

## **Conversation with Ted Schettler, MD and Michael Lerner – February 1<sup>st</sup>, 2007**

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*Michael:* Welcome Ted Schettler, we're delighted to have this conversation with you today. Our topic is the implications of ecological health. And you bring a very strong background to that; you are one of the leading physicians in the environmental health, science and activist community, traveling across the country and around the world to talk about ecological health. You are one of the leading people in the science and environmental health network and also in the Collaborative on Health and the Environment (CHE), holding important positions with both groups and you've thought a great deal about ecological health. So, in order to start, because I believe that people really have to understand these stories, I wonder if you could talk for a few minutes about your personal journey from being a practicing physician to a full time scientist promoting public and professional awareness of ecological health? What drove you from a satisfying medical practice to make this major career change?

*Ted:* Well, thanks Michael, I appreciate the opportunity to talk with you about this. I was, as you suggest, in medical practice for a number of years and in a somewhat parallel life, was also engaged in a variety of activities around what are typically thought of, or traditionally thought of, as environmental health work. I worked on river restoration in a community in Maine, where I was living. I worked on issues of contamination of rivers by the pulp and paper industry in Maine. Had a long, long interest in gardening and raising food and so forth. But what was interesting to me was that these seemed to be parallel tracks and they didn't seem to be connected in any coherent or consistent way and that after awhile, that lack of coherence just seemed to matter more to me, and I eventually decided to take steps to try and connect them in a more contextual and comprehensive way. And that led me back into further training in public health and then, just in some ways following the way the winds blew, to find myself where I am now. But I think that's exactly what happens when you sort of cast yourself loose into these sort of swirls of energies and activities that are going on. So that's a short summary of how I ended up where I am now.

*Michael:* You're the author of an important book, "Generations at Risk: Reproductive Health in the Environment" and an important book, "Toxic Threats to Child Development" and over a dozen research papers for the Collaborative on Health and the Environment on heart disease and developmental disease, on autism, birth defects, and many other issues. Out of this you seem to have emerged with a personal focus on the concept of ecological health and I wanted to ask you to briefly describe the concept of ecological health and why you think it's important.

*Ted:* Well I think that in order to answer that I needed to go back and reflect what the word "health" actually means. And I originally thought of this, of course, as a traditional physician often does, but if one goes back to the roots of the origin of the word "health," you run into things like whole, and holy, and heal. And Wendell Berry for example has written widely about this and I think many of his essays are consistent with what I am talking about and I learned a lot in this regard and that is the notion that is to be healthy is to be whole and that very quickly then invites you to think about the context in which you are thinking about health. And suddenly the rather artificial breakdown between individuals and families and communities and entire ecological systems starts to disappear. And so for me, the notion of ecological health invites a

whole new way of thinking about health and thinking about our individual relationships to the communities in ecological systems in which we live.

*Michael:* When you speak of Wendell Berry's work and the deep meaning of health and the connections between health and whole and holy and heal and logically, do you make, personally, a deep division between scientific discourse on this and the deeper resonances in the language and in consciousness of words like whole and holy and heal?

*Ted:* No, I actually think that division is just one more example of the so-called dualism that has characterized science for the past several hundred years. That actually, at least for me, it's much more useful to think in a more organic way where those dualistic categories disappear, that isn't to say they don't serve purposes from time to time, but I think this division between matter and spirit, between science and the spiritual consciousness that you're talking about are actually.... to some extent I understand their historical roots but I think they have led us into blind alleys in many cases that have kept us from having a more organic, or ecological conceptualization of health. I actually think that we're bumping up now in our lifetimes, against the wall that that is leading us toward and that one of our challenges right now is to find our way beyond that. And I think it's probably somewhat unique now, compared to years in the past because of the stressors which are becoming increasingly apparent to everyone as we look at the ecological systems, whether it's in our own communities or in the planetary level.

*Michael:* When you speak of the stressors that are becoming increasingly apparent, when you speak to scientific audiences about ecological health, just returning to that point: what are the main categories, not only of stressors but of internal factors like genetics and gene expression that you talk about? What are the boxes that you see interacting when you look at it from a scientific perspective using language that makes sense in the current scientific paradigm?

*Ted:* Well, they are things like a genetic inheritance. And then, as you mentioned, a couple of the books that I co-authored with colleagues, put a lot of emphasis on toxic environmental contaminants. Industrial chemicals, pesticides, heavy metals and so forth that are pervasive in our landscape and in our bodies and in our food, and air and water and so forth. And we were interested in the impact of those in our health, both individually and collectively. But they are also among the stressors. Others include the food that we eat and the way we grow that food, which has a major impact on its nutritional value. Infectious disease, of course, radiation, some of which is from natural sources some of which is from human sources. There's a good deal to be thinking about in terms of physiological and physiological stress that are both the results of the ways we organize ourselves and decide how to live and all the things that flow from that but whether it's in our personal and family lives or on a much more societal level. There's no doubt I'm leaving one or two boxes out, but I think the important point is that we do tend to break this larger concept of environment down into these more manageable pieces that we then try to study and understand. And my observation, the thing that has really been motivating me in the last several years is to become more acquainted with their interactions, to begin putting them back together again into the system from which they were sort of derived. To begin to understand how it limits us when we take the environment apart into those pieces and study them one at a time and then miss the rich interactions that actually do exist among them and really as we all know, characterize the complexity of the world in which we live.

*Michael:* Give us an example of this kind of interaction that has intrigued you.

*Ted:* Well I've been intrigued with interactions of toxic chemical exposures and nutritional status and it's for several reasons. First there are some examples that have been widely reported in the medical literature where we can actually begin to understand some mechanisms of these interactions, things for example like children whose diet is deficient in iron, which by the way is very common in the United States and I should point out it's much more common in children who are living in poverty. So children whose diets are deficient in iron, when they are exposed to lead, they actually absorb more lead from the intestinal tract than when their diet is not deficient in iron and it doesn't stop there. They actually transport more of that lead into their brains, than children who have a diet that has a sufficient amount of iron in it. So what you begin to see is an interaction between lead exposure, iron deficient diet and poverty. Well now that's kind of interesting and what the literature also tells us is that if you address one of those but not all three of them you don't really gain very much. Of course prevention of the cognitive and behavioral impacts of lead is what we're most interested in, but if you have children who have been exposed to these stressors and you want to correct things you really need to address all of them. Well that raises an interesting question because how do you begin to address iron deficiency in the diet, lead exposure and poverty all together. And my observation is, even in the world of public health, we tend to portion those responsibilities out to various agencies or areas of expertise and rarely are people talking to each other about it. And I think it's an interesting challenge for us all to begin to think creatively about how we might solve problems like that with interventions that literally sort of address them collectively. Now we have to be careful because we could end up causing more problems than resolving, if we don't think carefully about interventions. There are ways to do that I think could be carefully done but nonetheless, that's the idea of interactions that are begging for responses that are more comprehensive.

*Michael:* At a scientific level, how can we even begin to study the complexities between genetics, gene expression, toxics, nutrition, physiological and social stress, infection, radiation and all the other factors that are affecting us and as you said we could add many others to that list. But how, given that we are immersed in this soup that has become increasingly inimical to healthy development, how can we begin to study and think about these interactions scientifically when all of our science has depended on our capacity to single out things in order to study them alone, which is complex enough as it is?

*Ted:* Well it's a good question and of course what we're talking about now is beginning to lay out a scientific research agenda that will keep people busy for a very long time. Systems biologists for example, are understanding the need to begin to re-assemble the parts into a somewhat larger whole, and are starting at the molecular DNA level and then slowly re-assembling things into a somewhat more complex system, but still not at the large ecological systems level that we all know we would like to understand. Now ecologists, on the other hand, are facing complex ecosystems and then they try to understand it and develop some techniques to understand it although it's my understanding that even in ecology there's a tendency to take things apart, but the complexities very quickly overwhelm our capacity to do it. So I think what I'm taking from this is that science is at a point where we understand the need to bring a systems approach to

understanding, but we are also increasing overwhelmed by the understanding that our tools and resources are really quite primitive to approach that complex of a problem.

*Michael:* It's been frequently true in human history, has it not, that public health has moved in advance of science. That when we've begun to see relationships between disastrous human health outcomes and environmental exposures that often public health measures have been taken before we understand the mechanisms, particularly when the interactions are this complex. It seems to me that that observation has lead you and others to think about the concept of resilience both at the individual level and the community level. In other words, given the incredible complexity of the interactions that are affecting us as individuals, our children, our families, our communities, that any steps that build a psychobiological resilience may be beneficial and any steps that either reduce stress or increase nurturance to the organism or the family or the community may be helpful in these extraordinarily complex interactions. Could you talk about your own thinking about that and the field of exploration of resilience as a concept in relationship to ecological health?

*Ted:* Well I do think that there are certain principals that can guide interventions or decision making and your focusing on resilience, I think, is exactly right. It's the notion that trying to build into systems, whether it's at the individual family, community or ecosystem level, it's the notion of trying to build buffering capacity or resilience into that system so that it is able to absorb outside or internal stresses more readily. And you very quickly find yourself bumping against a very interesting philosophical question. Because we all understand that change is really the rule and not the exception, this is not an attempt to think that ecosystems or individuals or families or communities can be somehow kept apart from change, after all birth is followed by a period of living, followed by death, and that is inevitable and it is the way it is, whether it's at an individual or a community or a ecosystem level. So this isn't about trying to keep change from happening, but it's about that there are questions that as humans we need to begin to ask and answer, that have to do with, what are the impacts of our activities and what is the world likely to look like if we continue along a particular trajectory and is that a world that we want to contribute too? Or, are there ways to build in resilience and buffering capacities so that the qualities of lives of not only people but also other species can be maintained or improved so that brings in the whole idea of restoration as well as resilience. To get to the point here, I think that there are concepts of resilience, restoration, buffering, and self-renewal. These are kinds of ideas that we ought to be thinking about as well as static end-points. And we ought to be asking ourselves when we are contemplating an intervention "what does that do, or what might that do to the resilience of a system that we're interested in?" Or groups of individuals or communities that we're interested in, what might that do to it's buffering capacity, what will that do to the distribution of wealth in a community of people, because we know for example that an increasing gap between the "haves" and the "have nots," at certain levels can have major public health impacts. So thinking through how interventions ripple through systems, and have impacts that are quite indirect but none the less related to the intervention, is very much a public health idea and public health, of course, has a strong history of being interested in prevention, in preventing harm rather than dealing with damage after it's occurred.

*Michael:* So if we were to imagine a world, for a moment, in which public health officials, the citizens both of this country and citizens of countries around the world, government officials and

everyone else simply seeing the combined effect of climate change, the depletion of the ozone layer, toxic chemicals, destruction of habitat and basic species, biotechnology, nanotechnology, and all the rest upon the wholeness of life had finally concluded that the piecemeal approach was not going to work. And you were asked to give your comments on what kinds of root public policies were most critically important to restoration, to buffering to renewal. How would you address the complexity of this, how would you imagine public policies that would begin to focus on restoration?

*Ted:* Well, it's a little hard to be prescriptive of course outside of a particular context, but there are some things that I think should guide us. And that is we are in many ways continually looking for the technological fix to a problem, and that of course has characterized medicine for over a hundred and fifty years, where medicine tends to think in terms of a technological response as opposed to an ecological response. So I think what would serve me, at least, or guiding ideas, are to think through the lens of ecology and evolutionary biology. So I think that these are neglected areas by many disciplines. And I would strongly advocate for making study and familiarity with ecology and evolutionary biology absolutely essential for public officials and certainly in our educational system and by all means particularly in the health disciplines where very quickly people these days are being acculturated in ways that make us think of individual health outside of the context in which we live, so ecology and evolutionary biology as essential guides for decision makers and decision making.

*Michael:* What about the question of indigenous knowledge, what about the consciousness with which indigenous peoples lived in the world and saw themselves and the world in which they lived in terms of wholes? Do you believe that there is any capacity in modern industrial and postindustrial civilization, either to learn from or actually to, I don't want to say return to, but re-integrate that consciousness in our efforts to imagine a sustainable world?

*Ted:* Well, not only do I think it's possible to do that but I think it's essential to do that and you, I think, have made an important point when you said "I don't want to say, return to" because it appears when one says that it's as if we want to return to some sort of more primitive time and that isn't how I think of history. But I do think if we're able, in the far distant future to look back on this period of time, we will see that the period of time in which we've been living was characterized by an extraordinary and unjustified faith in the development of technologies that were not at all invented in the wisdom of the world. And that what I think, at least for me, has characterized the indigenous ways of knowing, and thinking and behaving is that it was born out of a real wisdom of how to be in the world. You know if we look at certain species that have been around for sixty-five million years, and there are some, there's a certain wisdom that's embedded and we could probably even think about that in strictly biological terms, that's imbedded in these organisms and similarly, certain social ways of organizing are based on a wiser understanding of the world, and so I think that it's truly essential that we try to rediscover that as part of this effort toward restoration and building resilience. There's a tremendous amount of resistance to it because we're living in a world where we literally believe that we can continue to grow economically by pushing more stuff—more material stuff—to human societies when we're living on a finite planet, and the arguments that we need to continue doing that are that it is the best way to insure that people live lives of quality and more likely to keep us from fighting with each other. I mean these are the arguments that the economists and historians have raised,

that if we stop growing economically and stop pushing this material through we will inevitably end up in conflict. This is an enormous challenge but all of the efforts toward returning to a more defensible kind of material economy are going to have to grapple with this because, clearly what we're doing now is not sustainable and I think some of the wisdom from the more traditional cultures are crying out to be listened to.

*Michael:* One thing that has struck me Ted, is how unexpectedly widespread that observation that you made is in different parts of the culture. I've recently been reading a book by Peter Senge and others, called "Presence," and he and his colleagues are part of something called "The Society for Organizational Learning" at MIT. And they include the CEO's of, you know, a whole bunch of major corporations and in this book they literally speak about the impossibility of continuing to rely on technological fixes and how much junk can we push into the world and have the world metabolize it and what are the limits that people will accept, the rising gap between rich and poor. And then, they go in the same direction you just went, to the need to return to a deeper wisdom, and a deeper understanding. And they manage to do this in a language that is absolutely, or almost entirely separate from the languages we normally hear this in, languages of indigenous knowledge, languages of spirituality, even languages of ecology. But rather in a language that speaks to their particular constituencies. So I'm just curious as to whether you sense that there may be a human capacity to move as a species, at least in terms of a critical mass within the species, to a level of consciousness at which what seems impossible now in terms of the shift that we're describing, might actually take place, and might actually take place in a relatively brief period of time?

*Ted:* Well, I think there is the human capacity to do that, whether or not it will happen is anybody's guess. But I think one of the points you made is essential, and that is you were struck by the language of Peter Senge and others in the book that you're reading. And it seems to me that the language, at least for me, is becoming increasingly important. To think about the language with which we discuss this and that we use. These are changes, in many ways, in conceptualization as well as language. So it's not that I'm looking for, or think that we need to come up with another clever sound bite that will suddenly flip a switch or persuade people, so much as it is I think that language and metaphors that we use in our language—and we use them all the time—are essential for influencing the way that we behave in the world. And it seems to me that we need to think carefully about that, particularly in the educational system because in my work in medicine, for example, I find much more resonance for some of these ideas among students than I do among physicians who have been in practice for many years. And I think that ideas just become concretized in some people and others are somewhat more amenable to thinking about things differently. So I think the capacity is there, but I think we need to think carefully about language and metaphor, we have to try experiments, we have to find out where successful experiments are underway, we need to collect those, we need to tell those stories, we need to show that certain things are possible often at a community level and then think how and under what circumstances are transferable to a larger level.

*Michael:* I'm going to ask one final question personally and then I'm going to open the line to share the conversations with others and I encourage listeners who'd like to speak, to begin to reflect on what you might like to ask Ted or comment on. And please identify yourself before you speak. Ted my final question in this section of our conversation is explicitly about the

relationship between our understanding of ecological health and the total complex set of stresses affecting all life, but human life in particular. And the growth over the same period that we've begun to understand ecological health, of integrative medicine, whatever you want to call it, holistic medicine, and complimentary medicine. I like integrative because it involves integrating the best of conventional and complimentary approaches to health care. But these have been parallel phenomenon. Now you're a physician and it seems to me that modern medicine has been characterized, to a large degree as you suggested, by technological fixes. But we have this phenomenon developing at exactly the same time, that we have the awareness of environmental health and the paradigm of ecological health, which is a newly holistic approach to personal health. And I wanted to ask you to comment on that parallel and sort of where you see that leading, both in your own mind and your experience in medicine, in what we as a culture are trying to achieve.

*Ted:* Well I do see the parallels of course, between the re-conceptualization of ecological health extending out beyond the individual and attending to multiple stressors and what's going on in integrative medicine. But as you also pointed out, much of integrative medicine is still being addressed at the individual level, to the individual. Now there's nothing wrong with that, because clearly there is a place for attention to help with individuals in this entire framework, at the same time I think our challenge is to figure out how to do that, and to address community and planetary health. The one way that strikes me, the wedge, the entrée into this that strikes me as being useful to explore and that is deeply embedded already in integrative medicine is attention to nutrition. And I bring that up because we can have profound influence on individual health by attention to nutrition. And we can reduce a lot of the need for the technological responses to diseases or conditions by preventing them through nutritional interventions and eating well to begin with, also helping to buffer against some of the other stressors. But the other point is that it seems to me to be an entrée into a larger discussion about how we're treating the land. Because many, many years ago Sir Albert Howard talked about the inextricable links between the health of the soil, the health of food, and the health of the people who are eating the food. The distinctions, he argued, were artificial and that if you wanted to know something about the health of people, you needed to look at the health of the soil that was growing the food that they were eating. And I think what the nutrition link does for me is to bring us into a very specific conversation about industrial agriculture, about the way we're raising our food, all the impacts of agriculture on the health of ecosystems. It's terribly destructive the way we're doing it now in terms of air and water pollution, loss of biodiversity, loss of soil quality and so forth, this is true all around the world. So I believe it represents a topic that we can bring into medicine, into integrative medicine and into a larger discussion about social institutions and apply it at both the family level, the community level, at the state level and truly at a planetary level.

*Michael:* I completely agree with you on nutrition, I would add that in the work I've done with people with cancer over the last twenty years, when I talk about integrative approaches to health, I talk about a vital quartet of spiritual, psychological, nutritional and physical approaches to health. And the contribution that each of those can make and in interaction to enhancing resilience and making people healthier, people with cancer or whatever other disease they may happen to have. And the scientific evidence that if you have better functional status, or performance status, whatever oncologists chose to call being healthier, there's good evidence that you tend to live longer with less cancers. And clearly, I think you would agree, that that's

probably true across a wide range of illnesses and is true of preventing illness as well. When you say the area you would focus on, I completely agree, is on nutrition and land, that's a very powerful area. I think I would simply add that that's part of a quartet of four major approaches to the human spirit, to the mind, to the body and to diet.

*Ted:* I completely agree. Yes.

*Michael:* So I'd like to ask the operator to open the lines now and please tell me when they're open.

*Operator:* All lines are open

*Michael:* And please don't be shy, friends, we welcome questions and comments for Ted Schettler, please give your name first. We have a shy group of people with us today.

*Ruth West:* My name is Ruth, Ruth West from Oxford, England. *[The long-distance connection was very poor, so her comment is restated in Michael's answer below]*

*Michael:* Thank you Ruth, former director of the Kessler Foundation, doing important work on herbal pharmacies and indigenous communities around the world. As I heard the core of Ruth's observation it was simply an affirmation of the importance of this relationship between our health and the health of the land, and that fits deeply, as I mentioned, with the important work she has been doing in Latin America and elsewhere seeking to develop herbal pharmacies in indigenous communities and reacquaint indigenous communities with their own rich tradition of herbal approaches to health.

*Ted:* I think that's right and it's kind of interesting to me because, it's not intentional I'm sure, but I think when we talk about the health of the land we should be explicit about the health of the seas as well. Certainly in our lifetime being shown how it's possible to over-fish and contaminate the oceans in ways we are seriously going to regret. And it's probably having already, ripple effects that we're not understanding fully. So it's part of the emphasis on the land, also it's sort of the general well being of the surface of the earth, including the waters.

*Michael:* Ted, you spoke of the importance of language, the different languages that we use and I fully agree with that but I want to go back to the question of consciousness, which really goes beyond language. Language, it seems to me, emerges from consciousness to a certain level and I'd like to ask you personally to describe the trajectory in your own life of the consciousness that has brought you to the work you are doing now. Did you, from medical school onwards say, or even from earlier, have the same kind of consciousness about the world and the work that needs to be done? Or is this something that evolved, and if it evolved who were the teachers, what was the process by which you came to the understanding that you hold today?

*Ted:* Well, a couple of thoughts come to mind. I was fortunate enough in my very early childhood to be able to, number one, spend a lot of time out of doors, in what then seemed to be wilderness, although in retrospect probably not much of it was true wilderness, but it felt so at the time. And also with animals, I have always had a close connection with animals, both domestic and non-

domestic animals, and in fact felt that at some deeper level since childhood. And so for me it's been a matter of cultivating early interests and affiliations, rather than trying to discover, or having discovered something new in adulthood. And it's interesting also, I think this is true for a lot of people, where early life experiences are important in terms of setting trajectories for later. As far as the consciousness piece of that though, it's always been apparent to me that there are many beings in the world that don't communicate through language, and yet the idea that there is a form of communication that goes on that's completely apart from language has never seemed particularly foreign to me. And in fact I felt that I participated in it in some levels. So for me, and it's a very personal comment, it doesn't particularly take the form of a traditional religion, but for me, that kind of being part of the consciousness of the world falls into that category if you will, if categories are what we're using, although as I pointed out I think that categories sometimes get us into trouble. So I've had this, I think, affinity with other species in the world and non-human constructs since childhood and it's been a matter of paying attention to that and it seems very easy sometimes not to pay attention, but I miss it when I don't and I am always gratified when I take time to pay attention.

*Michael:* You mentioned to me once that you had done some thinking about consciousness in addition to this experience of non-verbal communication beyond a species barrier and this connection with nature. What kind of reflection or thinking about consciousness have you done that has contributed to the emergence of this lifelong connection?

*Ted:* Well it seems to me that at some level there's a layer of what we call consciousness that lies over the, here we get into trouble because it starts to get into the realm of geometry or images, but lies over the surface of things. Or penetrates is perhaps a better way of thinking about it, that interpenetrates, that does not belong just to individuals or things as they are manifest in the world. And I've been, like everyone else I guess, I struggle for images that I hold in my own mind that help me organize these thoughts a little bit, although I often have trouble finding words for them, but that the reality of the world that we actually look at and that we interact with on a daily basis is just the current way we look at the way energy has organized itself in the world and it's done that in ways that present itself to our senses, but that outside of those senses and beyond them is also a swirl of energy that is not immediately apparent, that does at some point get into the realm of consciousness as well. So I guess I try to break down these barriers between matter and spirit, which I like everyone else, grew up with to try to imagine an underlying consciousness that is so much like the water that the fish swims in that if you ask a fish about the water they wouldn't be able to say much about it but is much like the water that the fish is swimming in.

*Michael:* And this oceanic energy that you describe, do you envision or even hope that at some point science will understand this energy better, or are we just as well, given our history of misuse of science, if it alludes the grasp of science in an ongoing basis?

*Ted:* Well, that's a very interesting question. I actually am not particularly hoping that science tries to figure that out in the way that science is currently configured. I happen to agree with the perspective that the way we think of science now is the result of what people thought at the time, back several hundred years ago, was a necessary split between mind and matter and led us into this Cartesian approach to understanding. It's been very helpful and we've learned a lot about the

world and about ourselves using that reductionist approach. But I'm not even hopeful, nor do I even hope at some level that applying that same approach to understanding consciousness, will either be fruitful or serve us well necessarily, so I'm not going to get real optimistic about that.

*Michael:* On a more mundane level, but related to that, you're familiar I believe, with the studies that Raymond Neutra, MD and others have done on the incidence of leukemia under power lines and of course you know about the work of the Collaborative on Health and the Environment in the whole area of electromagnetic fields. And my understanding, and I'm not a scientist, is that in many of these studies—the study of childhood leukemia under power lines—that the question of the increased incidence is reasonably well established but because they don't understand the mechanism by which electromagnetic fields might relate to this increased exposure the science is not widely accepted, and there's certainly other areas in EMF research where analogous problems exist. The question I want to pose to you is whether the issue of electromagnetic fields is an intermediate case of our incapacity to understand energy in the broader sense that we've been discussing, consciousness and the like. Is EMF on a continuum with the energy of consciousness or are these simply likely but completely discrete phenomena that are just at different levels in terms of our incapacity to understand?

*Ted:* Well I think at some level all forms of energy are on a continuum and so yes, I think they probably are but maybe quite distant on that continuum. But I do think you're raising an interesting question about asking about EMF and it's biological effects and how it's flummoxed so many people, and some people are resistant to thinking through it because there seems to be some features of EMF energy that just don't behave as if they were discrete particles, or chemicals or whatever and show us therefore that we can be, in some ways our understanding of phenomenon, can be hindered by the categories that we've built. So for example, we think, well it may be the case that the hypothesis seems to have some support that EMF causes biological effects, but you'd expect to see a bigger effect if you were exposed to more of the energy field and it doesn't seem to be the case, therefore it can't be true. So immediately we're caught up in this notion that if a little bit causes something a whole lot more causes more, but I mean that happens to be true for some things, but we know it's not true for all things and so people are suddenly realizing, well how could it possibly be that such a weak electrical field could cause a biological effect that had any consequence when we're exposed to the magnetic field of the earth, for example, that is orders of magnitude higher? Well there are plausible explanations for that but these questions, I think, often get in the way. So I think that in raising your question you've used the method and the example of how our current understanding, and our current categories are going to keep us from a deeper understanding of some phenomena that we don't even have a clue about and make me think that the time will come, that if the human species survives, when we'll look back and realize how primitive our understanding was right now about many phenomena that are occurring in the world.

*Michael:* Ted, a final question, you've mentioned Wendell Berry as someone who has influenced your thinking a great deal. Are there any other authors who come to mind that you would recommend to people who are exploring these issues? Any other sort of sources of wisdom and light that have moved you and you think would be useful to others?

*Ted:* Well, another ecologist that I've read fairly widely is Aldo Leopold and many people know of his "Sand County Almanac," but actually he was quite a prolific essayist. And many of his earlier essays have been pulled together in several volumes and re-published and they're interesting to read because you can see the evolution of his own thought. And as an ecologist he came to understand deep, deep relationships between individual and ecosystem health and came up with the notion of health being the capacity for self-renewal. Van Potter, an oncologist who coined the term "bioethics" back in about 1970, and his essays, some of which are widely available on the web, are quite interesting to read because there thirty-five years ago was concern about human survival, watching how humans were interacting with ecological systems in which we were living. And wondering what lives were going to look like and so posed bioethics as being a science for survival, interested in whether we would have lives of quality and what those lives might look like. So those are two people that come to mind. One of the physicists who was influential in my thinking about energy fields was David Bohm who was a theoretical physicist who worked quickly beyond my understanding of theoretical physics but his idea of the implicate and the explicate order in energy fields and so forth, helped me at least, to develop some images in my mind about ways of thinking about the world. So those are a few people who come to mind.

*Michael:* Ted Schettler as a physician and a leader in the environmental health community who travels tirelessly around the world and has touched thousands and thousands of people with your insights. Thank you for talking with us today and thank you for your work.

*Ted:* Michael thank you, it's been a real pleasure to have this conversation.