Vandana Shiva
The slow consequence that they were reacting to was basically an erosion of the agricultural base. As you know, the Himalayas are extremely high gradient slopes, fed by rains that come three months in the entire year. So on those slopes, the only way to maintain water and moisture through the year and not lose soil as well as water during the rainy season is linked very much to the organic matter that you add to the soil on the terraces. All that comes from the forests, either directly in the form of leaves or through the animals, which are crucial. The animal and livestock population is not a pressure on the Himalayas. Without it, you can't do agriculture in the Himalayas, without livestock. The link between livestock and land is absolutely essential. And some of the areas where deforestation has become extremely severe--and '82, I remember, was the worst year--'82, the first time I personally saw a distress sale of cattle because there was no fodder to feed them from the forest. And very soon after that, agriculture stopped because without cattle there is no way you can do agriculture. That was the first slow consequence. In the '60s, the women say they went from self-sufficiency to dependency. The '60s is the benchmark if you go into different villages where deforestation accelerated and agricultural productivity declined. The drying of water resources was linked in the same kind of way to the lack of conservation. The absence of forest cover doesn't allow a holding back of the rainfall that comes in three months to feed springs throughout the year, and that causes the disappearance of springs that used to be next to every village, which is why villages got set up. They got set up next to sources of clean drinking water, and springs in the Himalayas are like springs here where you get bottled spring water, you know, from up in Maine or somewhere else, absolutely pure, good filtered water. Now, as they disappear, the only water sources left are the low-flowing rivers in valleys, so the women have to start climbing down 10 miles, up 10 miles, every day for one little bowl of water. Diseases start spreading again because people start getting to stagnant pools instead of the fresh, clear stream which has disappeared because of the lack of forest cover. But the most dramatic consequence of all in the Himalayas was the fact that, first in '72 and then in '78, two rivers, basically just river systems collapsed because of landslides. The landslides were so huge that they blocked the rivers, and when the rivers released the waters through these blocked dams, the floods went all the way down to Calcutta. All the way down to Calcutta. Because in one particular blockade, it was a four-mile-long lake that was formed on the Ganges, upstream near this place called Uttarkashi. Now those were events that really brought the very physical survival of people into question because villages were washed away, and in a real sense, the people have started recognizing that deforestation up on the slope means landslides lower down. So their physical survival is at stake in the immediate--it's not just the long term decline, ecological decline, not merely longer walks for water but basically just the stability of the Himalayan slopes.

David Cayley
The Chipko movement eventually succeeded in winning a governmental ban on logging in the Himalayas in 1981. For Vandana Shiva, this movement was just one instance of a struggle now going on all over India, a struggle not just against certain dams or forestry schemes but against development as a philosophy, a way of receiving the world. She sees a perfect example of this philosophy in what was called the "green revolution," the introduction in the Punjab district of a new agriculture based on high yielding hybrid strains of cereal grain developed by the Rockefeller Foundation.

Vandana Shiva
Very dramatically, there are two shifts that took place with the green revolution in agriculture that aren't talked about when the miracles about the great revolution are talked about, that it robbed the farmer, the man or the woman, of his or her mind. No more was the farmer a thinking being. He or she was from now onwards a passive receptor of external ideas coming from four or five centres of international agriculture research. And in the same way, the same thing happened to the natural resource base of the land, that all agriculture, especially in the Third World, had been a fully internal input system. Trees linked to livestock, linked to soil, reproducing each of these systems through recycling, year after year after year after year, needing nothing from outside, in fact producing surpluses that could feed other organized forms of society outside agriculture. Livestock of course disappeared as a part of farming with the green revolution because tractorization totally displaced the need for animal power, and trees totally disappeared with the concept of green revolution because now it was just crops, their production had to be maximized, and the soil from now onwards was just a passive receptor of inputs to be purchased on markets, and the inputs were seed, which till then had been a product of that same soil and went back to that same soil and produced grain as well as seed. So the seed was more than one entity till the green revolution. It was both the food for human beings as well as the source for its own reproduction. The green revolution created for the first time an ontological split in the nature of the seed. The seed was now no more grain and the grain now could no more be seed, and seed had to be purchased on the market, and the seeds that had to be purchased in the market were engineered in a certain kind of way so that the internal input cycles of the seed were no more relevant. In fact, the seed was manufactured to make the seed free of these internal input cycles and to make it dependent on external inputs of chemicals, of which a new build-up had taken place after the war. And the nature of the seed also meant other balances got destroyed, so you needed chemicals also to control pests, and seeds that were hungry for chemicals were also very thirsty for new amounts of water, usually about three or four times the traditional varieties. So that you needed large irrigation systems through the year, around the year, because part of what the green revolution designed was seeds that could be cropped in multiple ways. They were season insensitive, they were photo insensitive, so you needed water

through the year. You didn't shift crop to crop, depending on the rainfall and climate patterns. You had to basically engineer the environment for the seed, so you had to have abundant water, you had to have massive inputs, and for all this you needed credit, and for that credit you needed to go to the World Bank and other aid agencies. And usually what's forgotten when people talk about debt is that those were the kinds of programs which before development were processes of daily living and subsistence in which people didn't have to turn even to their own bureaucracies, forget international development agencies. They didn't have to turn to their cities. They were the producers and there was a clear political base of power in the rural areas based on the knowledge that they were the real producers. The green revolution gave a new kind of power based literally on bargaining over prices of inputs and sale of commodities. The only politics it left possible for the farmer was a politics of the market place, of prices. The farmer, the producer, had been turned into a consumer more than anything else. Having robbed both the farmer as well as the ecosystem of their basic sense of productivity and their sense of knowing where productivity comes from, a self-perception of productivity, when the green revolution, because of its inherent non-sustainability, ran into problems, could not maintain yield in the same way, could not maintain profits of the same magnitude, the problem was located not with this process of social and natural transformation but into other political processes.

David Cayley
Is there disillusionment amongst those farmers now? Do they see what you see, the costs of destroying the traditional way of farming?

Vandana Shiva
This is something I was saying earlier. They don't see the costs in that same way. Like I said, they see the costs much as an American consumer who's getting worried about the environment sees the costs more in terms of, does this package say it can be recycled? It's the only question a consumer in a supermarket will raise about the environment. Is this package recyclable? The gaze has narrowed down through participating for twenty years in supermarket purchase. In a very similar way, a green revolution farmer has had his mind narrowed down, and by and large the green revolution farmer is a "he," because one thing that the green revolution systematically has done is remove women from agriculture. Punjab is conspicuously different from the rest of India, in that you don't see women on the fields. You just do not see a single woman working on the fields. It has turned women into genuine parasites in that sense of removing them from what is productive activity. Everywhere else you go, you see women doing certain jobs in the fields. In Punjab, you don't see them in the fields.

David Cayley
And you would have, thirty years ago.

Vandana Shiva
Oh yes, oh yes, you would have seen women working on the fields earlier. The green revolution changed the whole gender presence in agriculture. Now, the green revolution farmer, who is a "he," after twenty years of participating in the green revolution thinks very much like the consumer in the supermarket. He's a consumer in the supermarket of agrichemicals. And just as the only question a consumer raises is not, does the forest from which this product comes suffer when it's first harvested? or Does the soil in which these off-season strawberries are grown get hurt? Those are not the questions that are possible because you are not living in those soils. It's not in your imagination. Your imagination as it's been perked up by the environmental consciousness is around the packaging, and your politics then gets focussed on the recycling of packaging and not on the ecological costs of what the substance itself takes to produce for world markets. In a similar way, the Punjab farmer, the green revolution farmer, has had his mind narrowed down to that interaction between subsidies, prices and production. He does not see ecology as relevant to all this. You go into what I call more backward areas, the resistance is of a different quality. They worry about seeds, they worry about returning to a farming that's more under their control in the genetic sense.

David Cayley
Genetic diversity is part of the genius of traditional Indian agriculture. In some areas, nearly 300 different varieties of rice were cultivated, each adapted to some season, soil, pest or perhaps just some ceremonial use. This is part of what is lost when green revolution style monocultures take over, and the green revolution is not an isolated case. There is now also an internationally backed "white revolution," so called, in dairying.

Vandana Shiva
The white revolution has the same parallels, that it takes the cow by itself as not linked to the farm, takes the cow only for its milk production capacity, separates it then from its animal energy, and a terrible tragedy has happened in south India. Because cattle, just like plants, get bred for maximizing a certain input and a certain output, cows start getting bred for maximizing milk production. Very often, cows that produce more milk are extremely useless for other work functions, and in India, we have always had what are called dual purpose cattle. The cattle need to pull bullock carts, they need to pull plows in the field and they give you milk, and the same breed has to function well for both because the male and female are both useful. Through the white revolution, the female for the dairy yields is transformed more and more and the male calves become more and more useless. So that when they're butchered, you will get very, very tasty veal in Bangalore markets for next to no price because all male cows are butchered, and now there's a total deficiency of bullock power in India, of animal energy, which is creating its own bottleneck, because in paddy growing areas you really need to work the paddy fields very heavily to make them right for paddy cultivation.

David Cayley
Why can't the males be kept for that purpose?

Vandana Shiva
For a number of reasons. They don't have the stamina.

David Cayley
Because they're the offspring of these specially bred cows.

Vandana Shiva
Of exotics, yes. They're not bred for stamina, they're not bred for pulling weight, they're not bred with the right--they don't have the hump, flat, you know. The Jerseys and all are flat on the head and our cattle are humped, if you know, and that hump is very valued and that's what pulls the weight, that's what pulls the plow and the bullock cart. I mean many reasons, I am still finding out how many reasons, but many, many reasons. You don't breed male offspring, you basically breed the female offspring.

David Cayley
Can you talk for a minute about the kind of science that makes this possible and your attitude towards it, that has made possible forestry on the high slopes, that has made possible a transformation of the nature of the Indian cow, that has made the green revolution possible, and so on?

Vandana Shiva
To me, it's a kind of a one-eyed science, literally, a one-eyed science that looks with that one eye only to the market and then tries to design instruments to feed the market. There's a very lovely phrase that some of the women in Chipko had once when I was talking to them, and I was talking to them precisely about this issue. I said, the government is setting up all these research institutions, all these development agencies, and how do you feel about them? And this woman said, "Without food, fodder and water, any thinking, any thought that devotes itself to developing new technologies is a one-eyed thinking." I call it, in another language, reductionist thought, in the sense that it cuts itself off from the many purposes that any object in nature or any object that human beings create is supposed to fulfill. It shuts out other dimensions of the nature of being, so it creates extremely efficient artifacts, designs wonderful artifacts and wonderful instruments to maximize flows to the market, and that's the only flow that this one eye can see. But it doesn't have the balancing of even seeing what it destroys, leave alone being able to serve those other objectives better, those other ends better. It has no capacity. Institutionally it has no capacity. Institutionally it has been trained only to look towards the market. Its very source of nurturance, the nurturance of institutions, their sense of recognition, their sense of relevance, their sense of dynamism comes from how market mechanisms, as pushing the engine of science, can direct where scientific thought will yield or will not yield.

David Cayley
In your book, you also call this form of thought patriarchal. Today in our conversation, you seem to be emphasizing much more the market as its genesis. Is that a change or not?

Vandana Shiva
No, it's not a change, because my reading of how human history in various cultures has gone is from basically being multi-dimensional--it's just like the dual purpose cattle, that the female and the male are needed for different values. You don't measure the bullock for yielding milk and you don't measure the cow for animal energy. They have different purposes. They serve those purposes well. That from that kind of an existence we have moved systematically into an existence where men of every society are pulled towards the market, largely through the efforts of other men in centres of power who see the men in the village or the men in the tribal society or the men in the Third World as the head of the household, the breadwinner, or a series of hierarchical terms of that kind. So that societies with division of labour are split into one-handed societies, and the one hand that links up to the market is the hand of the men of those societies, and the hand that reaches out to these men in Third World societies is a patriarchal hand from centres of capitalist power. In that sense, a science that breeds through the market, given the structures of power between genders, is necessarily a patriarchal science.

David Cayley
It is Vandana Shiva's belief that circumstances are now forcing India towards a more integrated view of the questions of gender, environment and development which she has been discussing. Social and environmental disintegration are now so obviously linked, she says, that the very idea of development is beginning to be radically questioned.

Vandana Shiva
It's really in the last one or two years that there's a national level of thinking, organizing, talking about these issues and, in some way, a building of an idea about an India different from where the development push took us. Larger and larger numbers of young people are getting attracted to that environmental movement. For the people whose very survival is at stake when a dam is built or a mine is built or an industry set up on agricultural land, it's not a matter of choice. It's not a matter of preference. It's a matter of life and death, and for them quite clearly to say "no" to that destruction is the best statement of wanting to live. So both trends are very strong, and in that kind of sense I feel the genuine environmental conflicts, the real ecological upsurge, if it happens, will take place in countries like India where both sides of the struggle sit next to each other, they live side by side. Part of the reason why Western environmentalism has been hijacked by the technological fix response is because the pressure on nature happens way away. It's not lived by anyone in your neighbourhood. You don't get the feedback. In India, that's coming all the time. It's coming to the communities that live in the destroyed system, it's coming from the communities into the mainstream each time more and more numbers of people are displaced. And the environmental issue is getting very intimately tied to the issue

of displacement, to the fact of uprooting people from their cultures and their locations, and the right to culture, the right to be what you are, the right to live communally is becoming a very major issue of democracy in India. Does a minority sitting in Delhi planning development projects have a right to uproot people in that kind of sense? That is one of the biggest and most lively debates. But what troubles me even more than that is what's happened to society in India with the development process. We were talking about polarised thinking, thinking that necessarily turns the other into a not me and therefore the annihilation of the other is a precondition for the continuation of my existence or my group's existence. And that's what's at the root, to me, of the whole problematic around gender, that it's precisely the way in which the Western dichotomies around gender have been implanted world-wide that has created the battling between the sexes in a highly unproductive kind of way. In a very similar way, every community, every ethnicity, every region, every religion is going through that same kind of identity definition, because part of the development process is that fragmenting of the mind, including the fragmenting of the identity. And the kind of violence that that's planting on a very large scale in a situation where, just like Illich has said, development is creating its own kind of scarcity. In that situation of growth generated scarcity and development generated fragmentation, the combination is extremely volatile, and that's where I personally feel the biggest disturbance in India is taking place right now. The environmental disturbance is very severe but the disturbance to the organic existence of India as a peopled India is even more severe.

David Cayley
Wouldn't you say in the last analysis that they're the same thing?

Vandana Shiva
Yes, they are the same thing. They are the same thing. It's just that the environmentalists haven't looked at the other, which is why I state it like that. To me, they're part of the same ecological breakdown.

David Cayley
Vandana, thank you so much.

Vandana Shiva
You're welcome, David.

David Cayley
For Vandana Shiva, development is more than just an economic practice: it's a world view. The green revolution farmers of the Punjab may have thought all they were getting from the Rockefeller Foundation was a more productive way of farming. What they ended up with was a new way of seeing the world. The green revolution, as Vandana Shiva says, "robbed them of their minds." Development implies a type of person as well as a type of practice. What constitutes this modern type of personality and how it differs from the personality of traditional society has been the study of a friend and collaborator of Vandana Shiva's called Frederique Apffel-Marglin, whom you'll be hearing in the balance of tonight's program. Apffel-Marglin is a professor of anthropology at Smith College in Massachusetts. Her interest in this question has been shaped by her own experience of the encounter between the modern West and the peoples it wants to modernize and develop. She grew up as the daughter of French parents in colonial North Africa and then lived for many years in India, where she studied classical dance. Later, as an anthropologist and writer, she focussed on what had bothered her deeply as a girl in North Africa and a young woman in India: the easy assumption that Western science and rationality are superior to traditional forms of knowledge, with the corollary that development is the world's destiny. This led her to try to understand the nature of the modern personality which development wants to foster. We spoke recently at her home in Shutesbury, Massachusetts.

Frederique Apffel-Marglin
Basically, I argue that the modern form of personhood is a tripartite form of personhood in which you have a self that "owns" a body and a mind. The self is the seat of will that controls the body and activates the mind. The mind is the seat of rationality, and rationality is unsituated socially, historically. It does not belong to any particular time and place. It is transcendent, and it is a transcendent agency that gives one a point of view from an outside Archimedean point. That Archimedean point is unsituated and allows you to talk and view and analyze everything that you put your mind to, and that is its characteristic and that is what makes it dominating. And that kind of knowledge then renders either invisible or certainly illegitimate, if visible, the kind of knowledge that is situated and embodied, and therefore shifts, because if you are situated, then what you see will depend on where you are located. And if you move, that will change, if your vis a vis moves ... versus a sort of "up from above" point of view which rationality gives you.

David Cayley
The new imperial self, Apffel-Marglin believes, emerged when labour became a commodity. As capitalism developed, work was standardized and fragmented, its rhythms no longer derived from the body of the worker or the task in hand. They came from the clock and the exigencies of organizing production. This process required something unprecedented: interchangeable workers, workers whose only relevant attribute was their labour power, and these workers had to be forced into this new mold.

Frederique Apffel-Marglin
This mode of labouring, as recognized by Marx, as recognized by Adam Smith, is extremely boring and debilitating mentally, debilitating emotionally, debilitating socially. Nobody produces this spontaneously, and there were no habits. These habits had to be created for this new method of working. To create these new habits, these new working habits, you had to have supervision, and here I'm relying very heavily on Foucault's historical work, especially

in The Birth of the Prison. In that book, he discussed Jeremy Bentham's architectural device, panopticon, where a person sits in an elevated tower, and around that surveying person in individualized slots are put the people who are either working, or students, or patients, or whatever, and the lighting is so that the surveying person can see those he's surveying but cannot be seen himself. This is called panopticon, and Foucault shows that this became a principle from an architectural device. It's a pervading principle of modern society, panopticism, which is this discipline and surveillance so that people do in fact produce this labour that can be quantified, that's reliable, that's monotonous, that's precise, and so forth, that people will not produce spontaneously. Now, what I argue, taking this a small step forward, is that you could not rely solely on this sort of police type of method. You had to rely on new habits that had to be produced spontaneously, and for the worker to produce this spontaneously, they had to believe this was good in itself. To believe it's good in itself, it had to be legitimized by something that they would not associate precisely with this surveillance function in schools and in factories and other institutions, because that is oppressive and that is recognized as being oppressive. And I argue that that something, in order to find legitimacy, had to be socially unsituated, transcendent, and something that already had a great deal of cultural prestige, and that something is rationality. And in schools particularly, there are all these exercises that teach you the value of rationality, the value of disembodied thought and the value of the control of the body, and that's internalized and produces this spontaneous behaviour that is required. It becomes a habit and it also produces the modern person. The reproduction of this new kind of person, modern person, does not happen in a community or kinship context, it happens through the institutions of society that teach the internalized panopticon, that teach that the body has to be controlled, the body is a natural, unknowing object that has to be controlled by the rational mind. And in order to do that, you had to totally devalue the kind of learning and the kind of embodied knowing and passing on of embodied knowledge that used to happen in pre-commoditized societies and times. Therefore the production of new people became associated with the fertility of nature. Women's fertility became equated to the fertility of nature because these are bodily processes. Conception, gestation, birthing, lactation and menstruation are bodily processes which become, in this new tripartite person, "natural" processes, separated from the mind and from knowledge. They become things that just happen, just like a tree grows naturally, and therefore these processes had to be under the control of the rational mind. These processes furthermore, in women, were seen in the 19th century--and there's plenty of evidence for that and plenty of research--were seen to be in opposition to the development of the mind. If women developed their mind, then they could no longer have babies. Their uteri would dry up and wither. This all gets played out very clearly in the foundation of Smith College, my own college, which is the first American college for women that gave women the same curriculum as men, as the Ivy League, as the elite men, and there was a raging controversy that this would ruin the race, the elite race. Their regenerative capacities were seen as antithetical to their intellectual capacities. And I argue that this is because the female body was made analogous to nature, or rather nature as nature came to be seen in the 17th-18th century, that is, inert, passive, not a knowing agent, as something that must be controlled. And therefore women's generative capacities necessitated control, control by men, control by the rational knowledge and expert knowledge of these "natural" functions, that is, gynecology, psychiatry, all the medical discourse that arose precisely at that time, and the management of women's pregnancies, delivering of women's babies, this whole thing that is documented so well by many feminists and in particular by Emily Martin in her book. And therefore women became the producer of the raw material of modern society, and that was done through this naturalization of their regenerative function. And this is contrasted with non-commoditized societies where the generation and regeneration of people, and of everything else--knowledge, the world, trees, water, houses, food, names, social arrangements--is what the society is about. That's what everybody does, men, women, that's what the business of the group is about is the generation and regeneration of everything of value, including people. Whereas with modern society, making new people then becomes re-production, and it is no longer what the society is about. The society is about production.

David Cayley
So in traditional or premodern, non-commoditized, you said, societies, nature is drawn up into culture, in effect, and no real nature-culture distinction is drawn.

Frederique Apffel-Marglin
Right. Well, I wouldn't say that nature is drawn up into culture, I would simply say that our division of culture and nature does not exist. By "ours" I mean the contemporary modern view that culture is the domestication of nature, and that view of nature as being domesticated, being transformed through the culture of human beings, is a process that happens with our own bodies. Our bodies are considered nature, natural, and we domesticate our bodies. We have domesticated our bodies and we have controlled our bodies, and particularly the female body. The way the male body is controlled is that, for the male, development of the mind and of rationality helped the body to function better as a productive body, whereas for females, the development of the rational mind hindered female procreativeness.

David Cayley
And you're arguing, in effect, still does? Even though these Victorian beliefs may seem silly, it is still impossible for a woman to be a woman and participate in this vision of what a person is?

Frederique Apffel-Marglin
Well, I mean, I see that the whole domestication movement, you know, the natural place of woman is in the domestic sphere and her destiny is motherhood and wifehood, all of that ideology, of course, is the ideology produced by this

commoditization of labour. And the second wave of feminism, that is the wave that came in the late '60s, early '70s, was a rejection of that ideology of domestication, and the rejection is no, this is not our natural destiny. Our natural destiny is not dictated by our biology, but we can develop our minds and freely choose what we want to make of ourselves. Now, from my perspective, I argue that this movement accepts the logic created by commoditization of labour. It accepts the division between the biologized body and the mind, and the woman rejects being domesticated and rejects her destiny as a reproducer and demands the right to develop her mind, that she be recognized and do the things that men do. But that equality with men does not question what commoditization has created, and in particular it does not question this division between a naturalized body and a mind that controls this body, and therefore, going with this, the division between culture and nature. And it does not see that the generation and regeneration of life, be it human life or non-human life, is what we ought to be worrying about, particularly today, but at any time, and that's what non-commoditized societies were concerned with and we ought to be concerned with, and this is a concern of women and men. It ought to be the concern of the collective, of the collectivity of the human group, and in that concern, the regeneration of everything of value, which includes what we call nature as well as human society, requires all the energies that both genders possess.

David Cayley
In a recent essay called "Women's Blood: Challenging the Discourse of Development," Apffel-Marglin has developed her distinction between commoditized and non-commoditized societies by examining the meaning of menstrual taboos in the South Indian state of Orissa. In the community she describes, there is an annual festival of the menses of the earth. During the festival, the earth becomes untouchable in the same way that the women of the community are believed to be untouchable during their monthly periods. Menstrual taboos, to the modern mind, are both a form of superstition and a form of discrimination against women, but Apfel-Margolin shows them as a point of articulation between the cycles of society and the cycles of nature.

Frederique Apffel-Marglin
The menses of the earth is when the earth must not be touched. It is celebrated for three days, or four days actually, just like women's monthly menses. There is no agricultural work, everybody stops, and all the men go out of the village and the women celebrate in the village, and the men celebrate around the temple of a goddess on a hill outside of the village. They all pitch their tents, they cook their food and they make merry there, and the women make merry back in the village but they do no work. It's the old women who do the cooking, or they prepare food beforehand and then they eat it for three days. And what emerges, from what men and women say and what they do, is that that season, the season of the menses, is in preparation for the reunion of the cloud and the earth, the cloud and the soil. The cloud and the soil have been separated, which is the hot period, which is the fallow, which is the regenerative period of the earth, which is unproductive, and it's preparative, it's a period that prepares for the joining of cloud, or rain, and earth, which is then the period at which you sow and which produces germination. And they all talk about it in terms of menstruation being necessary, the observation of menstruation being necessary for germination, for life, and they speak the same, whether it's human beings or seeds or plants. There's no difference, and they emphasize that, and when you ask about it, they say, you know, Are you stupid? Don't you know, did you take life? You know, when I'm asking about seeds, they say, Don't you know? How did you take life? Because your mother menstruated. If she hadn't menstruated, you wouldn't be there. So I use that going into depth to show that there's no separation between nature and culture, and that continuity, regeneration, life depends on chosen actions of human beings to observe the regularities of the cosmos. If human beings through their knowledge and their will do not consciously establish rituals--and the root for the word "ritual" is "ritu," the Sanskrit "ritu," meaning menses as well as cycles of the season--these rituals which are observances that place humans in harmony with the regularities of nature, then the continuity of life, be it human life or non-human life, is threatened. And we, of course, we modern commoditized beings see the reproduction, what takes place in the bodies of women, as something that happens automatically. You do not have to do rituals for that, that's superstitious. You do not need knowledge. To make a baby, you don't need a PhD. On the contrary, a PhD will hinder your ability, or it used to be thought like that, hinder your ability to make a baby, because that's totally separate. And I am trying to show a non-commoditized world in which continuity of life depends on seeing that we are part of nature and choosing to live according to the cosmic order, and if we don't choose that, we will endanger the continuity of life, which is what we are doing.

Lister Sinclair
On IDEAS tonight, you've been listeming to part four of The Age of Ecology. Heard on tonight's program were Frederique Apffel-Marglin and Vandana Shiva. The writer and narrator was David Cayley.

Trascripts by Multi-Media Transcriptions, Toronto.

Lister Sinclair
Good evening. I'm Lister Sinclair and this is The Age of Ecology on IDEAS.

John Todd
Ecology is not a luxury of the rich. Ecology is the very basis of life, whether you're rich or poor. I think that message is coming through more and more these days. The greed, in deed, is slowly being supplanted with a "My God, there are other sentient beings than ourselves out there, maybe we should pay attention to them." And that's good news in this particular year, I think.

Lister Sinclair
John Todd calls himself an ecological designer. He believes that the future of civilization lies in living machines, assemblies of organisms that do the work now done by polluting mechanical machines. In a recent article about this concept, he recalls an event from many years ago that planted the idea of living machines in his mind. He and his friend, Bill McLarney, were poking around in the small upland streams of Costa Rica. They came across a species of large fish living in streams that seemed to lack sufficient food to sustain a species so large. They then discovered that these fish were capable of digesting the hard, seemingly inedible fruits that fell into the stream. Closer investigation of their anatomy revealed terrifying-looking teeth, capable of shredding hard materials, and a long, serpentine intestine that was able to digest tough materials. "It dawned on me then," he wrote, "that the world is a vast repository of unappreciated or unknown biological strategies that have immense importance for humans if we could develop a science of integrating the stories embedded in nature into the basic systems that sustain us." Using ecology as the basis of design has been Todd's life work. Like Shakespeare's banished duke in the forest of Arden, he has found "tongues in trees, books in the running brooks, sermons in stones and good in everything". He began his work in the late '60s as a founder of the New Alchemy Institute, a pioneer in ecological technologies. Today he directs the Centre for the Protection and Restoration of Waters, dedicated to using ecological knowledge to solve the problems of water pollution and toxic waste disposal. Tonight, in the fifth program of our series on the Age of Ecology, we present a profile of John Todd. Our series is written and presented by David Cayley.

David Cayley
Harwich, Massachusetts, May 1, 1990. It's a festive occasion. While a steel band plays in the background, the citizens of Harwich circulate amongst large, translucent, cylindrical tanks full of algae, snails, fish and numerous plants. The tanks contain "septage," the toxic, highly concentrated output of septic tanks. But there is no smell and the building, under its gossamer greenhouse roof, is bright, airy and vibrant with life. The occasion is the opening of the Harwich Solar Aquatics Septage Treatment Facility.

Shirley Gomes, Harwich Board of Health
Today reflects the combined efforts of many who, envision an environmentally responsible Harwich. As environmental leaders, we are the sustainers of earth's precious resources. We did not inherit the land from our ancestors, we borrowed it from our children. Thus we acknowledge here today that we are now a part of the solution to clean Harwich's septage waste with this dedication of our solar aquatics greenhouse. It's a prototype but it's a milestone for each member of our community. Thank you, Dr. Todd, and all those associated with guiding us to this moment. You share our vision for the future.

David Cayley
The new plant is located in a place only a seagull could love--the back end of the Harwich dump. It's the work of John Todd and his associates, the second such facility they've now completed. Its purpose, as Todd told the opening day crowd, is to treat a type of waste that's difficult to treat with chemical and mechanical technologies--septage.

John Todd
This particular sludge is extremely concentrated. It's some 30 to 100 times more concentrated than ordinary sewage, so it's very, very difficult to treat. This material also has in it, because of our bad household practices, a number of heavy metals and toxic materials which are in themselves carcinogens. So the idea here is, without the use of hazardous chemicals in the treatment process, to purify these compounds, to try and break up these carcinogens that get into our water, using organisms that have this capability, and to try and shunt out of the water stream metals, using organisms which have this particular talent. And so inside this building are probably over 1,000 species of different kinds of organisms, each of which are working in a constellation to accomplish a task that no single one or small group of organisms could ever do, and that's the reason why it's called ecological engineering. Ecological engineering is really bringing together organisms from the wild and putting them into a new, contained environment to do some of the work for society. In the case here, the work is purifying the wastes. So, in a sense, what ecological engineering and solar aquatics really is, is miniaturizing in a high light environment the processes that take place naturally in lakes and streams, and doing so under controlled conditions so that we can in fact effect something in a matter of days, say ten days here, that would normally take months in the wild. And I think, with that, I'd just like to welcome you all and say thanks to all of you--there are too many to single out--who've made all of this possible. Thank you very much.

David Cayley
The town of Harwich is on Cape Cod, which is essentially a big sand bar extending off the coast of Massachusetts, south of Boston, like a crooked finger. There are few sewer systems on the Cape, which means that most wastes are hauled to the town dumps in tank trucks, called "honey wagons," and then dumped into holding ponds or septage lagoons. Below these ponds is the large lens of groundwater

which is the Cape's water supply, between them only the Cape's quick-draining, sandy soils. The problem is obvious. But now Harwich has a solution. It's a result of the town's own political intiative, and this is what is most gratifying to John Todd. He's been engineering elegant ecological solutions to contemporary problems for twenty years. Now local communities are starting to get interested. The road to the Harwich dump began in the late '60s, when Todd, his wife and colleague Nancy, and biologist Bill McLarney started the New Alchemy Institute. Medieval alchemy was the precursor of modern science. New Alchemy was to be the harbinger of a new science.

John Todd
I would say in many respects it was quite a sixtyish thing, in the sense that Nancy and Bill McLarney and myself had a range of concerns, everything from the ecological devastation resulting from things like pesticides and abuse of land, that kind of thing, our concern with the way science in the broadest sense was going, where so much of its talent, money and energy was going into weaponry, and a broader sense of inequities, both biological, ecological and human, in the world. And it was a quixotic but certainly well intended attempt to somehow see if we could create a science and a practice of earth stewardship, a way in which we could try and redirect scientific activity in the broadest sense and yet apply, in the literal sense, ecological knowledge to a wide range of human problems. We believed then, and I still do now, that inherent in the world's modern knowledge are the bits and pieces that could create high culture living in harmony with the planet, whereas now we have high culture out of harmony with the planet, and this was what New Alchemy was set up to do, to explore these, in the broadest sense, questions of a new kind of science of stewardship and a practice of stewardship. So we're certainly of our time, but in many ways I think the questions that we were concerned with then are the same ones that people should be concerned with today. I don't think that's changed.

David Cayley
That was the same time at which the word "ecology" began to come into general use and become a kind of metaphor, at times almost a manifesto, while remaining at the same time a science with aspirations to scientific rigour, suffering, as Paul Ehrlich said in an article I happened to look up the other day, from physics envy. Anyway, I wanted to propose that to you as a subject, this question of the ambivalence of ecology.

John Todd
Well, I really loved the ambivalence because I was happily in both camps. First of all, I was trained in straight behavioural ecology with one of the finest ecologists of the time, Marston Bates, and at the same time, I was working with what really were hippie homesteaders who had decided to turn their back on the crass materialistic culture of their parents and head off into the wilderness. Only when they got in the wilderness, they discovered they didn't know what to do or how to do it. So we all became kind of consultants to them, so to speak. But I used to laugh because I would go to scientific meetings and watch the scientific ecologists kind of start to crawl when the ecologists in the social, political and behavioural sense would arrive in the room. They were very nervous and very few people could cross back and forth between the boundaries.

David Cayley
The relations between scientific and philosophical ecologists have fluctuated over the years, but John Todd has always kept his passport and his desire to straddle that boundary. New Alchemy blended science, social vision and technical ingenuity. It began in Southern California in the late '60s and was relocated to Cape Cod, where it still prospers, in 1970. There, the Todds and their colleagues began to pose the questions that would eventually produce a whole new family of technologies.

John Todd
One of the first questions we asked was how could we in a very small space, using renewable sources of energy and ecological cycles, produce the food needs of a small group of people, and we began to immediately, in order just to accomplish in a small spaces those ends, we had to immediately develop integrated systems. And so we had, for example, inside a small solar greenhouse-like structure, a pond. The pond was in that structure in order to absorb enough radiant energy so we didn't have to heat it with fossil fuels, much the way the ocean provides the climate for planet Earth. We did the same thing. With that body of water which was, again, just like here in this house, providing the thermal storage and the thermal buffer, we began to use that water column for aquaculture, and that work married ancient Chinese methods of polyculture, which we got from the Orient, with modern eoclogical knowledge, combined with the idea of introducing a lot of light, and out of that grew the whole area of work called the solar aquatic aquaculture. In some cases, on the surface of the water we would be growing foods. To do that, we began to study the ancient Mayan floating agriculture and began to sort of bring that into our thinking. And then, because we were growing fish in this small space, we couldn't use any agricultural poison--it'd kill the fish--so we had to find ecological methods of pest control. For example, we had to look at predator-prey relations, a subject dear to the heart of academic ecology, and find those beneficial organisms to fit in our small habitats. And then we began to start working with wind energy or moving water for providing electricity, for a whole variety of things, and then began to start out of that designing systems based on pulses. For example, wind doesn't blow all the time, so if you have a fish farm powered by a windmill, you have to design it so that it can cope with natural pulses, which is the opposite to the Western mechanistic point of view, which is to just sock it to it with a continuous source of electricity and maintain a steady state system. We decided that working with pulses might be beneficial, and so we started to study pulse-like environments, like a tidal marsh, and asked marshes--what are you doing and how do you do it? We want to do it too.

And that knowledge from mangroves, tidal marshes and things like that became incorporated into the thinking.

David Cayley
Out of this early research came a new type of building called a bioshelter, a building capable of regulating its own climate, producing food and recycling its own wastes. Both John and Nancy Todd were born and grew up in Canada, though they've made their lives and careers in the U.S., and they managed to convince the Canadian government to support the building of a bioshelter at Cape Spry, Prince Edward Island. The Prince Edward Island Ark, as it was known, was inaugurated by Pierre Trudeau in 1976. As an experimental design, it was a success. As a place to live, it was a little before its time, and the Canadian government eventually withdrew its support. Todd, meanwhile, continued to expand his field of interest, spending time in Costa Rica, where Bill McLarney had established a New Alchemy offshoot, and travelling in Asia.

John Todd
One of the things which was important to me was to go and study parts of the world that had been farmed continuously for millennia, and there, you would say, human beings had been doing something right. Now, in the West, farming for centuries is considered a long time, you know, before the soils erode and the trees are all cut down and people have to abandon it and then let it regenerate. The whole history of Europe has several of these phases of internal colonization, and in North America we're seeing a repeating of the pattern. But near Bandung, in Java, in Indonesia, I was able to look fairly carefully at farming systems that had lasted for thousands of years and fertility had been increased, certainly sustained and possibly increased. And I found some fascinating things, but the real news in it was there was an extraordinary balance between water farming and tree farming and grains and vegetables. No one was allowed to dominate, and in those parts of the world where the ponds fed the soils, provided nutrients and fed the soils, and the trees protected the upper reaches--these, I guess, in ancient times were probably wild trees, now they're economic trees, useful to the residents of the area--they've become a vertically integrated, horizontally integrated, mutually reinforcing type of agriculture.

David Cayley
As John Todd's work progressed, his attention turned increasingly towards the Third World. Faced there with devastated economies and environments, he began to see applied ecology as the only real alternative to the ruinous type of development which hooks poor countries on manipulated flows of capital and technology. Ecology offered a way of putting people's fates back into their own hands.

John Todd
Only a very small percentage of humanity has access to capital, and the only substitute we have for capital or hardware which capital can acquire is information. It becomes a universal currency. It's the key to creating equity throughout the planet. If we're really interested in helping the Third World, it won't be through the importation of technologies, it'll be through some kind of partnership in finding the appropriate information to a given context, and most of that information is going to be biological or ecological.

David Cayley
An instance of what Todd is talking about occurred in the Seychelles in the early 1980s. There he was able to solve a problem threatening an entire island community by applying information originally reported in Russia.

John Todd
A couple of Russians had studied a process in which they had observed that ponds could be found on top of rubble mound hillocks. They said, how could this be, I mean, water should just drain right out of there, and they discovered a process which occurs in nature which they called "gley" formation. And basically what happens in nature is if carbon and nitrogen are present in a hollow, and somehow oxygen, over time, gets driven out so it's an anaerobic environment, this biological plastic forms. So I was in the Seychelles in the middle of the Indian Ocean, visiting a coral island which was threatened. A hundred or so people were going to have to leave the island because their source of fresh water, which was a lens under the island, was being used up and salt water was invading. This process happens on islands in coastal regions all over the world, but it's particularly acute on coral islands because they have no ability to--the coral sand has no ability to hold moisture. And so I happened to be in the particular time frame of a disaster. So we asked ourselves, that knowledge from those bogs in Russia, could it work in quick time in the middle of the Indian Ocean? So we dug a small lake and we looked around for the fibre and carbon that we needed to simulate this Russian process that occurs, who knows how often in nature and how long it takes. We didn't have a clue. But anyway, we lined this lake with fibre of the coconut husks which were a byproduct of the industry of the islands, which was to make copra or the meat of the coconut, which they shipped to Pakistan. And then we went around and looked in the understory of the island for the nitrogen we needed, and what we found primarily was a wild type of papaya. We cut the branches, the whole shrub and even the fruit, which also has the active enzymes, and we put a six-inch layer of papaya. And then the one thing left to do was to drive the oxygen out, and so we did that by putting another six-inch layer of coral sand and tamping it, rolling it down to make sure we drove the oxygen out. Then we took some of the available groundwater to fill it up just enough to cover the bottom, and then a couple of weeks later, the monsoon rains came, and lo and behold, nature made a biological sealant. The rains came and there is a lake sitting in the middle of this island, allowing the people to stay there that wouldn't otherwise stay there, and it's also acting as an ecological magnet. I understand that Sir Peter Scott visited the island about a year after we did the experiment and there were birds on their way from the steppes to Asia, to Africa that were landing there that never land on coral islands,

somehow attracted to the source of surface fresh water. So that's an example of knowledge by studying the wasted places and finding ecological processes that counterbalance the natural tendency to make a place a wasted place, using that knowledge in a sense to serve a human community. It made a fundamental difference.

David Cayley
When I first interviewed John Todd in 1981, he described for me a vision of what he called "a biological hope ship." The ship would carry the biological materials needed to restore shattered ecologies or even, as in the Seychelles, create altogether new ecologies. She was to be called the Margaret Mead, after the late anthropologist who had been Todd's friend and mentor, and was to be a great sailing ship, inaugurating a new age of sail. He wanted to combine his passions for farming and sailing, he said, and sail a farm around the world. It was a grand vision, but Todd had trouble finding investors for his sailing symbols of the Age of Ecology. Eventually, he settled for something more modest, a sail-powered fishing boat. By this time, the Todds had left the New Alchemy Institute and started a new organization called Ocean Arcs International. Their first project was stimulated by the plight of Third World coastal fishermen.

John Todd
We were aware, both through direct observation and through FAO United Nations reports, that literally millions of fishermen in the last few years have been unable to fish, that they no longer have the fuel for their outboards, the capital for their gear, or what have you, and that this is a world-wide phenomenon, that coastal communities are in really tough shape. And if you analyze why they're in tough shape, it's because their countries' economies have lost their buying power. Their currencies have become worthless. There are very few hard currencies in the world. We're so used to being able to take a dollar and go anywhere with it. For example, one country that I've had direct experience in is Guyana, South America, and a Guyanese dollar won't buy you anything, and what happens when these currencies go soft is that the infrastructure disappears. Mr. Yamaha outboard motor pulls out. The local distributor doesn't have a hard currency, so he can't buy it. The oil importers don't want to import oil because no one's going to pay for it with anything. So what happens is the economies come unglued. We saw this happening all over the place, at a terrifying rate, and so one immediately says, well, they could go back to the old ways. They could build traditional boats and do it the way they did it a generation earlier. That argument breaks down when you discover that the old ways involve boats being made of teaks and mahogany and rot-resistant woods. They'd all been cut down to pay for the outboard motors and the steel boats and everything else. The trees ain't there, so that their biological capital had been used up. So I started to ask the question, would it be possible to build a boat that could be powered by the wind, that could be built primarily out of fast-growing, soil-restoring weed trees, if you will, that would be as fast as the motorboats they were intended to replace, that would have the most advanced aerodynamic and hydrodynamic thinking. Could we take the information from a high performance aircraft or speedboat or what have you and apply that to the needs of artisanal fishermen.

David Cayley
The answer to all of these questions turned out to be yes. With the help of a prominent naval architect named Dick Newick, Ocean Arks came up with a vessel which they called an "ocean pick-up," a one and a half ton trimaran. A prototype, called the Edith Muma, was built in Dick Newick's boatyard on Cape Cod and launched with great fanfare in November of 1982. Dean James Morton of the Cathedral of St. John the Divine in New York gave a revised version of the traditional Anglican prayer for the launching of ships, the champagne was gently poured, not broken, over the hull, the Paul Winter Consort played "Amazing Grace," and shortly afterwards the three-hulled Edith Muma set sail for Guyana. The Guyanese fishermen were skeptical but eventually impressed.

John Todd
One of the funny things that happened in Guyana--we had a little radio on board that nobody knew--nobody knew that we had all this fancy cop equipment, like radio receivers and all kinds of stuff for the scientific work. And we would sail into Georgetown, and we'd hear the trawler captain, you know, as he's saying, "Mon, that three-winged thing is worthless," and the other guy's saying, "Yeah, mon, I'd like to see you take that tub of yours all the way to New York," and they'd be arguing back and forth about the merits of it and we'd be sitting there, listening on their frequency. Then occasionally we would be sailing in and the trawlers would try and catch us, but with the Trades, we could for sustainable periods of time go faster, and listening to them laughing at each other as they chased us into Georgetown, telling each other to put a little bit more power to it, stuff like that. Thank God the shrimpers were a national company because they were burning fuel like crazy to stay up with us. It was satisfying.

David Cayley
The fishermen who sailed with Todd and his crew also liked the ocean pick-up's performance. One offered to buy her the first day out. The boat was designed to be manufactured on a small scale, out of mainly local materials, but it still required some local investment and that was where things broke down.

John Todd
There was a lot of interest in Guyana in building a large fleet of several hundred of these, because the one thing Guyana does have is marine resources. The financial community was interested in a technology transfer and it looked like a real go-ahead. But there were certain sectors, as I understand it, in the government that saw this as a liberatory technology--liberation technology, if you will, and they didn't want the idea of maybe a thousand fishermen being able to go anywhere. They didn't like the idea that they could sail up to Trinidad and pick up spare parts for the remaining outboards that were still functioning, or ship down to Surinam

to get wheat flour and bring it back, because wheat flour is--was, anyway I guess it still is--illegal. They were perfectly happy to control the movements of that sector of the society at the gas pump, and I was struck by the sort of shadow side of the internal combustion engine which is the ability to control people, and that's how they seemed to do it. And so the dominant sector in the government, which is, as you know, not a democracy, basically decided that this is not what they wanted.

David Cayley
The Edith Muma set sail for Costa Rica, but her problems winning acceptance continued. "Small is not beautiful," Todd has written about this experience, "when it comes to research vessels achieving recognition by the appropriate authorities." Ocean Arks joined forces with the Marine Research Centre at the University of Costa Rica, but co-operation proved difficult. The ocean pick-up remains an idea whose time hasn't yet come. There is still no prospect of the boat being manufactured, nor any governmental interest in Todd's larger vision of the ocean pick-up as part of an integrated scheme of coastal development. This experience changed his orientation. He still believes that ecological technology is critical for poor countries, but he's concluded that it will have to prove itself in the rich countries first.

John Todd
When I was working in the Third World, people asked me, if this is such a good idea why are you not doing it at home? And so at that point I said, they're telling me something I have to pay attention to. I will go back and do solar aquatics, develop fleets for New England, or vessels that would be appropriate to New England, develop architecture that could be used in Canada or United States, and give myself ten years doing that, get that understood as the way of the future, so that one could go to Jakarta and say, "My God, Massachusetts already has 22 of those and has 200 more in the works." Then I will have the credibility. Too often it's said, what are you bringing, second-class knowledge to the Third World? We don't see you doing it at home. And then you get labelled as a do-gooder rather than a person of creative action.

David Cayley
One of the first projects that Todd got off the ground was a solar aquatics waste treatment facility for the city of Providence, Rhode Island, not far from his own home on Cape Cod. Like the Harwich facility described earlier, it's a greenhouse structure, containing engineered marshes and lines of translucent tanks where an amazing variety of plants, microbes and marine creatures purify Providence's wastes. Unlike conventional secondary treatment plants, it uses little energy, no hazardous chemicals and produces no toxic by-products. It was opened in July of 1989 and has continued in successful operation since. I was there this spring.

All right, John, why don't you tour me around here, beginning by telling me just where we are, exactly.

John Todd
We're right in the bowels of Providence, Rhode Island, in the centre of the most industrial district of the city. To our immediate east is 63 million gallons of partially treated sewage roaring out into Narragansett Bay. To our immediate north is a dog pound where all the stray animals of the state gather for their last days, and off to the west is one of the largest haulers of liquid asphalt and other nice materials in the state, and to our immediate south, overlooking Narragansett Bay, we have a glorious mountain of scrap metal which is destined to go back to Europe, where they turn it into BMWs.

David Cayley
And here?

John Todd
And right in the middle of all this, we have a gossamer-like greenhouse structure, and inside that structure is a water garden. So if you were to walk into it, you would see ginger and flowers and watercress and fish and snails and clams and herbs and spices. And what comes in at one end of the building is raw, untreated industrial sewage from an industrially-based city, and what you see here, the sound of falling water, right here, is water leaving the building which is pure and transformed from that original state.

We're now inside the first chamber. The raw material sewage is quickly being transformed into these great vats of algae, and then the algae, in turn, their numbers are kept in check by these large grazing populations of snails which you can see here. All these dots over the surface are snails, which really are the sheep and the cattle of the aquatic realm. And the organic material is burst up to the surface, the surface is grabbed on to by the roots of these microscopic floating plants here, and in there is where the bacteria reside that do the waste treatment, and then the snails themselves consume the bacteria that treat the waste, and so begins the basis of the food chain. These mountains of foam that you see coming off are the various surfactants and wastes from restaurants and wastes from households, the soaps and the various types of things, and they foam up, and in those foams, again, there are algae and bacteria and other organisms that also continue to do the treatment process. At the very beginning, you can see higher plants floating on the surface. That's a tropical plant, the water hyacinth, and during the summer months here, it is just a mass of orchid-like flowers. The contradiction between the treating of waste and the aesthetic is one that we find very interesting and somewhat ironic.

We've now moved into the second and largest room inside the solar aquatic waste treatment greenhouse. Basically, this second stage in the treatment process mimics exactly the strategies a salt marsh uses, which is a period of drying and a period of wetting. So that for half of the day in here, the marshes dry out, and that allows air to penetrate down into the system, and then the other half of the marsh--they're all in parallel, there are eight of them here--the other half of the

be a hermit and be a practicing Jew. You have to have to have a community.

David Cayley
I'd like you ask you finally about what I'll call environmentalism for want of a better term, meaning all those persons who are concerned with this. And this is a movement which seems divided in many ways but which ranges certainly from a managerial perspective at one end, an attitude which is confident that sustainable development is possible, that you can have growth and environmental protection, however it's phrased, and at the other end one has a biocentric perspective, let's say, descending from Leopold's famous saying that we should be only a "plain citizen" of the biotic community. It seems to me that coming out of your Jewish roots, you take a different view, neither one nor the other.

David Ehrenfeld
Yes, let me try to answer your question by describing the Jewish attitude towards work and the Sabbath, which I think is the ultimate, for me at least, the ultimate way of stating this problem. In Judaism, you're supposed to work six days and rest on the seventh. On the seventh day, on the Sabbath, which for us is Saturday--or it actually starts Friday evening at sundown, you are supposed to stop working and there's three things you have to do if you are going to observe the Sabbath correctly. You can't create anything. I mean anything. If you get an idea for a book, you cannot write it down on a piece of paper. That's very painful for an author and it happens to me all the time, and I wonder, will I remember this till after sundown on Saturday, and sometimes I do and sometimes I don't, and I have stopped worrying about it. If you're a gardener, you can't plant a seed. That's a creative act. You can't do it. You also can't destroy anything. That's the second thing you can't do. Again, if you're a gardener and you see a weed growing in your garden, you can't pull it up, you can't kill an insect pest, you can't shoot a rabbit, or anything of that sort on the Sabbath. The third thing that you're supposed to do is a positive injunction, which is to celebrate the Sabbath and celebrate the fullness of the earth that was given to people to live in, to work in and to enjoy. So you have this prohibition against creating or destroying, which means you cannot be a manager, you can't be a steward even in any sense. You've got to leave it alone, and it will continue all by itself. It's a wonderful lesson. You also have to learn how to enjoy it, and that's the other part of the lesson. People were told you had to have the confidence, in a sense, in the earth and in the creator of the earth that says I'm going to just rest for one day, I'm going to leave it alone. Now, I think that stewardship without the idea of the Sabbath is bound to go wrong. Without the idea of the Sabbath, without some idea of a built-in restraint, then the steward eventually becomes very arrogant. Hence my title, The Arrogance of Humanism. The stewards says I'm really the king. You know, the late J.R. Tolkein, in his book, his wonderful Ring trilogy, The Lord of the Rings, has this dilemma of a steward who says How long do I have to stay a steward if the king doesn't show up? When do I become a king? And the man who asks this question is told by his father, who is the steward, Even ten thousand years wouldn't be enough, and essentially there is never a time when a steward becomes a king. Well, I think that there's a great temptation for stewards to want to play king, to want to play God, and without some kind of a restraint that's built in at a regular basis, a kind of constant reminder you're not running the show, you can't run the show. You don't know enough to run the show and you never will and you're only going to mess it up if you have that attitude. Without that idea, then I think that stewardship is bound to go awry, to go amiss. I think that the idea of the Sabbath, for Jews, and perhaps for Christians too, introduces this idea of restraint which is so essential to keep stewardship on the right track. So I think that stewardship is the only hope, but I think it has to have some kind of restraint built into it.

David Cayley
David, thank you so much.

David Ehrenfeld
You're welcome.

David Cayley
In 1980 a book appeared which I think of as a kind of sibling to The Arrogance of Humanism. It was called The Fallacy of Wildlife Conservation and it was written by John Livingstone, a lifelong naturalist and a professor in the Faculty of Environmental Studies at York Unviersity. It was a book, Livingstone once told me, written in blood--his life's blood. After a lifetime of arguing for wildlife conservation, Livingstone took apart the arguments he himself had made and found them all wanting. Everything seemed to come back to what David Ehrenfeld calls "the doctrine of final causes," the idea that the end to which something can be put is the cause for which it was created, the idea, as Ehrenfeld says, that gravity exists in order to make it easier for us to sit down or that rain forests should be saved because they may contain undiscovered medicines. Species and places with no obvious economic usefulness become recreational amenities, prized for their aesthetic value. All arguments circle back on humanity. None can penetrate what Livingstone calls "the metaphysical dome" which encloses human society and cuts us off from the living world. In the light of The Fallacy of Wildlife Conservation, John Livingstone began, in effect, a second career, searching for a way out of environmentalism's utilitarian bind, trying to put a retractable roof on the metaphysical dome. We spoke recently in his office at York.

John Livingstone
If I have a technique, it has been, I think, to ask the question that my colleague, Reg Lang, always asks: What is the problem to which this is the solution? So what I've done mostly is critical analysis, I think, of the statements of the so-called conservation movement, the so-called environmental movement, and so forth. Nobody seems to want to reveal what the problem is that is being addressed by all the environmental placards. I like to say to my students, "Go out