the same way that a private forest owner ought to be. This would allow foresters to become personally and intimately involved with their own pieces of land, and it would provide excellent stewardship of our forests.

The implications of forest farming by Natural Selection Forest Management are indeed far-reaching and exciting.

About the Author: **Orville Camp** is a consultant in Natural Selection Forest Management. He helps private forest land owners set their forest lands on the path of Natural Selection Forestry. He and other forest farmers have established an organization based in Southern Oregon called the Forest Farmers Association, which promotes Natural Selection Forest Management. It also publishes a journal and sponsors workshops for those interested in these methods. For more information write to them at P.O. Box 715, Grants Pass, Ore. 97526. This article is excerpted from the author's book **The Forest Farmer's Handbook: A Guide to Natural Selection Forest Management**, Sky River Press, 1984, 2466 Virginia St. #205, Berkeley, CA. 94709, $6.95 U.S. Reprinted with permission of the author and of Sky River Press. For more information on the book see the book review article following this paper.

SOME RECENT BOOKS ON FORESTS AND FORESTRY

John C. Miles

Undoubtedly the most contested environmental issue today in the Pacific Northwest is whether to log or preserve remnant stands of old growth forest. The issue has intensified to a white heat in the summer of '89. Loggers demonstrate with truck convoys and slogans about the spotted owl ("the only good spotted owl is a ...etc."). Politicians push for compromise solutions, trying unsuccessfully to bring contending parties together, themselves contributing to the difficulties by casting the issue as one of "jobs versus owls." The media is feasting on the controversy. Meanwhile, the saws whine and the trucks roll.

In contrast to the heat and noise of political battle, several scientists have attempted to think about how we can have our ancient forests and a timber industry too. Chris Maser, an authority on the ancient forests of western Oregon and until recently a government scientist in the employ of the Bureau of Land Management, is one of these. Last fall he published **THE REDESIGNED FOREST** (1988, R.& E. Miles, P.O. Box 1916, San Pedro, California, 90733, paper $9.95 U.S.). What does it mean, he asks, to redesign a forest? How are we doing it, and how should we be? He concludes that the current redesign approach will not sustain forests, and suggests that a wholly different, much longer-view approach is necessary.

Maser begins by explaining how nature designed the conifer forests of the Pacific Northwest. Nature, he says, designed this forest as an "experiment in unpredictability," in a long-term time frame (a 500-1200 year lifespan for individual trees), with built-in flexibility and diversity, over a broad landscape, with a built-in self-sustaining and self-repairing capability. Humans, on the other hand, are trying to design a forest which they can regulate, in a short time frame, with qualities of simplicity, uniformity and manageability. The result of this human approach is dramatic reduction in biological diversity, an increased potential for instability and a long-term reduction in sustainability of forest resources. Maser summarizes this first third of his book as follows:

> And so it is with our management; we see only trees, or big game, or whatever our vested interest is. When we think of Nature's forest as a commodity, we treat it like one. Because we treat it like a commodity, we are trying to redesign it to become one. . . We do not see a forest. We are so obsessed with our small goals that we neither see nor understand that Nature is warning us about gross simplification. . .in our blindness, we redesign the forest with an instability that cannot be repaired with fertilizers, herbicides, or pesticides. Our forest can only be healed with humility, love, understanding, and patience.

The last line above concludes part one and signals what is to come. Maser the biologist becomes Maser the philosopher. Part two begins with the observation that "as we think, so we manage." Thinking about forests is dominated by short term economic expediency, which leads to a view that grossly simplifies the biological challenges of managing a forest for long term sustainability. Citing examples from all over the world, Maser makes a compelling case that thinking about forests in terms of economic rather than biological rotations has and is resulting in worldwide forest decline. He concludes that section with the observation that "...we face grave, uncomfortable uncertainties in our renewable resource management decisions, or for that matter in all land-use decisions, because we are giving economics and technology higher priority than we are according scientific understanding."

In part three, Maser moves entirely away from forestry questions and attempts to understand why we seem unable to make the changes in thinking necessary to move toward more inspired management. How and why do we make the decisions we do? He seems to be saying that everyone means well, everyone is afraid and everyone is resisting the sort of deep change in values and beliefs that Maser thinks necessary to deal with the forestry problem. This problem is symptomatic, in his view, of deep seated difficulties in the human experience. So what to do?

First, recognize that what we have is a challenge to will and imagination. Values are in conflict in forestry, so use science and imagination to propose and defend values that will yield sustainable forests. Moral absolutes in this struggle would be nice, says Maser, but they are not there. Nature deals only in short- and long-term trends, he argues, not in absolutes. What we need is "restoration forestry." He defines it thusly:

> Restoration forestry is, by definition, the exact opposite of the plantation management we practice today. In plantation management, costs are hidden and deferred to the next rotation or human generation; in restoration forestry, on the other hand, there are no hidden, deferred costs. Restoration forestry is pay-as-you-go forestry that more closely follows Nature's blueprint in maintaining a self-repairing, self-sustaining forest. Product extraction is maximized in traditional plantation management and sustainability of the forest is minimized; in restoration forestry, however, sustainability of the forest is maximized and product extraction is "optimized" at a level and in a way that does not impinge on the sustainability of the forest.

Maser's prescription is that we use the tools of science to understand "Nature's way" in designing and sustaining forests, then incorporate our insights into forest management. This will require difficult changes in how we think about forests, but our options seem to be to change our ways or to lose the forests. He sums up as follows:

> . . .if we care to dream boldly enough, we can have a sustainable forest in the Pacific Northwest that includes old growth trees, and woodfiber, and wilderness, and elk, and native trout, and clean water, and, and . . .But like the Old West

movies, we'll have to check our guns at the door; we will have to transcend our own special interests and encompass all interests in the forest as a whole. To do this, to change our thinking, we will have to accept that we, as product-consuming humans, are the problem, so we are also the **solution**.

Chris Maser has, in **THE REDESIGNED FOREST**, written an important book. He has described the problems involved in the way industrial forestry is practiced, and suggests directions wherein the sustainable forest future may lie. His aim is to define the agenda, to put the argument about ancient forests and spotted owls into context. The spotted owl was selected, with good intentions, as the symbol of old growth, but the real issue is not the owl. The real issue is the "economics of extinction-- the planned liquidation of old-growth forests for short-term economic gains." We must, he says, reject this economics of extinction and embrace an economics of sustainability and permanence. This is the central point of Maser's book.

Another scientist thinking about these matters is Larry D. Harris. A university-based ecologist, Harris published **THE FRAGMENTED FOREST** in 1984 (University of Chicago Press, Chicago, Ill. 60637, paper $11.95 U.S.). Harris addresses part of the larger problem treated by Maser and has written a much tighter book. His aim is to describe a forest management strategy for the Pacific Northwest that will maintain biotic diversity and minimum viable wildlife populations on public forest lands. He proposes that island biogeography principles be used to design this management strategy.

Harris develops his argument very carefully. He begins by evaluating the current situation (at least current to the early 1980's) west of the Cascade Mountains in Oregon and Washington. He describes the natural forest community there, forest trends and patterns, and the characteristics of the animal community. He reviews principles of insular biogeography, and examines how the objective of maintaining biotic diversity can be evaluated. He then proposes a planning strategy that he thinks will assure this diversity, which is threatened by the isolation of islands of old growth surrounded by clearcuts. He thinks we can both practice forestry and maintain viable populations of old growth dependent wildlife.

Harris' proposal involves the setting aside of representative old growth ecosystems as islands that will ensure a viable gene pool and "maintain the complex, functioning ecosystem in perpetuity." Each island will be surrounded by a long rotation management area that is to be managed on a 320-year rotation. Cutting of the managed stands will be scheduled so as to maximize edge effect and maintain the old growth core at 5% at all times. Spatial distribution and connections between the islands will be critical. A regional system of managing this "archipelago" will be essential. Harris describes the "priority old growth site" that will be the centerpiece of this island system:

> The stand should occur on a moist site containing surface water and, ideally, a stream. It should contain a topographic bench and a riparian strip dominated by hardwood species. This same riparian strip should connect it with at least one other stand. The site would be at a lower elevation with a north or east aspect, but would ideally extend over a ridge top so that the ridge system could be used as a dispersal route; thus some sunny, south-facing area will be included. The site should be removed from traffic and high probability of wild crown fire deriving therefrom. It should be nearly surrounded

by replacement stands that can serve as buffer areas, but these should include at least two stands in early stages of growth to provide the full successional spectrum in close proximity.

This system of islands will, in Harris' scheme, be interspersed throughout the matrix of the managed forest. Wherever possible, it will be connected to the system of parks, wilderness and research natural areas currently in place, which themselves serve as islands.

Harris correctly points out that such a system will require a reorientation of conservation thought. He believes that there is no possibility of setting aside areas of sufficient size to protect wide-ranging species. Thus, creation of parks and wilderness areas is not the answer to the challenge of maintaining biotic diversity. Therefore, "the attitudinal and resource commitment must be reallocated from the 'intensive' park and preserve approach to the more dispersed, 'extensive' approach." Harris' scheme will also require a level of interagency cooperation uncommon up to now. While Maser rather vaguely suggests that some changes in thought and action will be necessary, Harris provides specific examples of what sort of change would serve sustainable objectives. Maser was thinking more broadly than Harris. The two books provide a nicely matched pair in that together they present a clear picture of what is involved in working out this old growth issue.

Several other recent books that relate to the issues treated by Maser and Harris should be mentioned. Back in 1981 Ray Raphael provided a good overview of an approach to forestry that was based on environmental considerations. This was **TREE TALK: THE PEOPLE AND POLITICS OF TIMBER** (Island Press, P.O. Box 7, Covelo, CA. 95428, paper $14.95 U.S.). He attempts to show how we can have our timber and our forests too. More recently, Gordon Robinson has written **THE FOREST AND THE TREES: A GUIDE TO EXCELLENT FORESTRY** (1988, Island Press, paper, $19.95 U.S.). Robinson draws on fifty years of experience to advocate an "excellent forestry" built around uneven-aged management and selective cutting. He clearly explains how we got where we are and how we can manage forests in ways which preserve the ecosystems and satisfy a wide range of values. Robinson's book contains an annotated bibliography of over 400 books and articles related to excellent forestry and critiques of the short-comings of conventional practices. This book is a valuable resource for all who want to clearly understand the issues surrounding forests and forestry.

While Harris points out that change will be necessary in how forest management agencies approach their tasks, Randal O'Toole has written a book that presents his views on what changes will be required of the U.S. Forest Service. **REFORMING THE FOREST SERVICE** (1988, Island Press, 250 pages, paper, $19.95 U.S.) is an economically based look at the inefficiencies and inadequacies of this agency, with specific recommendations for change. The book provides a detailed account of how current Forest Service administrative structures make sound management of forests almost impossible, and it provides some interesting strategies for how these structures could be changed to give us sound forestry on public lands.

A book mentioned in the author note at the end of Orville Camp's article, in this issue of **The Trumpeter**, needs to be included here as a practical, down to earth guide to Natural Selection Forestry. **THE FOREST FARMER'S HANDBOOK: A**

GUIDE TO NATURAL SELECTION FOREST MANAGE-
MENT (Sky River Press, 1984, 2466 Virginia St., #205,
Berkeley, Ca. 94709, $6.95 U.S.) is a practical manual to Natural
Selection Forestry, which provides specific guidelines for such
things as road building and thinning. It gives detailed explana-
tions of how Natural Selection forestry is actually carried out.
Camp's experiences and those of others working with the Forest
Farmer's Association based in Southern Oregon (P.O. Box 715,
Grant's Pass, Ore., 97526) are showing the way to a sound and
economically viable, sustainable forestry that maintains forest
ecosystems intact. For more details see Camp's article in this
issue.

**PUBLIC POLICIES AND THE MISUSE OF FOREST
RESOURCES**, edited by Robert Repetto and Malcolm Gillis,
Cambridge University Press, New York, 1988, is an anthology
by authors from other countries offering a comprehensive look
at global forestry.

Finally, the Wilderness Society has recently issued two brief
and useful reports, one by Peter Morrison, **OLD GROWTH IN
THE PACIFIC NORTHWEST: A STATUS REPORT** and
the other by David S. Wilcove **NATIONAL FORESTS:
POLICIES FOR THE FUTURE**.

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POSTMODERN AGRICULTURES

Richard Conviser

Introduction

Since the middle of this century, the output of world agriculture
has increased substantially. Between 1950 and 1971, grain
production on the planet nearly doubled, resulting in a yield
equivalent to about two pounds, or 3,000 calories, per person per
day.[1] In North America, despite decreasing numbers of farm
workers and government subsidies for leaving farmlands fallow,
yields have made similar gains. The grain surplus from North
American farms has provided between three-fourths and seven-
eighths of the world's grain exports since mid-century;[2] since
1972, much of this surplus has been made available even to the
key ideological opponents of the United States government.
Modern agriculture does not merely produce enough grain to
feed all of the world's current human inhabitants; according to
proponents of The Hunger Project, a group dedicated to ending
world hunger by century's end, enough food is produced today
from all sources to nourish the expected population of the Earth
in the year 2000.

Many are prepared to view this accomplishment in a positive
light, as a sign, even, that the present organization of agricultural
activity has achieved unprecedented successes. In terms of one
of the goals of that mode of organization, maximizing short-term
productivity, modern agriculture is indeed nonpareil. But from
another point of view, the optimistic statistics cited above
obscure serious problems in the organization of agriculture
which are both political and ecological. Politically, the abun-
dance of the world's total food supply has not eliminated serious
hunger problems in many parts of the world. Indeed, the way in
which that abundance has been achieved has contributed to the
hunger problem. Ecologically, modern agricultural practices are
simply not sustainable: their yields are achieved at the eventual
cost of the very conditions which make the yields possible.

Political and Ecological Problems in Agriculture

In the modern world, a number of forces have combined to in-
crease the scale of agricultural operations and, at the same time,
concentrate control over agricultural products into fewer hands.
For many farmers and peasants, these processes have removed
them from access to the land and the goods which once enabled
them to be self-sufficient in meeting their food requirements. In
addition, those forced off their own land typically become de-
pendent upon others for employment, whether as farm laborers
or in oversupplied urban labor markets.

One of the factors contributing to this condition is the inter-
nationalization of agricultural markets.[3] Land once used to raise
crops for local consumption has become attractive to investors
for the growth of products for export. Local economies have
thus become dependent upon fluctuations in world markets,
making local farm workers vulnerable to forces far beyond their
control. Barnet cites the example of Brazil, where fields pre-
viously planted in black beans for domestic consumption now
grow soybeans for export. The cost of black beans, now large-
ly imported, has increased nearly threefold. In other parts of
Latin America, land has been converted from gain production to
pasture for grazing cattle which will eventually be exported as
beef. In the decade ending in 1965, production of such cash
luxury crops as coffee, tea, bananas, and cotton grew at a rate
twice that of other agricultural products in less developed
countries.[4] On a local level, this process enhances the power of
landlords and merchants at the expense of that of the peasants.[5]

Two other factors contributing to this concentration of power
are a concentration of farmland ownership and the development
of technologies favoring those with large land holdings.[6] In the
United States, federal policies since at least mid-century have
encouraged the concentration of ownership by favoring larger
landholders, whether through subsidies, non-enforcement of
acreage limits on irrigation from federally funded projects, or the
imposition of regulations with which small farmers cannot af-
ford to comply.[7] The increasing scale of farms has contributed
to a demand for large-scale technologies as well. These tech-
nologies tend to be out of reach of all but the wealthiest
landholders, and they tend to make unavailable those earlier
technologies which were suited to farming on a smaller scale.[8]

Armed with more sophisticated technologies, large landholders gain a further economic advantage over small farmers. Officials of the United States Department of Agriculture have boasted that this country's food needs are being met by a diminishing number of farmers.[9] Such officials overlook the fact that the increased mechanization of farming involves increasing numbers of urban factory workers in the process of food production.[10] They also neglect the political and cultural consequences of further centralizing control over farmlands, while dislocating small farmers from rural areas.

The exodus of small farmers from the countryside transforms the quality of rural community life. Goldschmidt's long-suppressed pilot study of two California farming communities in the 1940s has proved to be prophetic of developments which have occurred since. Where there is a preponderance of large-scale farming operations, rural communities have lost many of the features which support a full community life, including small businesses, social amenities, civic organizations, and democratic institutions.[11] A diminution of rural culture also results. As Cochrane has observed, it is no longer appropriate to look to farmers as an independent source of values in this country. Instead, the farming sector "is now a part of a larger homogenized society which receives and accepts its values, ideas and life style from an amorphous media system and a uniform educational system."[12] Berry likewise notes that among American farmers, "the ideals of workmanship and thrift have been replaced by the goals of leisure, comfort, and entertainment."[13]

These processes bespeak an increasing dependence of agriculture upon outside forces, both cultural and material: increasingly, both the techniques and the materials used by farmers are being imported from outside the communities in which they are used. While only twenty percent of the goods to run American farms were purchased in 1950, by 1973 that proportion had risen to sixty-five percent.[14] To establish this **pattern** of dependency, however, is to address only political aspects of agricultural organization. If we are to understand the latter's ecological aspects, we must examine the **content** of the agricultural practices exported to the countryside as well. That these practices depend heavily upon fossil fuels is well-known: not only are farm machines oil-based, but so are many of the fertilizers, herbicides, and pesticides which have come into common use. Such practices are largely responsible for recent increases in food productivity, but they are not sustainable. Moreover, some of their side effects are likely to decrease future agricultural production, once fossil fuels are no longer affordable or readily available.

A key factor in the nonsustainability of modern or conventional agricultural practices is their energy use. Given that plant growth involves a transformation of solar energy into plant matter, one might reasonably look to agriculture to increase the total amount of energy available to humans. There are indeed forms of agriculture which do so, from archaic slash- and-burn techniques to types of intensive cultivation by peasant populations. Leach notes that Chinese peasants earlier in this century were able to obtain over forty calories of food energy for each calorie of labor they expended.[15] Many styles of agriculture, while still yielding more energy than they consume, return considerably less energy than this. Fossil-fuel-based agriculture, on the other hand, is a net consumer of energy. Some crops produced with fossil fuels do show a net energy gain, but on the whole, the caloric content of foods produced in this modern fashion is only equal to that of the fuels used in the agricultural machines which help to produce them. When other energy costs of this form of food production are included--such as those involved in producing farm machines, pesticides, herbicides, and fertilizers--the fossil fuel expenditure becomes two and one-half times the caloric content of the foods produced. Transportation, processing, and packaging raise the ratio of expenditure to production all the way to six to one.[16] Such fuel expenditures have been attractive to food producers on economic grounds, since the corresponding cash outlays have been lower than the cost of human labor. As supplies of nonrenewable fossil fuels diminish, however, the economic advantage of fuel-intensive agricultural practices declines. And since such fuels are in only finite supply, these practices are not indefinitely sustainable.

Even if supplies of fossil fuels were limitless, they could not be counted upon indefinitely to increase agricultural productivity. The doubling of yields experienced earlier in this century required an eightfold increase in the use of nitrogen fertilizers and thirtyfold increases in applications of potash and phosphorus.[17] In some places, additional applications of fertilizer are no longer economically feasible because they produce only fractionally higher yields.[18] But ecological grounds for limiting the use of fertilizers and other chemical products are also compelling.

These grounds concern the quality of both the foods produced with these substances and the soils on which they are used. Fossil-fuel-based farming techniques layer nutrients onto soil to be consumed by the crops growing there, but they also contribute to the destruction of the soil, by burning out organisms which give the soil its vitality. Research reported by William Albrecht notes a decline by nearly one-third in the protein content of wheat grown in northwestern Kansas as a result of a decade of fossil-fuel-based farming.[19] The destruction of organic matter in soils also renders them less able to absorb moisture; compaction of soils by heavy equipment has a similar result. These factors make crops grown on such soils more susceptible to drought, necessitating more intensive irrigation, which in many places has drained underground aquifers and raised soil salinity. The latter, if carried far enough, can make soils unsuitable for many crops. Decreased absorption and increased irrigation also make soils more susceptible to erosion, especially where deep plowing is practiced. In the United States, topsoil losses average an inch every sixteen years; the creation of an inch of topsoil without human intervention, on the other hand, generally takes substantially longer.[20] Soil losses were not critical when the Earth was sparsely populated: people could simply transfer their growing activities to new sites. But contemporary population pressures have all but eliminated that luxury. The health of the soil is important for continued agricultural productivity; yet, as Jackson has noted, "we have literally moved our agricultural base from soil to oil."[21]

These ecological aspects of modern agricultural practices have been discussed as if they were distinct from the latter's political aspects, but they are in fact importantly connected. In moving control over agriculture away from the locations in which it is practiced, political factors have contributed to an abstraction of agricultural knowledge: the techniques employed are typically developed some distance away from the places in which they are used. Moreover, they are often unsuited to the special characteristics of the places where they are used, treating soils as if they are inert. In the short run, these practices born of abstraction may

produce high yields, but in the long run, they tend to render land inert, unsuited for further agriculture. The Dust Bowl was a product of such processes.[22]

Origins of the Abstraction Crisis in Agriculture

The attitude of disregard for place which typifies modern agriculture does not stem from a single source. As John and Nancy Todd have noted, people of diverse cultures in many different places have overtaxed the capacity of land to provide for their needs, even where religions have counseled gentleness.[23] In our own culture, some of the responsibility for humans' degradation of the environment has been attributed to the particular interpretation of Christianity which has prevailed since about 800.[24] According to White's thesis, humans were encouraged by Christianity to be masters, even exploiters, of an inanimate nature. Some have taken exception to White's thesis, arguing that successful soil management techniques were practiced in Europe during 1500 years of Christianity's ascendancy.[25] White himself noted that a more ecologically sensitive interpretation of Christianity was made available by St. Francis of Assisi. Nevertheless, it is an explicitly exploitive attitude toward nature which has come to be dominant in the West.

Two cultural movements of more recent origins than Christianity have contributed to the dominance of that attitude: modern science and liberalism. Science has fostered an exploitive attitude in humans by contributing to a separation of humans from nature. The progress of that separation has been especially well chronicled by phenomenological philosophers in this century. The very accomplishments of Galileo and Descartes which hastened the development of modern science also promoted the belief that the world as it is in reality is not the world of our daily experience. Instead, these natural philosophers argued, nature is discoverable through science. The accent of reality was thus bestown upon the mathematical abstractions of science. The world of experience, in the meantime, was relegated "to the inferior status of a merely subjective phenomenon"[26] and the truly subjective work of humans in constructing a scientific image of nature was ignored. In Husserl's words, "natural scientists consider nature to be concrete and overlook the abstraction through which their nature has been shaped into a subject matter for science."[27]

Both Christian and earlier cosmologies had provided people with a sense of their place in the universe. In many ancient pagan religions, the unifying characteristic of the universe was taken to be spirit, which was believed to pervade all aspects of nature: But the scientific picture of nature separated humans from the latter, divesting it of spirit and rendering it **other**. Analytical knowledge supplanted the mystical bond humans had previously felt with their natural environment. Even as they were coming to feel separate from that inert environment, however, humans were being empowered to transform it.

While the scientific revolution contributed to a change in human attitudes toward nature, a later starting but concurrent social revolution was to have consequences no less important for the natural environment. This was the rise of liberalism, the political and economic philosophy which spelled the end of feudal social relations through the development of the modern nation- state. Like the growth of science, that of liberalism was rooted in a deep faith in the power of human reason; like science, it contributed to the weakening of the Church.[28] In place of an order which had been made to seem divinely ordained, it left an intensely individualistic culture. Next to the nation-state, the most important institution in that new culture was the market.

In the traditional culture, economic relations had been embedded within longstanding social relationships; in consequence, economic values had been subordinated to moral and social values.[29] While markets had been in existence long before the nineteenth century, prior to that time "gain and profit made on exchange [had] never...played an important part in human economy."[30] In the new order, however, private economic gain became paramount, and social relations came to be embedded in the economic system.

The rise of markets to prominence marked a fundamental shift in human consciousness. Rather than evaluating the consequences of their actions for wholes, humans instead came to calculate the benefits of their actions for themselves. To be sure, proponents of liberalism, such as Adam Smith, argued that individuals' pursuit of their private interests resulted in the best society: But the placement of individual above social welfare in the calculus of decision-making certainly did not work to the benefit of all in society.

Neither did it work to the benefit of the natural environment. Already rendered inert by science, nature came to be further objectified under the market system as a source of potential profits. Whereas traditionally, agricultural production had been intended for home use, it now shifted "toward production for market and for the sake of profit."[31] This process required that components of agricultural production be regarded as commodities to be bought and sold, land and labor included. Decisions about the use of these factors thus came to be based upon their relative prices and expected profitability, in abstraction from the actual situations in which they were involved. Some of the consequences of such decisions have little bearing upon the short-term profitability of agricultural activities, but these **externalities**[32] are quite real in their consequences for the natural (as well as the social) environment. In short, the rise of the market system contributed to a disregard for the care and health of the land and its people. For these real matters, it substituted the arithmetic abstraction of a balance sheet.

Values for Postmodern Agricultures

To the extent that modern agriculture's problems stem from centralization and abstraction, solutions to its problems might be sought in moves toward decentralization and attention to context. In his eloquent plea for the salvation of small farmers and the traditional agrarian values they represent, Wendell Barry has contrasted the dominant "exploitive" values with others he identifies as "nurturing."[33] While the exploiter seeks monetary profit through the efficient use of land's productive capacity, the nurturer's goal is the health of the land, to be achieved through care and a respect for the land's carrying capacity. Unlike the exploiter, who serves institutions with an organizational competence, the nurturer is devoted to place, with a competence for maintaining or restoring order. Berry's approach to agriculture would reverse the dominant tendencies toward large spatial scale and small temporal scale. He argues that a sustainable agriculture requires attention to the process of return, as well as the processes of production and consumption.

Similar concerns have been voiced by proponents of the contemporary (if poorly named) social movement for appropriate

technology. Some of the values which have emerged from this movement are relevant for agriculture. Perhaps the most important of these is that food production should be not a specialized industry, but rather, shared by all.[34] This point is consistent with the decentralist goals of the movement and its desire to see small units of people be self-sufficient. It is also consistent with the movement's goal of agricultural diversity, in contrast with the current tendency toward monoculture, and with the goal of local bartering in place of worldwide trade. The ecological orientation of the movement, while not limited to agriculture, certainly is relevant as a source of alternatives to the practices discussed early in this paper. Thus, proponents of the movement favor ecologically sound technologies requiring small energy inputs, yielding little or no pollution, using materials in a reversible way, that are integrated with nature rather than alienated from it. Innovation in the type of society favored by the movement would be regulated by need rather than by profit; the economy would be steady-state and labor-intensive rather than growth-oriented and capital-intensive.

What is misleading about the name of the appropriate technology movement is its implicit suggestion that changes in technology could be sufficient to bring about changes of the sort enumerated in the previous paragraph. In fact, if technological changes are to have the desired effect, they must be accompanied by other changes in values and social arrangements. It has been argued, for example, that technology is responsive primarily to economic forces wherever a market economy predominates;[35] in a similar vein, Schumacher observed that contemporary technology tends to favor the few rather than the masses.[36]

One account of the fate of an apparently "appropriate" technology will amply illustrate this point. In recent years it has become possible to extract methane, or "biogas," from the decomposing fecal matter of animals. The gas extracted can be used to provide fire (for example, as a cooking fuel) or light, and its production does not diminish the value of the remaining solid waste as a fertilizer. The production of biogas is thus ecologically beneficial; yet, it does not necessarily promote the self-reliance advocated by proponents of appropriate technology. In China, biogas production has been organized within agrarian communes, and so its benefits have been made available to all who belong to the communes, thus helping to make these small units more nearly self-reliant. In India, however, biogas production has been undertaken not by community groups but by individuals. Since the smallest biogas plants have certain capital costs and require the dung from two cows, only relatively well-to-do farmers can afford them. Moreover, once such plants are in operation, the value of cow dung is enhanced to those with the plants. Thus, they no longer leave cow dung along the roads, where it was previously available for peasants to pick it up to use as fuel. These Indian peasants have thus been made less self-reliant by the introduction of this new technology.[37]

These considerations suggest that for technological changes to have the desired effects, they must be tailored carefully to their contexts. Such matters inspired one proponent of the appropriate technology movement to suggest that it be renamed "community-based innovation." The substitution of "innovation" for "technology" follows from the recognition that the movement seeks primarily social and attitudinal changes, and only secondarily technological ones. The identification of such innovation as "community-based" is a suggestion that it respond to--and perhaps emanate from--people relative to their place, to their

"needs, values, culture, aspirations, locale, ecology, and unique assets and liabilities."[38]

Small-scale operations, locally controlled and attuned to local ecologies--these are features of agricultures which could avoid the political and ecological problems characteristic of much of modern agriculture. And they are features which are realized in several agricultures which are currently being proposed or practiced. In the remainder of this paper I examine three such postmodern agricultures.

Postmodern Agricultures: Some Examples

Fukuoka's approach. For individuals as for cultures, the starting point for change is often a new vision of oneself. Such a vision marked a turning point in the life of Masanobu Fukuoka, who as a result of it returned from a laboratory job to the land, where he developed a novel technique for farming. One of the inspirations for Fukuoka's approach to farming was his noticing a field which had not been plowed for many years: "I saw healthy young rice sprouting up through a tangle of weeds and straw which had accumulated on the field's surface."[39] From this beginning grew up an approach to agriculture which begins with a respect for nature's wholeness.

In regarding that wholeness, Fukuoka expresses reservations about human knowledge, which he characterizes as relative and incomplete. In Fukuoka's view, humans cannot see the whole of nature through a science which is merely analytical, or which attempts to mold nature to human will.[40] Thus, he counsels, "Before researchers become researchers they should become philosophers."[41] That Fukuoka needed his own advice is made clear by the following description of his approach to agriculture:

> The usual way to go about developing a method is to ask 'How about trying this?' or 'How about trying that?' bringing in a variety of techniques one upon the other. This is modern agriculture and it only results in making the farmer busier. My way was opposite. I was aiming at a pleasant, natural way of farming [in cooperation with nature] which results in making the work easier instead of harder. 'How about **not** doing this? How about **not** doing that?'--that was my way of thinking. I ultimately reached the conclusion that there was no need to plow,...to apply fertilizer,...to make compost,...[or] to use insecticide.[42]

In his avoidance of modern science, Fukuoka shuns theories in favor of a careful study of the place where he works. "The face of nature is unknowable," he writes. "Trying to capture the unknowable in theories and formalized doctrines is like trying to catch the wind in a butterfly net."[43] Or again: "If you realize that the eventual human goal is to transcend the world of relativity,...then plodding along attached to theory is unfortunate."[44]

Fukuoka found that he could avoid many of the typical ways farmers intervene in the growth process by leaving things to nature. He is able to forgo plowing because he relies upon plant roots, animals, and small organisms to cultivate the soil. He

avoids having to fertilize his fields by growing white clover to enrich and soften the soil, although he does spread straw and, periodically, a little chicken manure. Aside from some flooding of his fields--less than is typical for Japanese agriculture--he does not weed, believing that weeds help to build soil fertility and balance biological communities. Fukuoka also completely avoids the use of chemicals, preferring to provide crops with a healthy natural environment rather than upsetting the balance of nature.[45]

Although Fukuoka's approach to farming is labor-intensive, it requires only a fraction of the labor of traditional Japanese farming.[46] A typical year's cycle in his fields goes as follows. Several weeks before the fall's rice harvest, clover seed is scattered in the fields, followed by fast-growing winter rye or barley. Sprouts from the latter, measuring an inch or two, are trampled during the rice harvest but quickly recover. All the rice straw is scattered back on the field after the grain is removed; a thin layer of chicken manure helps to decompose the straw. Rice seeds enclosed in clay pellets (as protection against mice, birds, and rotting) can be broadcast either immediately thereafter or in the spring, two weeks before rye and barley harvest. Once the straw from this harvest is returned to the fields, water is allowed to stand in the fields for seven to ten days in order to weaken the weeds and clover and to allow the rice to sprout through the straw. The fields are irrigated by rain or running water for the next three months.[47] Barley and rye yields, like rice yields, average 1,300 pounds per quarter acre; the field will thus "support five to ten people, each investing an average of less than one hour of labor per day."[48]

Fukuoka's method was evolved from over a quarter century of careful experimentation in one place; he practices it on one and a quarter acres of grain and over 12 acres of citrus orchard. How well-suited it is to its location is suggested by the fact that his yields are comparable to those of both traditional Japanese farming and the fossil-fuel-intensive methods, which gained favor while Fukuoka was pursuing his alternative approach. Unlike those methods, however, Fukuoka's increases the quantity of decayed organic matter on his fields. Thus, it fulfills Berry's standard of care and virtually all of the other alternative values enumerated above: it requires minimal energy inputs; it is non-polluting; it is labor- rather than capital- intensive; and it is notably well integrated with nature. Fukuoka's starting point of surrender to nature could hardly be more distant from the dominant attitude of mastery. And nature exists, for Fukuoka, within humans as well as without; he notes that the "ultimate goal of farming is not the perfection of crops, but the cultivation and perfection of human beings."[49]

Permaculture. Fukuoka's work is one example of an alternative to the energy-intensive forms of agriculture typical today. Within the past decade, there have been proposals for other alternatives as well. One of these is Wes Jackson's call for the polyculture of perennials.[50] Another, which I will summarize here, is Bill Mollison's outline for the permanent agriculture he terms permaculture.[51] Like Fukuoka, Mollison is interested in developing systems of plants and animals which are well-suited for their specific natural settings, but Mollison's concern is somewhat more theoretical than Fukuoka's, involving the specification of factors to be taken into account in all possible settings. Indeed, while Fukuoka's work exists as an example of such an agriculture, permaculture is chiefly an idea, a theoretical possibility which has not yet been realized.[52]

The ideas of permaculture come from a variety of disciplines. Their goal is the production of complete agricultural ecosystems which will be permanent and stable. Permaculture is also oriented toward regional self-sufficiency in food, as one element which will contribute toward a substantial reduction in the energy requirements of agriculture.[53] Flexibility and diversity in the crops grown in a permacultural system are expected to produce greater overall yields than monocultures because the various crops are better able to use all of the natural resources available in an area. The mix of crops in a permacultural system might include "forest, clearing, hedgerow, field, woodland, and intensive crop cultivation."[54]

Larry Korn has summarized some of the goals and principles of permaculture in a succinct way:

> The elements are designed into an integrated system which takes advantage of the unique conditions and attributes of each site. They are arranged in such a way that the species which require the greatest attention and care are located closest to the dwelling site.... By careful design, energies which enter the area from the outside, such as wind, sunlight, water, fire and wildlife, are encouraged or screened so they work to the benefit of the whole system. The idea is to design a perennial, highly productive ecosystem which, once established, will operate with a minimum of maintenance.[55]

Among the basic characteristics of permaculture, Mollison lists the following:

> 1. Small scale land-use patterns are possible.
> 2. Intensive, rather than extensive, land-use patterns.
> 3. Diversity in plant species, varieties, yield, micro-climate and habitat.
> 4. Long-term; an evolutionary process spanning generations.
> 5. Wild or little-selected species (plant and animal) are integral elements of the system.
> 6. Integration with agriculture, animal husbandry, extant forest management and animal cropping become possible, and landform engineering has a place.
> 7. Adjustable to steep, rocky, marshy or marginal lands not suited to other systems.[56]

Mollison specifically notes that permaculture is incompatible with a market economy, and that direct observation of a site is necessary for its practice, rather than the application of technologies developed by distant research scientists.[57] Thus, he explicitly distances permaculture from the world views underlying fossil-fuel agriculture. That it reflects a nurturing consciousness should also be evident.

The Findhorn community. While Mollison's work points to a change in how humans work with nature, its focus is primarily upon aspects of exterior nature rather than human nature. Fukuoka's work, on the other hand, hints broadly at the need for a spiritual reorientation among humans. A third alternative agriculture, and the last to be addressed here, quite plainly places spiritual considerations at its core. It is the agriculture of the Findhorn community.

Those who write about Findhorn generally preface their remarks with a plea for tolerance, for the beliefs of this community are both unorthodox and peculiar, at least by modern standards. They comprise a return to the pagan faiths of old, in which all of nature was taken to be the realm of spirit. At Findhorn, spiritual entities are taken to be quite real and are believed to be of two types, devas or essences and nature spirits

associated with particular locales. The existence of these different sorts of entities was revealed through meditation to two people who came to be involved in the community. Devas--the word is Sanskrit for "shining ones"--are taken to be archetypal patterns of life.[58] Nature spirits are held to be the earthly architects of plant growth: "They form and build up...the 'etheric counterpart' or 'body' of the plant from the energies channeled down by the Devas."[59]

Several members of the Findhorn community claim to be able to hear and see these spiritual entities; they attribute the success of their gardens to the advice they have received. The founder of the community, Peter Caddy, describes the relationship of humans to these entities as follows:

> True cooperation begins when we realize that man, the devas and nature spirits are part of the same life force, creating together. As a representative of man in the garden, I accepted communications from the devas as advice yet knew that I must create the garden as I saw fit, considering the available time, workers, weather and material resources. The ultimate choice of action on this planet always rests with man. This sometimes meant we could not put into immediate practice what we were receiving and learning from them, but our conscious cooperation with the nature kingdoms was beginning.[60]

There was, according to the reports of those involved, some skepticism on both sides as the partnership between humans and spirits was beginning. As Hawken mildly puts it, "to us the question of a Nature which 'talks' is a rather uncomfortable one."[61] On the part of the spirits, it is claimed, the hesitancy grew out of the longstanding disregard of humans for nature. But, as Caddy notes, he followed the advice his colleague Dorothy received in meditation, often quite specific advice "about preparing the soil, the compost, the watering, the plants, and how to apply liquid manure."[62] And as he did so, the spirits became more willing to cooperate with him.

Even those who remain skeptical of the claims of Findhorn regarding how they garden are easily convinced of the success of their approach. The climate in which they work, in the north of Scotland, is harsh and windy; the soil on which they work is sandy, and nearly devoid of nutrients. Yet their gardens are abundant and vibrant with growth; in their second year, for example, they produced a forty-two pound head of cabbage,[63] and various soil experts have acknowledged the impossibility of the gardens' success on the basis of material factors alone.[64] Regardless of whether one accepts the world view of those at Findhorn, it is clear that it is a holistic world view, one which calls upon humans to cooperate with a nature that is alive.[65]

Envoi

All three postmodern agricultures sketched above point toward a conception of human-nature relations different from the exploitive view which dominates modern society. In all three cases, the agriculture proposed is a nurturing one, small in scale, and tailored to specific characteristics of the location in which it is practiced. Both Fukuoka's and Mollison's approaches focus upon physical aspects of the locale; they have as their goal the production of stable, ecologically sophisticated communities of plants. Fukuoka's approach is spiritual as well as physical, emphasizing that the actions of humans in farming should help them to approach perfection as humans. The Findhorn approach also

has a spiritual basis, combining organic gardening techniques, with beliefs which integrate humans with nonhuman spiritual entities in nature. From such beginnings as these, perhaps agriculture can come to balance human needs with nature's capacity to provide for them in perpetuity.

Notes
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16. Perelman, **Farming for Profit**, pp. 11-12.
17. Leach, **Energy**, p. 19.
18. Brown, **Sustainable Society**, p. 103.
19. William Albrecht, "Physical, Chemical, and Biochemical Changes in the Soil Community," in William L. Thomas, Jr., ed., **Man's Role in Changing the Face of the Earth** (Chicago: University of Chicago Press, 1956), p. 671.
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28. Daniel W. Rossides, **The History and Nature of Sociological Theory** (Boston: Houghton Mifflin, 1978), p. 4; Foley, "Sacred Tree," p. 64.
29. Rossides, **History and Nature**, p. 210.

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39.Masanobu Fukuoka, **The One-Straw Revolution: An Introduction to Natural Farming** (Emmaus, Pa.: Rodale Press, 1978), p. 179.
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41.Ibid., p. 75.
42.Ibid., p. 15.
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44.Ibid., p. 126.
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47.Ibid., pp. 1-3, 42-44.
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59.Hawken, **Magic of Findhorn**, p. 223.
60.Findhorn Community, **Findhorn Garden**, p. 8.
61.Hawken, **Magic of Findhorn**, p. 103.
62.Ibid., p. 193.
63.Findhorn Community, **Findhorn Garden**, p. 14.
64.Hawken, **Magic of Findhorn**, pp. 264, 281. The process of attunement to nature forces has been followed at locations outside of northern Scotland as well. It has been practiced with success at several locations in the United States, including Parelandra Gardens in Virginia and the Sirius Community outside of Amherst, Massachusetts (Gordon Davidson, personal communication).
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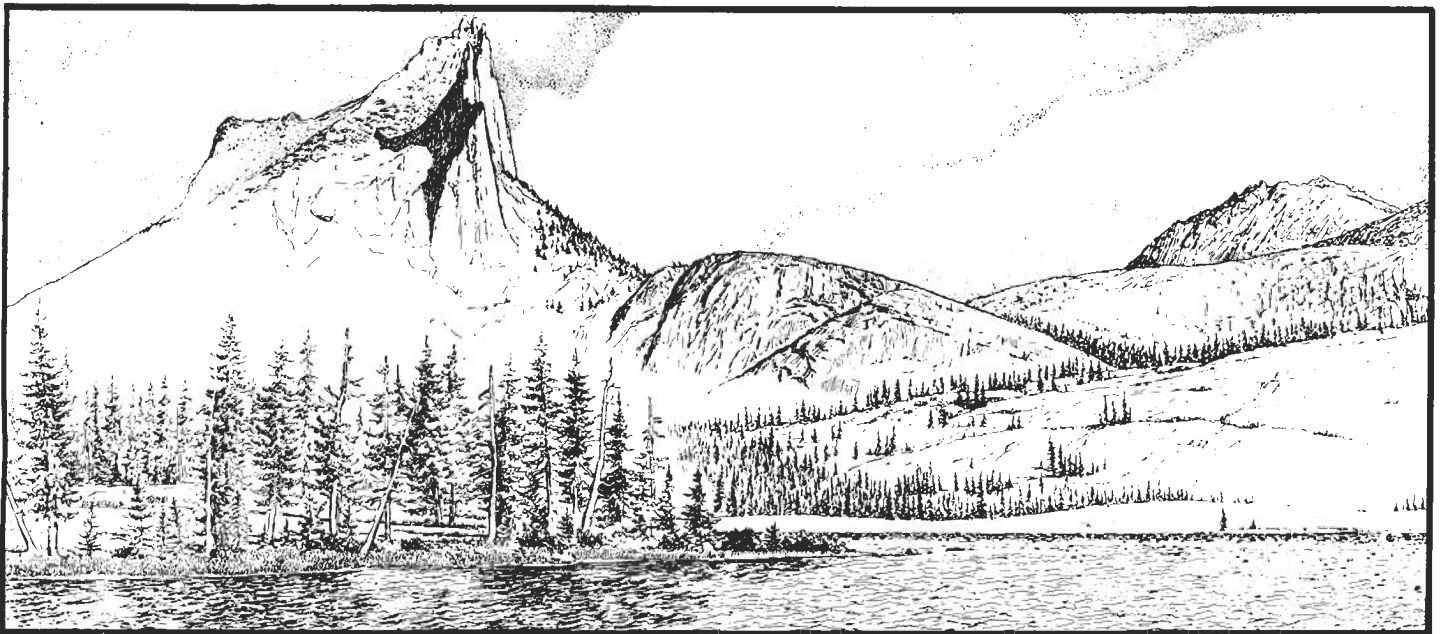
PRIMISM
Lee Nading

* The Great Spirit God is higher than any God whose form and word it is possible to know.

* Nature is the Great Spirit's divine grace and personal inspiration to man and all other things within Nature.

* The Great Soul of Nature is the sum of the souls of its parts.

* Each person's soul is part of the ecology of Nature, and preserving it is a spiritual imperative.

* Being happy in Nature strengthens one's soul for eternity.

* The Laws of Nature and of Nature's God are self-evident truths, divine in their Balanced Purpose.

* Teach people to see greater reverence in Nature than in their ability to discover and manipulate its parts, to avert Technocalypse; do not confuse science with Nature and Art.

* All people are of the Great Spirit Primism and they are Earth-Native if they perceive it in their heart.

* Nature is the Great Spirit God's church, focused at inspired-intuition sites.

* Any religious observance that enhances Joy of Nature also enhances Earth's biosoul and is good.

Every week take a devotional walk in Nature to observe its Ways and to contemplate its Soul and your soul's part in It.

Celebrate the First Breakfast - the gift of Ecological Awareness given to today's World - on the March equinox or on Easter.

Keep a Life-List of work you do on behalf of Nature, and recount it at culture-strengthening activities on the June solstice.

On the September equinox celebrate the Sustenance of Nature that the Great Spirit provides for All Species.

On the December solstice prepare a yule tree and gifts for the December 25 new-life celebration of childness, family, and the Great Kinship of Life.

Place visible-affirming totems to the Great Spirit at sacred sites, in two-dimensional shape to symbolize that only God gives three-dimensional form to things.

At appropriate times conduct spiritual vigils at sites where man is notably disrespectful or respectful to Nature.

* Keep the Ecodice covenant of biosoul and environmentalism.

* Always carry a token that reminds you of your spiritual part in Nature.

About the Author: **Lee Nading** was born in rural Indiana in 1929, and holds fine arts degrees in sculpture from Indiana University and the Art Institute of Chicago. He has been active in environmental work for twenty years, and is the author of wilderness **Survival Cards** and **Chek-Map** field cards for birds in North America. He also does large-scale road paintings and roadside totems which combine environmental and other themes. He says, "My work is always concerned with how symbolism affects the structure of the psyche." He can be contacted by writing P.O. Box 1805, Bloomington, In, 47402.
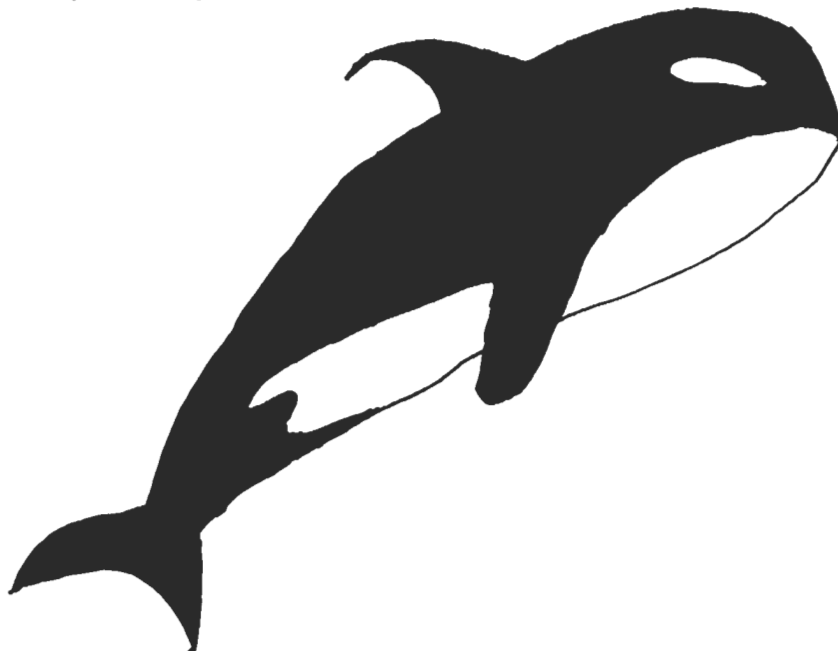
MYSTICETI TESTAMENT

Freya Mathews

The heart is a huge old barnacled whale,
Encased in a mountain of deadweight flesh,
Lugubrious, peering out of her carnal tomb with little wrinkled eye,
Unable to encompass her own immensity.
Yet this great gravid tender yearning creature lies
Undetected, invisible, under the waters of appearance.

The whale dives amongst galaxies, dense and planetoid,
The curve of the universe reflected in her gaze.
Within her great compass is inscribed a contradiction:
The reaching out that afflicts all corporeal beings,
Set apart from the rest of Creation by flesh,
Condemned in this way to irremediable separation.
Yet this same flesh, on account of its very perishability,
Its susceptibility to pain and dissolution,
Occasions the turning away, the inward spiral,
The secretion of a shell, a hide, to keep at bay
The immensities outside.

Out of this tension, this cross-fire,
Emotions spring:
Out of finitude, seeking and striving.
Out of limitation, love.

* * *

She was blown into a cove one wild, white-water night
In 1967,
Washed over a high reef and stranded in a called inlet
When the storm subsided.

She was a finner,
One of the great whales, the Mysticeti, and one of the rarest.

At break of day
Fishermen were alerted to her inquisitive presence
When she circled their boat, taking care
Not to upset their nets.

The word spread.
Local men began to arrive, toting their rifles.
The fun commenced.

Since she had to rise to the surface to blow
She could not avoid exposure to the shells.
For five days, at their leisure, they fired at her.
Spectators came, children on shoulders, to enjoy the show.
For the most part she bore it patiently.

There were moments when she lashed and bluntly raged.
But she respected the small vessels which eventually entered the enclosed waters
On her behalf.

Out in the cove her mate, father of her unborn calf, patrolled,
Keeping faith.
Mysteriously, despite the reef, they blew and sounded

In unison,
The sea electrified with their communion.

After five days the shooting was stopped.
Prohibited.
The hide of the whale was filled with shot,
Riddled and rent from head to tail.
For another week she kept to her beat,
Her taut circle of pain,
Conversing through the waters with her unseen mate.

What did they convey to each other through those haggard days?
Were they aware that their separation was terminal,
That she, even while the foetus still turned within her,
Was going to die, ignominiously?

Is it a comfort, if death comes, to meet it in the midst of gestation?
To hold a little hand, or fin, in yours
As you swim over the brink into oblivion?
Or does it etch grief deeper, to know that your sinking ship is a death-trap
For its tender cargo?

In the night Old Barnacle returned to the centre of the pond
To drown.
Her body sank steeply.
It lay on the floor, capsized, its tail swaying slightly.
The accelerating music of her mate, swelling the waters,
Perhaps pacified the little calf turning, shivering, panicking,
In the now deserted inner cavern.

* * *

Is this a measure of the dread with which man regards his own heart?
Are the tenderness and grace expressed unmistakably, on such a tragic scale,
In the lineaments of the whale,
Offensive? Do they tempt loss and rejection?
Do they spell surrender?

So, when a whale, unimaginably huge with vulnerability,
Sails into your midst,
Join in with the rest of the affronted, frightened boys,

And punish her.
Dismember her. Stamp out tenderness, lest it infect you,
Lest it open the grille of your heart to grief,
And release from your secret Alcatraz that supremely threatening inmate,
Your aloneness.

With hearts thus incarcerated, there is of course no chance of men
Achieving happiness.
If happiness has visited this planet yet
It has to be in the person of those sweet cetaceans.

Not perfect happiness. No. Not ever.
Pleasure potentials are proportional to those for pain.

What could be more discreet and just than this distribution
Of potentialities on the part of Nature?
She does not dictate the contingencies of individual fate,
But she does decree that, as ye rejoice,
So may ye grieve.
Those with chainmail hearts, steelclad against grief,
Are of course immune to the shafts of happiness.

If happiness is so fallible, so premised on pain,
What advantage can cetaceans claim?
Just this: that they do, to all appearances, adore their oceanic
matrix.

By way of their streamlines and their undulations
They elicit the marine caress.
In their demeanour they express exactly the glad abandon
With which they commune with their reality,
The sea. The inflections of their bodies advertise
Those ecstatic Pythagorean harmonies that orchestrate
Cetacean thought.

Having found the perfect fit with the ocean which beats out its
rhythms
In their bodies and spirits,
They can fearlessly admit their aloneness, their distinctness,
And yet belong.

Even if it is the fate of an individual to end up as a carcass
Disfigured by tortures in an unmarked grave,
This is as nought beside the good fortune
Of her angel-like cetacean status.
As angel, at-one with things, her identity withstands
The vagaries of destiny and circumstance.
She has nothing to lose in life, and nothing to prove.

Her kin, the dolphins, those other incarnations of cetacean grace,
Risk, catastrophe, court hazard.
Loving on all fronts, they reconcile family ties
With an expansive sexuality. They love recklessly,
Detonating endless rockets of happiness into the heavens,
And die regularly of broken hearts.

* * *

Once a year, at dawn, off the coast of Devon - so it's said -
The steeple of a submerged church rises obliquely
Out of the waves. The bell tolls awhile
Before the grey, troubled waves reclaim it.

Does it matter if the whale becomes extinct?
If so, for whom?

Is it for the sake of those unborn, individual whales of the future
That we mourn? But any break in the thread
Of that constantly fretted and rewoven causal web
Would foreclose their individual chances of actuality.

So of whom are we bereaved?
The living whales violated in those floating death camps
Manufacturing obscene and precedented soap?
Yes, but they would each die anyway,
And harpoons are, from their viewpoint, as neutral a misfortune
As the jaws of a cachalot.
Is it then for the eclipse of a species that we grieve?
But every species marches to eventual sunset.
Would we beat our breast if it were a virus
On which the Mysticeti were impaled?

Maybe. But in that case we could rail against a mindless fate.
It is mainly for ourselves that we sit, wrapped in rugs on the cliffs,
Waiting for the spire that will rise from the unquiet deep.
The voice of the drowned bell, thick with swallowed seaweed as
it sounds its knell,
Foretells the harpoon which our brutality and greed
Will drive into the hide of our own already wounded planet.

Yes, the wake of the whale as it passes over the arc of the world
Into the dark makes us mindful of our own passage.
What does it mean that we may blast the very Wheel of Birth
and Death
Apart? How does this differ from an ice age blindly and inciden-
tally
Placing its great white boot on Life on Earth?

Isn't it shame, not fear, that darkens our brain
When we think of the end? Shame the spear
That pierces us to our hearts' depths, and marks us
As condemned.

But wait. Even if it is too late to halt the technology of hate
That has our struggling planet in its metal jaws
And is already feeling for the fontanelle in her defences,
It may not be overlate to win our individual redemption
From disgrace.

Can we indeed be retrieved, even as our boats
Gather momentum on the flood, and veer, faster and faster,
Toward the dark weir?

Could we just once encompass the stars in a circle of love,
Just once induce our heart to emit the pulse
That would dissolve its casing and travel to the rim
Of space, then could we stake out our claim
To hope. The vectors of faith point not only forward,
Toward the future, but inward,
Where those whom we have driven to extinction
Still rise with dripping faces from the dark,
To forgive us.

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