Interview with Dr. Michael Novacek

BILL MOYERS

I've been told by some scientists that we human beings are altering the biological future of the planet on a geological scale, and that no species in the four billion years we know about has ever possessed that capacity. Is that an overstatement?

MICHAEL NOVACEK

It's funny. In some ways, a bit of an overstatement, it's really a correct description of the power, the incredible power of this species over the planet. But it's not unprecedented. About three billion years ago, there were certain lineages of bacteria, may not have been just one species but a small corner of life diversity that fundamentally changed the atmosphere, because it had a lot to do with the concentrations of oxygen that converted a more ancient atmosphere into a more oxygen-based, or an atmosphere enriched with oxygen. So, there has been some fundamental change. But think of it in this way: as humans as a species we're fundamentally changing not only local ecosystems but the whole cycle and physical body of the planet.

BILL MOYERS

What does it mean when we say we human beings are changing the planet? What actually are we doing?

MICHAEL NOVACEK

Well, we have a sort of full-frontal assault on the planet from several different directions. First of all, we're markedly changing the biota. There's no question. The destruction of land, the diminishment of land has an impact on the millions of species that live in natural habitats. That number has to be reducing, and the data for that are striking. There's no question about that. But in terms of other activities, we're altering the cycles in ecosystems that have to do with the amount of nitrogen in the soil. We're changing other physical parameters of the planet in terms of, perhaps, even, atmospheric change in terms of temperature.

BILL MOYERS

When you say, biota, what do you mean?

MICHAEL NOVACEK

I just mean all the living things on the planet: the plants, the animals and a lot of the other organisms that we tend to overlook.

BILL MOYERS

Where is the Earth taking the hardest hit?

MICHAEL NOVACEK

There are a lot of scientific questions and studies focused on the places that are being most affected on the surface of the Earth. And one of the consensus of result is it's really hard to pinpoint any one ecosystem that's more under threat than another. There's a global level of threat that many have attacked around the world.

BILL MOYERS

I hear scientists talking about living today in human-dominated ecosystems. What does that mean?

MICHAEL NOVACEK

Well, you think about what our culture's gone through in times when places like museums or other institutions of learning and science were developed. Nature was this wild and untamed thing around us. Much of it was mysterious and far beyond our capacity even to take it in. Now, humans are essentially everywhere, and their role is not only in terms of human society and interaction. But it's an interaction with the other living things that exist on the planet. Everywhere we go, part of the energy recycling in an ecosystem, part of the feeding structure, part of the distribution of these organisms is affected by the presence of people, and humans are as much a part of those ecosystems as they were not part of those ecosystems some centuries ago.

BILL MOYERS

I don’t think many of us view of the world in terms of ecosystems. Is it important to think that way?

MICHAEL NOVACEK

The word is cumbersome, and there's no question about it – too long, too many syllables. But it has an important meaning: it's the interaction of living things, not only the diversity of living things but the way they depend on each other for the survival of the biological planet. So, we need to think of ecosystems and keeping those ecosystems in a healthy management profile.

BILL MOYERS

How are, for example, the forests and the reefs and the plains connected?

MICHAEL NOVACEK

These different habitats, they may be far apart from each other, but they have connections that relate to the atmosphere around them. Habitats, for instance, are very closely related to the way the ocean currents and the biological life in the ocean, is organized. So, the connections across these habitats are global now, and they've been global for 3.5 billion years.

BILL MOYERS

Do you think the fact that we're having such an effect on other species is very high on people's radar? I'm not so sure.

MICHAEL NOVACEK

I would agree; it's a very tough lesson to teach. There are several ways in which that message gets diluted. I think people go to a national park, and they see a lot of natural beauty around them. Or they go to a fish market and see a tremendous array of diversity there packed on ice. Or even a grocery store. People see that bounty of life around them, and it's very hard to accept the notion that it's very tenuous and under threat.

BILL MOYERS

Do we know the extent of the problem?

MICHAEL NOVACEK

I'd love to say that we knew in very precise terms what's happening to the living things on the planet. We can give it sort of a general ballpark figure, just based on the loss of land in many places in the world that is occurring. In a sense, it's a cultural embarrassment not to know the total number of species living on the Earth today. In an age where we can go to the Moon and explore Mars and penetrate the secrets of the genome, we really have a poverty of information about the range and the wonder of life living now on this planet.

BILL MOYERS

Why don't we have a better database?

MICHAEL NOVACEK

There are a number of reasons why our knowledge of the living earth is so poor. We naturally tend to focus on the more charismatic forms of life. We have a fairly good accounting of the whales in the sea and the problems that they face and lions and tigers and bears, as I like to say, and a lot of the other, more charismatic organisms. But when it comes to the lowly firm and the bacteria and the fungi and the mushrooms, and the slime molds, and all the things that are easy to overlook but yet are essential to driving, to maintaining these communities of life, these ecosystems, we have very poor knowledge. The number of specialists working in these areas are few. The developing countries that have a lot of this biological wealth and richness have a very poor infrastructure for educating and training scientists. There are a number of reasons why our knowledge is simply deficient in these areas.

BILL MOYERS

We're told that one thing that does make today unique, and we humans unique, is that we are causing a massive extinction. Is that so?

MICHAEL NOVACEK

There's no question of that. And it's a very powerful concept in terms of the history of the

planet. The planet's been shaken by a number of these mass extinction events, but for the first time, we have a very easily identifiable source for this stress and this extinction, and it's us. There's no question.

BILL MOYERS

Why are we doing it?

MICHAEL NOVACEK

I don't think we intend to destroy all this life. I think people love beautiful wilderness and nature, and that's the sadness. That's the paradox of this whole thing. Humans treasure nature, maybe even necessary not only for our aesthetics but for our survival, our community, and yet there's perhaps an unintentional but clear mark of devastation on the Earth's natural habitats.

BILL MOYERS

Why is that? Do we not know what we're doing? Or do we think it will automatically regenerate itself?

MICHAEL NOVACEK

I think there are two reasons why we have the problem. One is, we have enormous needs. With the current population projections over the next three decades, it's been said we need to increase food production by 62 percent. That's a tremendous amount of human need to feed our populations. So, that's one of the drivers. The other may be simply ignorance, a sense that these devastating effects are not real or they're unknown or they're not related to our everyday lives.

BILL MOYERS

How does it affect my survival that we lose a quarter of the bird species over 1,000 years or that the worm disappears? People seem to fail to make the connection, including yours truly, between that little bacteria or that worm or that bird and my survival.

MICHAEL NOVACEK

It's not an easy connection to make always, because the ecosystem, that is, the systems of living organisms, uh, that bring organisms to work together, they're complex. And, indeed, very often, some of this devastation may happen, in some cases, far away from us, and those problems are removed from the kinds of environments we live in.

BILL MOYERS

You're a paleontologist. You've spent so much of your life studying the extinction of the dinosaurs. I mean isn't it part of the natural cycle for species to die and then rebound?

MICHAEL NOVACEK

It's very true. The paleontologist knows better than, perhaps anybody else that the extinction of life is part of the reality of life and the history of life. But when you look back at the extinction

events, you're talking about a scenario for recovery that are extraordinarily long. It's shown that after a big event like the event that killed all the dinosaurs that it took about ten million years for these natural habitats, these ecosystems to recover to where they were really functioning in a way that they were before for the extinction event.

Worse yet, in terms of the current crisis, you know, when that asteroid hit the Earth, that was it. That was the big event. And then the Earth had a chance to recover from it. But humans aren't going to go away unless there are other things that take over to control their population. Humans are there as an agent for destruction and extinction, and they're not going to disappear like the asteroids. The recovery of the planet is not going to be affected under those conditions.

BILL MOYERS

Is it fair to compare the spread of humanity, the population growth to the kind of event that the asteroid represents?

MICHAEL NOVACEK

I think it's fair in terms of impact. There's a rather objective side to something coming out from outer space. That's the way the universe works. You throw the dice, and there you go, something hits the planet and, boom! It’s fair to compare us in terms of impact, but there's a distinct difference between ourselves as an agent for massive biologic destruction and these other agents. We have not only the capacity to identify the source, but the capacity to do something about it. We have in our power the capacity to address these problems and recover, try to sustain some of these environments or lead a recovery effort to do so.

BILL MOYERS

But is the impact of this human species severe enough to create as long as period of denial, as long a period of recovery as the loss of the dinosaurs?

MICHAEL NOVACEK

I think it's conceivable that it could. It could also create a longer one. We don't know all these issues. We don't know these forecasts. But given the kind of massive destruction of many habitats we're facing, we'll fundamentally change the biological texture of the planet, and it may never return to the basic kind of structure that it's had over the last 300 million years.

BILL MOYERS

Are we our own worst enemy?

MICHAEL NOVACEK

I think we are in that sense because we, as humans, have the capacity to improve the current situation. Yet we have to recognize that our need to do this must take place in spite of some of the other basic needs or urges we might have for more food, more land, more development, more economic growth and so forth. There are lots of good strategies that bring together growth and economics in development with sustainable environment strategies. We don't want to sacrifice everything. Humans have to live. Their lives have to improve. But we have to be more mindful about how that really fits with the environment.

BILL MOYERS

Is there anything in your experience that suggests we human beings take the long view, that we do defer our gratification, that we do put off short-term gain for an intangible return we cannot yet see?

MICHAEL NOVACEK

I think that the cases of our long-term vision, especially when it comes to the environment, are unfortunately rather rare. I'll take anything I can as an example, because I'm an optimist. I'd like to think that humans have the capacity to do this, and they will do this, and I think it starts with a vision of national parks in the United States over 100 years ago to programs like Costa Rica, who really have, at the governmental level, a recognition of biological diversity, of the richness of living species, as a national priority, sustaining that as a national priority, because it brings tourists, it's good for the economy, and it's good for the quality of life and the country. And there are, I think, some very inspiring programs going on right now. The problem is, they're not enough, and they're not as widespread as they need to be.

BILL MOYERS

Is it too late? Are we on the brink?

MICHAEL NOVACEK

It's a tough thing to say. I have a lot of colleagues in the field that basically say, "Well, I'm not really trying to save the Earth. I'm just trying to get a census on what's left, and, so, people will know." I would like to sort of diverge from that viewpoint. I really do think that there are a lot of scientists, a lot of professionals who understand this biodiversity loss better than anyone else…who really believe that that kind of information, that kind of work with conservation action and with government and policy, can lead to sustainable conditions that are better than we have now.

BILL MOYERS

You've spent the last 11 summers in Mongolia digging for dinosaur fossils. Have you noticed changes in the landscape?

MICHAEL NOVACEK

Absolutely. You know, I work in the Gobi Desert–one of the emptiest places on Earth. But fringing that desert are steppe lands and grasslands, and even in the desert itself are areas, the major areas of grazing, and just the station more sessile, the more stationary lives of a lot of the nomads have fundamentally changed in these areas. One of the most famous dinosaur sites in the world is the Flaming Cliffs–a beautiful escarpment of red cliffs where the first dinosaur eggs were found, and it's surrounded by beautiful green summer pastureland. And in the last two years, the huge size of horse herds and other domestic animals have very notably increased, as has the population in the valley. And the terrain. The grasslands do not look as lush or as high as they've had in years past.

BILL MOYERS

And this is a place with a lot of land and a low population, so it seems to me, they might have a chance to make it.

MICHAEL NOVACEK

Absolutely. You know, when I came to Mongolia ten years ago, I just said, "Wow!" You know, I've worked in a lot of empty places, relatively wild or natural areas, even in the Western United States. But we drove into a steppe land in a desert where there's not one single fence for thousands of square miles. It's an amazing sense of openness in a frontier sense. I thought I'd gone back 100 years in the Western United States. Of course, it's a little deceiving, because as we've seen, even knowing they have a very small population, you can have a very large effect, if you're trying to raise herds of that size on what turns out to be very fragile landscape.

BILL MOYERS

So, they're losing their resources, in effect? For what?

MICHAEL NOVACEK

Yes. That's the question. What are they gaining from that? It's a terrible dilemma.

BILL MOYERS

How do you get one herder here and ... one herder there to say, "Hey, this is good for me. But it's not good for all of us in the long run. So, I'm gonna take my herds on a migration in order to let the pasture recover"?

MICHAEL NOVACEK

This is a very tough thing. I mean, obviously, the market economy drives competition, and they're not gonna give up their desire to stay in one place or exploit some landscape if that's going to allow someone else to come in there. It's gonna take some management and regulation, I think, to do this.

BILL MOYERS

Why should I care about a problem in a place as remote as that?

MICHAEL NOVACEK

Well, the connection there, in terms of what we use, what's produced, what comes to us, may be a little thin. We're not drawing heavily on the resources from that country. But Mongolia really maintains perhaps one of the most important grassland ecosystems on Earth. So, the fundamental workings of that section of the living planet need to be preserved, and there's an enormous amount of aesthetic and, I think, in a sense, moral obligation that comes with saving those beautiful areas and the cultures that depend on them.

BILL MOYERS

So, there is a value in saving something for its own intrinsic sake, even if it doesn't benefit me personally?

MICHAEL NOVACEK

You bet. But you know, in a sense that even though the connections may be more indirect and more tenuous, essentially, all these things to relate to our life and our needs as well.

BILL MOYERS

So, do we take all this for granted?

MICHAEL NOVACEK

I don't think we take it entirely for granted. But I think we take too much for granted.

BILL MOYERS

What would you have us do differently?

MICHAEL NOVACEK

I think there are a lot of responsibilities here: an investment in terms of our national and government priorities is an investment in understanding the environment and the development of policies to maintain our balance with our natural world.

I think that takes leadership and vision and a way of bringing people together to recognize those problems. There are people who understand these things. We're still learning a lot about the natural environments of the planet, but the information is there. It has to be more effectively shared with people through outlets like this and many others, and there have to be ways in which people are helped in responding to it and learning from it.

BILL MOYERS

Here we are, talking about the future, with a man whose whole life has been lived in millions of years in the past. Is there any kind of practical, utilitarian connection between your search for what happened to be the dinosaurs millions of years ago and what we face today as human beings?

MICHAEL NOVACEK

There are certain levels of connections between what we study in the past and understanding the future. At one level, simply, studies that show historical documentation of how long it's taken communities and ecosystems to recover from mass extinction events, I think, are very educational in terms of our forecast of the impact of events we're experiencing now.

I think that some of the more remote extinction events — 200, 100 million years ago — those connections with our modern situation are not so clear-cut. But we've had a number of extinction events that go back less than a million years — 100,000…10,000 years — and I think the closer we get to our current situation in time, the more relevant the fossil record becomes in terms of what it can tell us about our current situation, our current extinction event in the future.

BILL MOYERS

What is an extinction event?

MICHAEL NOVACEK

Well, you know, extinction goes on all the time, over a 3.5 billion years of life. 99.99 percent of all life that ever existed on this planet is extinct. There's a good way of saying that: if you want to go explore life on other planets, you should take me, a paleontologist, because more likely that life will be in fossil form than alive on the planet. Things die out, and they're replaced by other species.

BILL MOYERS

What was the last one?

MICHAEL NOVACEK

Well, the last major mass extinction event was really the dinosaur extinction event of 65 million years ago. We have figures that suggest as much as 70 percent of the species life on the planet was extinguished during that event. But 250 million years ago, things were much worse. We lost about 90 percent of all life on Earth in the oceans and on land in some massive extinction event.

In more recent times, we have had major extinction events. But they've been much more selective. For example, over the last 10,000 years or so, and a bit more, we've seen the loss of large animals, particularly mammals, on islands, on the North American continent, where we do think, once again, we're moving into the area of cause that might relate to the activities of humans. But these are more selective mass extinction events. They're really focused on certain aspects of the biota.

BILL MOYERS

So, should I get out of bed in the morning?

MICHAEL NOVACEK

I think everyone should get out of bed every day and say, "What am I going to do today in terms of this planet and its sustainability?" Whether it's learning more about the problem, whether it's as a scientist studying it or leading the kinds of programs that bring scientific results and conservation action together, whether it's your role in your community, your local community, your role in action and policy action or anything else.

BILL MOYERS

You talk about these five extinction events, and all of us kind of subconsciously think of the possibility of the sixth one. And yet through all of this, through all these billions of years, no matter what happened, life in some form went on. Here we are, you and I and six billion of us around the planet. Somehow, it goes on. It never gets totally wiped out.

MICHAEL NOVACEK

Life will probably go on beyond the current event, even if it's unchecked and massively

destructive, beyond even what we predict. But think about it in these terms from a relative perspective. As far as life itself, there can be survival over the life of the planet. But what if you are a dinosaur, what if you are part of that ecosystem that's so threatened? It's not a good place to be in. So, from our standpoint, even if we survive, these major events, we may survive under conditions and a quality of life that's hardly acceptable to our species.

BILL MOYERS

We begin this century with six billion people. We might end it, by one reckoning, with 12 billion. Could the doubling of the Earth's population be the equivalent of a mass extinction event?

MICHAEL NOVACEK

I think the doubling of the Earth's population in combination with a kind of consumption, the kind of distribution of resource and consumption that we are now on, could be an equivalent driver to a massive extinction event.

BILL MOYERS

How so?

MICHAEL NOVACEK

Well, I think, you multiply the number of people and their needs and the huge needs in food and food production, and, frankly, the overconsumption in areas where that kind of resource use, is possible, then, you've got an enormous problem for the balance of the planet. We've already seen the devastation of a lot of marine life. And it's really a matter of time till we see, you know, the loss of major food sources in the marine environment. I think, things that we take for granted now, and I think there are many land-based environments that will limit us in the same way.

BILL MOYERS

How much time do you think we have to act?

MICHAEL NOVACEK

I think we have no time to act, in a sense. There's no security range. I think we're seeing the extinction taking place. It started some time ago, and what we're trying to do is mitigate the impact. It's already here. We're seeing a system ... we're seeing a system where the Earth has essentially changed, where natural habitats are dominated by the activities of humans. We have to deal, accept that transformation yet check it. And we have no time to do that. We have to do that now.