



## Program Transcript

CHARLIE MELANDER: It is so difficult to break with tradition.

MARIA FERNANDEZ-GIMENEZ: If there's anywhere in the world where there's some hope, this is where, it can happen.

BEATRICE FERREIRA: Everything's interconnected. Everything depends on everything.

BILL MOYERS, V/O: What on earth are we doing to our planet?

BRIAN VAN WILGEN: I think people don't realize that a whole lot more species of plants are threatened with extinction than animals.

BATBUYAN: The way how we're living now is changing quickly, very quickly.

MICHAEL NOVACEK: We're fundamentally changing the whole physical body of the planet.

BILL MOYERS, V/O: The Endangered species today - is us.

CHARLIE MELANDER: We have a lot of areas in Kansas where you can't drink the water

MELANIE STIASSNY: We are pushing our planet to the absolute limit of its ability to function.

BILL MOYERS, V/O: All over the world we are looking for a way out.

PRISCILLA NYEWU: Working for Water.

EDITH HENN: I'm doing something for my country.

BILL MOYERS, V/O: But will we make it in time?

CARL SAFINA: I think we're pretty well into the warning phase now. I hear buzzers going off all around me.

ADRIAN FORSYTH: We do have this brain that is capable of reason and we could think our way out of this one if we chose to.

BILL MOYERS, V/O: From around the globe, this special report - Earth on Edge.

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service. Now we're doing the same for the rest of America. Mutual of America. For all America. The spirit of America.

BILL MOYERS: Earth on Edge - but the edge of what? Scientists around the world this month launched an effort to answer that question. It's the most ambitious project ever to measure the human footprint on the earth. The human footprint is how scientists talk about the impact you and I and the other six billion of us are leaving on the natural world.

There's an urgency to this because we may be crossing thresholds that have never been crossed before. A preliminary survey has already reported that we're pushing the earth's life-support systems to their limits.

That's what ecosystems are -- our life support systems. It's the bear and the beetle and the forest. It's the fish, the coral reef, and the sea around them. It's the grassland, the mountains and their rivers. These ecosystems feed and clothe us. They purify our air and water. They recycle our waste, enrich our soil, and provide us jobs. We couldn't live without them.

But our demands are putting these resources at risk.

To find out what's really happening is the goal of the Millennium Ecosystem Assessment. That's the official name for it. As we'll see in this broadcast, which we've done with the World Resources Institute. Scientists are starting to comb every room in the global household to see what we have to do to go on living here.

In this report we'll travel to Canada, and a remnant of ancient forest in British Columbia. To the coral reefs and mangrove swamps of Brazil. To the Cape of Good Hope in South Africa. And to the vast grasslands of Mongolia. Between visits we'll hear from some men and women whose life work is the web of life itself.

## KANSAS: FARMLAND

BILL MOYERS, V/O: We begin at home in the heart of our own country, in the state of Kansas. Nature took hundreds of millions of years to store its treasures in the center of our continent. Over the millennia, the oceans and glaciers retreated, leaving behind the Great Plains. The sea of rubble became a sea of grass - a vast natural storehouse of minerals and nutrients. American farmers turned it into the best farmland the world has ever seen.

CHARLIE MELANDER: What I would call a farmer, is a person, who has almost a religious experience with soil. With the land. And it becomes a personal thing for him. . . .

BILL MOYERS, V/O: Charlie Melander is the third generation of his family to farm the prairie soil south of Salina, Kansas.

CHARLIE MELANDER: In the spring, we start working the ground that's going to be put into the spring crops such as grain sorghum or soybeans. Break the soil crust, scatter the previous crop residue, and prepare for planting. May and June are really busy times because we're trying to plant those spring crops - soybeans and milo.

Well, one of the joys in farming is getting to see the changing landscape. One season to another, each has its own beauty. And the diversity is - it's great to behold.

You see the wildlife, and the patterns that they go through, and how they're affected by what you're doing as a farmer.

Then in the fall when we get ready to harvest the spring crops, when the milo's mature, well, then it's time to be planting wheat and getting the wheat ground ready.

BILL MOYERS, V/O: Not until the 1850s did a plow touch this prairie. If the blades of grass were tall, the roots were longer still - and intertwined for centuries. It took a team of straining oxen to drag a steel blade through that doormat of organic life.

But the prize was worth it: millions of years of stored, mineral wealth - just waiting for cultivation. When word of this discovery spread, land-hungry farmers came from Europe in droves.

CHARLIE MELANDER: They were desperately poor in Sweden. I think that's one of the reasons my grandfather came to this country. The family was dividing up the property. Then they came to him. He was the youngest, and when they came to him, there wasn't anything left.. He migrated then to America.

BILL MOYERS, V/O: They had worked hard in the Old World and still they were hungry. In the New World, they would work hard and prosper.

The freshly-opened ground yielded its bounty to their labor.

But when the prairie sod was broken and turned, it was also exposed to the elements. Though they didn't know it at the time, the immigrants unwittingly triggered the soil's undoing, just by dragging a plow through it.

CHARLIE MELANDER: According to the traditional farming, you are supposed to tear the ground up, make a lot of dust, a lot of smoke. And the more you tear the soil up, the better a farmer you are.

BILL MOYERS: And every time you would work it, you would lose a little more ...

CHARLIE MELANDER: (Overlap) That's right.

BILL MOYERS: soil, a little more run off and a little more erosion.

CHARLIE MELANDER: (Overlap) That's right. And we would be pulverizing that ground, making it into those little fine soil particles that blow easier.

BILL MOYERS, V/O: And blow they did. Drought and wind struck often on the prairies. In the 1930s, they hit again, at the newly-plowed soil. Sixty-two million acres of farmland became dust. One storm alone picked up three hundred million tons of soil. Black clouds carried prairie earth to the streets of Chicago, New York and onto the decks of ships as far away as the Atlantic. The Dust Bowl was the worst environmental disaster in our history: a calamity we survived and overcame. Or so the story goes. In fact, the land didn't ever completely recover. And, if prairie farms look good today, it's only because looks can be deceiving.

Every acre of Plains farmland is losing seven tons of top soil every year - washed away by the rain, blown away by the wind. Since they were first plowed, the prairies have lost one-third of their top soil and half of their nutrients -- most of that since the Dust Bowl. At this rate of loss, it won't take long for these constantly plowed seedbeds to give up growing anything at all. This is the quiet, unseen crisis of the land here.

CHARLIE MELANDER: Soil in my mind, now, is a living thing, which we have to uh, to guard and husband as much as we possibly can.

BILL MOYERS: It took this soil here, thousands of years. Millions of years.

CHARLIE MELANDER: Yes, absolutely. And . . . we could destroy it in just a few years.

BILL MOYERS, V/O: About twenty years ago, Charlie Melander realized he and his neighbors were a big

part of the problem. So he started making small changes that turned out to be revolutionary.

CHARLIE MELANDER: My idea of what a good farmer is has changed dramatically. I thought you had to have a field tilled deep. . . . In fact, we don't have to till at all. We can go into a field that isn't tilled, and this blade actually tills a strip about yay wide. And then these disks come up behind it, drop the seed into that trench. So instead of working the whole field, we just work a strip a quarter inch wide.

BILL MOYERS: And you don't have to tear up the soil?

CHARLIE MELANDER: Right, right. Save all that time and money and energy So, we learned some things that to us were shocking. We learned that uh, clods, large soil particles, could assist us in suppressing weeds. We found out that residue - the stalks and all that-- instead of being something that you try to dispose of, can help you because it acts as a mulch. I think we can farm and accept five or six weeds in an eighty acre field. And we shouldn't feel guilty if they're out there.

BILL MOYERS, V/O: By changing the way he tills, Charlie has been able to reduce the damage that farming does to his soil. And more. He is also bucking the tide against the excessive use of herbicides, pesticides and fertilizers.

CHARLIE MELANDER: It is so difficult to break with tradition. It is so difficult to fight what all of your neighbors are doing. It is so difficult to walk away from all the advertising and not be affected by it.

BILL MOYERS: The advertising?

CHARLIE MELANDER: The herbicide ads that - that that say, "Well, if you use our herbicide, your wheat is going to make ten bushel more per acre. If you use our fertilizer, you are going to be overwhelmed with yield."

CHARLIE MELANDER: So we think well, instead of putting on 20 pounds of fertilizer, I'll put on 40 pounds, hoping that that additional government subsidy is going to pay for the additional input.

BILL MOYERS, V/O: It's called "farming the government." Last year the United States government paid \$28 billion to farmers in crop subsidies and tax deductions for everything from tractors to herbicides. The more they use, the more they get.

CHARLIE MELANDER: And the first thing you know, we're just saturating our soils with the chemicals and the fertilizers. That's a tragedy. We're talking about nitrates leeching into the ground water. Nitrates, and other fertilizers, ending up in our streams and lakes. We have a lot of areas in Kansas where you can't drink the water, and we're having a problem with that. Not only in the Gulf of Mexico, but in Kansas.

BILL MOYERS: Are they connected?

CHARLIE MELANDER: Absolutely. The pollution I commit here, is going to end up as pollution in our streams, and ultimately, elsewhere.

BILL MOYERS, V/O: All rivers east of the Continental Divide, and those from the Ohio River System drain into the Mississippi. Loose soil treated with herbicides, pesticides and fertilizer washes down the rivers to the Gulf of Mexico to an area just beyond New Orleans known as the dead zone - so polluted no fish can live there.

CHARLIE MELANDER: I maintain that we could change our environment almost overnight, if suddenly we said we'll reward less fuel usage, less herbicide usage, less fertilizer usage. Plus it is not only that I'm doing it for the environment, I'm saving dollars. In this area, the average farm would have spent about 25

dollars an acre on herbicide for this crop. I spent nothing. So I'm getting rewarded.

BILL MOYERS: What has happened to your yield since you have been doing this?

CHARLIE MELANDER: Oh, it's - it's stayed about the same. Originally I was really pessimistic, but now, from what I'm doing I can see that there are some simple things we can do to really make a difference, that wouldn't have to cost a penny more than what we're spending.

BILL MOYERS: Are you in the minority of farmers around here?

CHARLIE MELANDER: I would say so, yes.

BILL MOYERS: You say so with a grin.

CHARLIE MELANDER: Well, I know so. But I'm doing what I think is right. In the business test, I'm making that work, because if I didn't, I would lose my land. And I haven't been losing ground.

BILL MOYERS, V/O: In fact, Charlie has been gaining land by bringing back switchgrass, sideoats and bluestem: original prairie grasses that hold on to his soil.

CHARLIE MELANDER: The grass is going to break the wind as it comes howling out of the South - stopping dust. And also if we get a hard rain, these grass strips are going to clean the waters that leaves this particular field. One of the things that - that's is an asset in this kind of farming is that you get to see a lot more wildlife.

BILL MOYERS: How so? How come?

CHARLIE MELANDER: Well, we have grass strips where they can nest in. They have cover all year round. They have different sources of feed outside the grass strips so it - it is just an ideal wildlife habitat.

BILL MOYERS: That's the way it was when the prairie was virgin, I mean, the - the species supported each other, both the - the grasses and the wildlife. Is it getting some of that back?

CHARLIE MELANDER: In this case, we are.

BILL MOYERS, V/O: Weaving all of the pieces of the ecosystem together means recreating diversity and balance. Grass, wildlife, crops and livestock sustain each other.

CHARLIE MELANDER: I think animals go with a good farm.

BILL MOYERS, V/O: Once upon a time, all farmers raised their own animals. But now, most are raised in crowded feedlots.

CHARLIE MELANDER: What we do is put hundreds of cows in a small pen . . . or cattle . . . so they don't get exercise. Disease factor multiples. Why not have them out? They'll be happy out looking out for themselves. I learned that livestock can be a valuable part of the farm operation, because they can utilize residues. . . .

BILL MOYERS: The stuff that was left in the field after you've harvested.

CHARLIE MELANDER: The stuff, yeah, that we've ignored for years.

BILL MOYERS: Putting them back in the ecosystem.

CHARLIE MELANDER: Absolutely. We started a small cow herd, and contrary to everything that's supposed to do, started feeding my cattle residue. Those bales over there - you see those bales? You're not supposed to feed those to your cattle.

BILL MOYERS: Why?

CHARLIE MELANDER: Because we never did.

BILL MOYERS: (Laughs) Right. You never did.

CHARLIE MELANDER: Let the critter go out and eat the alfalfa on his own or let him come in here and eat the residue and leave the fertilizer. And Bill, when you think about it, it's better for him anyway because he needs good exercise.

BILL MOYERS: You know, I live in the heart of Manhattan. Why should I care about how you farm out here, as long as I get the food I need.

CHARLIE MELANDER: Because it's - the equation's not that simple. The food you get is produced in a complicated process. And one of the costs can be polluted water. And even in New York, you're going to need good water. You're also going to need fields back in Kansas that haven't eroded for future generations. So, whether you like it or not. You're going to be affected by what we do or don't do.

Almost two-thirds of agricultural land worldwide has been degraded in the past 50 years.  
*-World Resources 2000-2001 Report*

ADRIAN FORSYTH: If you actually did all the calculations about what went into our abundant cheap food, you might conclude, well, we can't keep this up forever.

BILL MOYERS, V/O: Adrian Forsyth of the Amazon Conservation Association studies the animals and plants of the Tropics.

ADRIAN FORSYTH: Eventually, the cheap fertilizer is going to run out. Eventually, the cheap transportation is going to run out. Uh, eventually, we're going to have to do something about regulating toxins in our - in our water. So, the picture is only rosy for a little while.

BILL MOYERS: Can we make more demands on the Earth than the Earth can supply?

HABIBA GITAY: To a large extent we are doing that, that's why those ecosystems, those systems are collapsing.

BILL MOYERS, V/O: Habiba Gitay, of the Australian National University, studies the effects of climate change. She advises the World Resources Institute.

HABIBA GITAY: If you just had say for example, climate change as one pressure, you'd say ok maybe the earth can cope. But we've got land fragmentation. You've got habitat destruction and therefore biodiversity loss. We've got water pollution and so on. All of those put together are basically making our planet very, very fragile.

ADRIAN FORSYTH: Our collective weight on the planet, uh, six trillion tons of protoplasm out there having to be fed every day is a lot of weight for the planet to bear.

BILL MOYERS: Do you think we can redefine what we need in terms of what nature needs?

ADRIAN FORSYTH: I think we can, and I think we have to. I think this is a - a transformation that's going to take centuries.

BILL MOYERS: But what will the world look like by then?

ADRIAN FORSYTH: I think we will have, uh, degraded a lot of it to the point where it is like, uh, like a Haiti, and um...

BILL MOYERS: When you say resemble Haiti what's the picture in your mind?

ADRIAN FORSYTH: Of a land that's been stripped of its topsoil, where there's no fish in the rivers. Where the rivers dry up every dry season so that, you know, water is scarce. Where you don't have enough fuel wood to cook, to boil your water so that your children have intestinal parasites. Where you have to risk your life and your family's life by getting on a raft and sailing across the ocean and ending up in Florida. You know, ultimately when we destroy the natural resource base, we either have to move on to another place, and what happens when there's no place to move on to?

HABIBA GITAY: Then ultimately what we are facing is conflicts over natural resources. And we've already seen in certain parts of the world that you've got conflicts occurring over water rights. And maybe that's what we're going to end up facing is we are going to have conflict and human death, fighting for natural resources.

BILL MOYERS: What about the human imagination, the human creative capacity to do what it's never thought of doing before?

HABIBA GITAY: That tends to be our long term optimistic view, that we'll, that we can leave a very bad legacy for our children or grandchildren and they'll find a solution. But I think we're running out of those solutions. We've tended to rely on natural resources to give us those solutions, and if the natural resources are being depleted or degraded, where are we going to get those solutions from? We still have to be on planet Earth.

BILL MOYERS: How do we go about measuring our true impact on the planet?

HABIBA GITAY: That's what the Millennium Ecosystem Assessment is going to attempt to do. Right from the local level to the global level. It's not just looking at the cuddly and cute animals. Or the wonderful trees as well because people do that as well. Some of the trees are very beautiful. It's looking at how whole of the ecosystem is functioning. Is it healthy? Is it able to support life and therefore ours? Or is it deteriorating?

ADRIAN FORSYTH: You know in the past we've tried to save a panda, or a tiger, whatever. And you know we now realize that we have to save the whole ecosystem, not just the particular thing of interest, but everything that it's connected to - including the people that live in that ecosystem. They're part of it. BILL MOYERS: How much time do you think we have to turn things around?

HABIBA GITAY: Do I have to answer that one? (laughs) The beauty of human beings is we can be very greedy and very demanding but also once people start thinking that this is an important issue, we do need to change things. We can turn it around very, very rapidly.

SOUTH AFRICA: FRESHWATER

BILL MOYERS, V/O: The most valuable and the most imperiled resource in the world is fresh water.

PRISCILLA NYEWU: [English Translation] Water vapor comes up from the sea into the sky and there it

forms clouds that get thick with rain which falls to the ground. We drink it, we make electricity out of it, we even make our homes from it. Right.

BILL MOYERS, V/O: Water is for everything we do - but water is not forever. There is now half the fresh water per person than there was in 1960. In twenty-five years, we will have half of what we have today. They are already running out of water in South Africa - where the population is growing four times faster than the water supply. Five years ago the government decided it was time to tackle this threat to life itself. They put 40,000 people to work preserving water.

PRISCILLA NYEWU: Working for Water. [English translation] What are we working for. We are working for water. The people are doing that.

BILL MOYERS, V/O: We ride on the blue planet - a sphere with far more water than land. But less than 3% of all the water on planet Earth is fresh water - and most of that is held in glaciers and the polar ice caps.

Much less than 1% of all the freshwater on Earth falls as rain - and that unevenly: buckets in the tropics, showers in the temperate zones, barely adequate cloudbursts in the arid parts of our world, such as South Africa.

BRIAN VAN WILGEN: These mountain areas, with this vegetation cover are extremely important in terms of generating the stream flow that - that keeps the rest of the country going.

BILL MOYERS, V/O: Ecologist Brian van Wilgen studies the relationship between plant life and water. All of South Africa draws its water from rivers that flow out of just a few mountain ranges. The sparse mountain rainfall is channeled to the rivers by a family of flowers unique to the Cape of Good Hope.

BRIAN VAN WILGEN: The world is divided into seven floristic kingdoms. And this part of the world, in the southwestern tip of Africa, is a floristic kingdom of its own. There's about eight and a half thousand species of plants here of which roughly 6,000 are found nowhere else on earth. The stuff you see around you here is a vegetation type we call fynbos.

BILL MOYERS, V/O: The fynbos - Afrikaans for fine bush - is perfectly suited to conserve rainfall in a dry climate because, like cactus in a desert, it uses very little water when it does rain and hardly any when it doesn't.

BRIAN VAN WILGEN: With these plants, you get stability in the soil, you get a good generation of stream flow from the area, and so they serve a very good purpose.

BILL MOYERS, V/O: But the Europeans who came to South Africa three centuries ago didn't recognize the value of the fynbos and its role in this very foreign ecosystem.

BRIAN VAN WILGEN: I think the Europeans first impression was a treeless landscape, which is something that they were not used to. I mean - coming from Europe, wild areas would have been covered in forest, and forest was regarded as both useful and culturally nice. They liked having shade to sit under. The people who spent a lot of time walking in the mountains used to take bags of seeds with them and just as far as they walked, they used to spread the seeds around.

BILL MOYERS, V/O: Pine, eucalyptus, black wattle, blue gum - all these foreign trees grew, cast their seed to the winds, and forests of alien trees invaded the mountains. That's when the problem started - for trees aren't always good for the ecosystem. These newcomers crowded out the native fynbos flowers - and drank copiously from the precious ground water.

BRIAN VAN WILGEN: Well, if you use the term they drink the water, that's quite a nice way of putting it, but that's exactly what they do. And trees grow by using a lot of water, and they're what we call luxury water users. As long as there's water available in the soil, they will use it. They'll take it up with their roots, pump it through their stems, through their leaves, and use it in the photosynthesis process to produce

BILL MOYERS, V/O: By the 1920s, biologists noticed that streams were drying up in the same places where non-native or alien trees were planted. So they performed an experiment. In one area they cut down all the pine - a species not native to South Africa. Next to it, they planted only pine. Then they compared the stream flow in both places.

BRIAN VAN WILGEN: After about 15 or 20 years, the stream flow had been reduced to about 50% of its level. Now, given that South Africa is in essence a dry country and most of the water that we use in the lowlands is generated in these mountain areas, that is a huge impact.

BILL MOYERS, V/O: Invasives drink too much and too quickly. Nationwide, that means 872 billion gallons of water a year go to the trees and not the streams.

BRIAN VAN WILGEN: It's 7% now, but if we wait for a while, the plants continue to spread, and we'll go up to 10% or 15% within ten or 15 years, and that's significant.

BILL MOYERS, V/O: At that rate, half of South Africa's rivers would run dry within the next fifty years. This eucalyptus drinks 12 gallons of water every day. Now it drinks none. That's the essence of Working for Water. Forty thousand people saving water by destroying invasive alien plants. It's that simple. There are 290 Working for Water projects in South Africa. The Palmiet Project is one of them: 120 people working on a nature preserve that straddles the Palmiet River. There is more rain fall here than anywhere else in the country - and there are more.

Edith Henn is the manager of the Palmiet Project.

EDITH HENN: The Working for Water originally started to get rid of all the invasive alien plants we have. And what we doing is cutting out these invasive alien trees to ensure that more water reaches the streams so that will ensure more water for the animals and for the people of South Africa.

BILL MOYERS, V/O: Thousands of people nationwide had to be recruited, assigned into projects and taught the basic skills of plant management. Priscilla Nyewu trains workers in everything from first aid to plant identification.

PRISCILLA NYEWU: [in Xhosa] Right, coming to this tree now. This one we call it a black wattle,

EDITH HENN: Priscilla, she's speaking their language and is from the same background that they are, and she's just got this very easy way of bringing things across.

STUDENT: [in Xhosa] This tree is a pine. You can see its long leaves.

JACKIE VAN DER MERWE: That is a pine preister and up there that is a port Jackson, that is part of the acacias. Okay, so that must be coming out, and that pine must be coming out.

BILL MOYERS, V/O: Jackie van der Merwe scouts the preserve for invasive plants, plots their location and figures out how much work it will take to clear them.

JACKIE VAN DER MERWE: [English translation] We look at ease of accessibility. Type of soil and vegetation. We look at the slope, we look at walking time, the distance between two areas. For sixteen hectares, it would take one-hour walking time. The slope will be steep. "Ease of Accessibility" will be very

high. Sometimes I am walking forty kilometers, maybe more, maybe less, up down, up down, over rivers, it's just the nature, it's just good, and I just love my job.

BILL MOYERS, V/O: When Jackie has located invasive alien trees, cutter-slashers move in to kill them . . . no matter where they are . . . It may take a helicopter, four men, climbing ropes and a chain saw to remove three pines. But if they weren't removed, the hillside would be covered with pine within twenty years - and the Palmiet River flow reduced even more. Because of this work, just the opposite has happened.

BRIAN VAN WILGEN: What also we find in areas which have become invaded by these alien plants, where we - where we clear them and people have lived in those areas for 20 or 30 years, they will tell us - you know, we haven't seen the stream flowing for - for 20 or 30 years, and as soon as you clear the trees, the water starts flowing again.

BILL MOYERS, V/O: Their efforts have already increased the water supply in just the Western Cape by one hundred million gallons a year.

BRIAN VAN WILGEN: In a developing country, when you talk about taking water away, you're talking about having a large impact on economic growth, on job creation, on - on our ability to fight poverty and so on. So, that was obviously the button to push and - and it worked.

BILL MOYERS, V/O: One-third of South Africans already don't have enough water. They are the same people who don't have enough food and don't have jobs. After Apartheid ended, the new government could see that chronic water shortage and chronic poverty could be two problems with one solution.

EDITH HENN: The social development, the development of the person should go together with the environmental development, yes, and I think that is what the project is all about.

BILL MOYERS, V/O: Lucas Mtoko and Fancy Mgxotwa are Xhosa people. Three years ago they had no work and no skills. Working for Water gives them day care for their children, health care and free transportation - in addition to training and jobs. . . .

Lucas is leader of a cutting/slashing team.

LUCAS MTOKO: [English translation] Before we just woke up and sat at home. So many people in the townships just started to steal and they went to jail. And the children start to steal too. That's the way it is for so many people. But now we wake up and go to work.

BILL MOYERS, V/O: The cut wood is taken away and turned into charcoal, paper and furniture. Lucas' wife Fancy Mgxotwa picked apples in an orchard before Working for Water trained her as a chain-saw mechanic.

FANCY MGXOTWA: [English translation] I'm going to look here now, because I have to make sure that this is good and tight. If I don't do that, the chain can get loose and hurt someone.

BILL MOYERS, V/O: There will be people Working for Water in South Africa for at least the next twenty years. That's how long it will take to stop the spread of invasive alien plants which can never be completely eradicated.

BRIAN VAN WILGEN: In other words, once they introduce and spread around, they - they will be around forever, probably. But you can bring them under control by first of all, keeping the numbers down so that they are controllable.

PRISCILLA NYEWU: [English translation] We are taking away all of the trees that drink our water. Right.

BILL MOYERS, V/O: The people who increased South Africa's water supply are justly proud of their achievement.

EDITH HENN: I'm doing something for my country, my people, my fellow South Africans. That's why I'm doing it.

BRIAN VAN WILGEN: In parts of the world like this, where you have something that's unique that's found nowhere else, it's something really to be proud of, it's distinguishes you from the rest of the world.

BILL MOYERS, V/O: So far, workers have only cleared invasives from government land. What will happen when the private land owners are required to do the same thing - at their own expense?

FANCY MGXOTWA: [English translation] Before, water was scarce. But since we've been working here, the river has been flowing stronger. After we cut the trees down, that's when the water came.

BILL MOYERS, V/O: And who will convince those who waste water that now it's time to stop squandering this rare, precious resource?

Within 25 years half of the people on earth will face serious water shortages.  
-*World Resources Institute*

BILL MOYERS: I never thought I'd live to see that day that an environmentalist would be carrying a chain saw.

BILL MOYERS: And they are in South Africa.

HABIBA GITAY: (Overlaps) (Laughs) They are. You have to because of those invasive species are destroying the system. They're in the wrong place, unfortunately. Now it's taken them ten years, yes they're increasing the water flow. But for ten years people would have gone in, say, I can't see any change. And you have to be optimistic saying, yes it's occurring. But it takes almost an equivalent of a religious belief, to keep going in that way. Believe in yourself, believe in the action and so on. So it's the longer term and the positive outcomes that have been, not surprising, but positive in many ways.

BILL MOYERS: So is your science going to help encourage and nurture a religious conviction about saving the earth?

HABIBA GITAY: (Overlaps) (Laughs) I shouldn't have said that.

BILL MOYERS: No, Why?

HABIBA GITAY: It's not a religion I don't think. I don't see myself as a preacher coming out and saying you need to convert. But what we have to do is say, this is our knowledge base, this is what we are putting forward to you. Argue with us, discuss it with us, but at least try to move forward in making sure that the Earth doesn't collapse as a system that can support human life and human beings.

BILL MOYERS: Because if it does, you don't think it can be put back together again?

HABIBA GITAY: No it'll be impossible. We'll just be wiped out as a species.

BILL MOYERS: And we can't find these goods and services anywhere else?

HABIBA GITAY: Well do you know of any other planets that might have these goods and services for us? I don't at the moment.

MELANIE STIASSNY: Water is absolutely critical to all life on our planet. It's really what makes our planet different from other planets.

BILL MOYERS, V/O: Melanie Stiassny, of the American Museum of Natural History, studies freshwater fish. What's striking to me is that you know I grew up thinking water would disappear, it would be taken up into the clouds and it would be recycled so to speak and it would come back as rain and I could always turn that tap on and have more of it.

MELANIE STIASSNY: And that's true. The amount of water that's on our planet today is pretty much the same amount of water that was on our planet when our species entered the industrial age. Only our population then was about two billion. Today it's six billion. I think one of the things that makes our generation so different from any other is really this recognition that we're crossing thresholds that have never been passed before. The notion of continual progress and growth is not one that's quite as realistic as it has been in the past.

BILL MOYERS: Because?

MELANIE STIASSNY: Just look at the numbers of human population growth globally. And you realize that things are changing, that there isn't just sort of a limitless frontier anymore.

BILL MOYERS: I was born in 1934. The landscape of this country has been transformed in my lifetime, just by what you said. I hadn't thought of it till you said it.

MELANIE STIASSNY: Completely transformed.

BILL MOYERS: (Overlaps) Dams rivers have been changed.

MELANIE STIASSNY: Right, right. We've dammed up, we've made huge reservoirs. We've actually held this water on land and we've redistributed the weight of our planet.

BILL MOYERS: What do you mean?

MELANIE STIASSNY: Our planet no longer has this water evenly spread out on it. We've put it onto the land, and that's actually changed the geodynamics of the planet in a measurable way.

BILL MOYERS: Tilted it on its axis?

MELANIE STIASSNY: Exactly. It's actually changed.

BILL MOYERS: (Overlaps) You're kidding?

MELANIE STIASSNY: No I'm not kidding. That's the actual fact is we have redistributed the weight of our planet. And one of the ways we measure that is in what's called the length of the day. And we've actually measurable changed the length of day of our planet by redistributing the weight. So that's all happened in my lifetime.

BILL MOYERS: What else? Damming?

MELANIE STIASSNY: Sixty percent of the earth's total flow, it's free-flowing rivers, have been diverted. Have been changed. Many, many rivers now as we all know no longer reach the sea. The Nile, the Ganges,

the Colorado River. The mighty rivers of the planet no longer reach the sea.

BILL MOYERS: What does it mean that we've made all these changes in the last 50 years?

MELANIE STIASSNY: While human population has doubled since 1940, human water consumption has quadrupled. Now what's that about? Well, it's quite simply, you need that water to produce the food to feed all of those extra people. So water extraction for irrigation and for agriculture is really at the moment the greatest sort of user of the world's water. To basically grow the crops to feed our population.

BILL MOYERS: uh hmm

MELANIE STIASSNY: I mean it's as simple as that.

BILL MOYERS: And isn't irrigation widely subsidized around the world by governments?

MELANIE STIASSNY: Its kind of silly because you're - you're giving no incentive for farmers to be efficient in their use of water. As long as you subsidize it, it's kind of hey, you know, it doesn't cost much I mean, amazingly, worldwide, irrigation is really only operating at about 50 % efficiency. BILL MOYERS: So how would we change it - the irrigation?

MELANIE STIASSNY: There's quite a lot of technological development that we can be quite optimistic about. Drip irrigation systems are one that I think are being developed increasingly and being instituted increasingly worldwide. And - and we're getting, you know, up to 90 percent efficiency out of really well managed drip irrigation.

HABIBA GITAY: And yet we don't because water is so cheap and it's so much more expensive to put in those efficient irrigation systems. Whereas if water was priced properly, according to how much it really costs to get that clean water for that length of time we would get people to put in proper irrigation systems and not use the water.

MELANIE STIASSNY: If people really began to understand what was happening to understand that our government is in a way subsidizing environmental degradation, I think people would change quite quickly.

BRITISH COLUMBIA: FORESTS

BILL MOYERS, V/O: It's not just water that's reaching a threshold. Half of our original forests are gone, many destroyed in the last thirty years. A thin green band of ancient rainforest clings to the west coast of North America. Along Canada's shores its very survival is at stake.

Vancouver Island. The far western edge. Glaciers retreated from these shores 12,000 years ago, leaving a series of inlets and mountains called Clayoquot sound. A lush rainforest links the mountains to the sea: spires of cedar, hemlock and fir growing for hundreds of years. Hanging from the branches, nestled in the roots, lives a tangle of mosses, fungi and fern. The layers of rain-soaked plant life here are feeding and sheltering animals, insects and birds. The Indians who are at home in this network of nature say, "Everything is connected. Everything is one." Science agrees.

Alton Harestad is a wildlife biologist.

ALTON HARESTAD: We turned our eyes and there's a little salamander right against the log. Now salamanders have big, big eyes .. big brown eyes and it just makes your heart melt. (Laughs) I'll just pass this along if you want and you can take a peak at him. And then I'll put it back where we got it.

When a fungi in the forest begins to rot a tree, it creates the home for a woodpecker. When that tree falls

down and the bacteria and the fungi begin to rot that log on the ground, it releases nutrients back into the soil.

Those trees provide carbon storage. They slow down the percolation of water through the soils. They provide the habitat for wildlife. That forest is providing service. It's providing ecological service. Those trees aren't all there to take.

BILL MOYERS, V/O: But the trees service Canada's economy too. The timber industry in British Columbia alone generates 15 billion dollars in profits and employs more than 90,000 people. It took centuries to grow these trees. Hundreds can disappear in a day. It's called clear-cutting.

ALTON HARESTAD: Part of the reason why we thought it was the right thing to do 'cause it was pretty much the only tool in our toolbag. It can be very efficient, but there are costs involved to it. When you clear-cut you've altered how the water flows down the hill. It causes a lot of water to go into one channel, scours out all the gravel and it flows down the creek and spills into a salmon-spawning bed, you've lost the salmon for awhile. Maybe for a long while. That's a cost.

BILL MOYERS, V/O: They were hauling 30,000 truckloads of logs out of these forests every year in the early 1990s. Until, [demonstrators chanting] These people cried enough.

WORKER: I work for MacMillan Bloedel, I'm asking you to stay off the roadway so our employees can go to work.

BILL MOYERS, V/O: It was the largest protest in Canadian history. Thousands of demonstrators halted one of Canada's biggest logging companies, MacMillan Bloedel, in its tracks.

PROTESTORS: "They can't arrest us all if we all stay on the road. They can't arrest us all... "

BILL MOYERS, V/O: The trucks could go no further. Hundreds of people were arrested, but the impasse continued. Logging shut down. Workers lost their jobs.

VALERIE LANGER: We are not against the workers here we are against the forest policies which just consistently put the people out of work... It brought the companies up face to face with environmentalists not as a nuisance, but as a threat to their daily operations. That was key.

BILL MOYERS, V/O: The environmentalists moved beyond Clayoquot Sound, to launch a global campaign to boycott companies that bought old growth timber from Canada's coast. Their message: you need to protect more than the bottom line -- stop destroying these ancient rainforests. Their tactics worked. Retailers like Home Depot pledged to stop buying wood from endangered forests. MacMillan Bloedel, faced with losing contracts, was the first timber company to change its ways.

TOM STEPHENS: Beginning today, Macmillan Bloedel will phase out clear-cut logging on it's private and public timberlands of British Columbia.

BILL MOYERS, V/O: But that wasn't the end of the story. The environmentalist's fight to completely end logging in Clayoquot Sound brought protests from another quarter.

LARRY BAIRD: Well, they wanted to turn everything into parks. We didn't want parks. Not all parks.

BILL MOYERS, V/O: Local Canadian Indians, known as the First Nations, said an end to all logging would deny them jobs. They argued that it was possible to resume logging without clear-cutting. Asserting their historic claim to this land, First Nations lobbied the government for more local control over the rainforest in their territory, and they won.

After years of conflict, First Nations now had the muscle to unite executives from MacMillan Bloedel, and environmentalists from groups like Greenpeace and the Sierra Club. The result: compromise that everyone celebrates.

LINDA COADY: The essence of our agreement is that we'll care about what you care about environmental groups, if you'll care about what we care about which is economic viability.

BILL MOYERS, V/O: MacMillan Bloedel, now owned by Weyerhaeuser, set up a project with First Nations to harvest trees in Clayoquot and protect the ecosystem.

LARRY BAIRD: This is just the beginning....

BILL MOYERS, V/O: They named the venture Iisaak. Chief Larry Baird is on the Board.

LARRY BAIRD: The word Iisaak, in our language, means respect. And that's respect for everything.

BILL MOYERS, V/O: Eric Schroff is the forest manager.

ERIC SCHROFF: We're a small company, we got support from a broad range of groups. It's an experiment. It's a learning opportunity.

BILL MOYERS, V/O: Iisaak agreed to set aside some areas never to be logged. And where they do log, they promised to follow guidelines drawn up by a group of scientists and tribal elders. The environmentalists, in turn, agreed not to blockade. And the company agreed to pursue certification. An independent team of auditors must visit the sight to determine whether the logging merits a green seal of approval.

ALTON HARESTAD: They put a sticker on that wood that says it's certified. What that means is that that wood comes from a forest operation that is sustainable.

BILL MOYERS, V/O: Alton Harestad is part of the team that will judge the logging here.

ALTON HARESTAD: What is at issue is how much you can log without interfering with those other, other ecological processes.

ERIC SCHROFF: The approach was to focus on the forest remaining rather than the trees removed. As you can see this area's been harvested, but with harvest management area, you'll see there's still a fully functioning forest remaining even after we've harvested."

BILL MOYERS, V/O: The method is called variable retention -it's all about what the forest gets to keep.

BILL MOYERS, V/O: Helicopters fly the loggers in so they don't have to build roads that destroy the forest floor. When they cut down the valuable old trees, they try to mimic the way the forest itself works.

ALTON HARESTAD: The natural process of disturbance is one tree. The roots rot. It wiggles a little bit in a windstorm and it falls over. And as it falls over it takes two or three other smaller trees with it. That's a small-scale disturbance. In this environment, the natural size of disturbance is small.

BILL MOYERS, V/O: So the loggers cut smaller patches. They take mostly western red cedar valued in the market place, and they work around trees that help the forest survive, like dead trees called snags.

ROB VOLKMAN: A snag is a tree that's dying or is dead and the importance of that is there's birds that nest in the trees. The bugs enter the tree that's dying and then woodpeckers or other birds go in and feed

off of that. And when they're feeding off of that they'll create holes for other birds to nest in as well. Bats actually live under some of the loose bark.

BILL MOYERS, V/O: They leave younger trees that will continue to grow, and older trees revered by native people for cultural and spiritual reasons, some of them scarred when their ancestors stripped bark.

ROB VOLKMAN: The tree is basically healed over. This bark strip was done probably in the neighborhood of pre-1867. So the tree has kind of healed over the scar. But the way that we determined whether it's been a bark strip or not is just this natural scar that's been left in the cedar tree.

ALTON HARESTAD: As I walked though that forest, what I was thinking, was, could a bear live here? Ah, that could be marked by a black bear... How would this logging influence a woodpecker? All of these creatures, could they meet their requirements, their habitat requirements within this modified forest now.

JAKE VAN DORT: There's still trees here. I mean, we're not going to scare the bears and the birds out of here. It's - there's still a forest here. I feel that there's some honor in that, you know, in the sense that we're not just going out and raping and pillaging the whole place, you know. We're going through with some care, you know, and some thought.

ALTON HARESTAD: And it seems to me that nearly every species could do just fine. And the ecological relationships, in my judgment would still function. And so, I'm very pleased. From my perspective, it looked pretty good.

BILL MOYERS, V/O: Iisaak harvested only a small amount of wood their first year - about 10,000 cubic meters. The annual harvest when MacMillan Bloedel clear-cut here was closer to one million cubic meters. It's a more painstaking process than clear-cutting, and more expensive. The only way to remove logs without building roads is to fly them out by helicopter. Although world markets are beginning to ask for certified wood it's not clear yet whether people will be willing to pay more for it.

VICKY HUSBAND: We should have a product that's really identifiable with this whole operation. Something that's original, that's new, that's a new product...

BILL MOYERS, V/O: Environmentalists, First Nations, and the company - once unlikely partners -now brainstorm on ways to market the wood for more money. The survival of this model of forestry depends on it.

CONSULTANT: People are starting to come back, I think to quality. They're understanding that they pay more for quality and it lasts. And it, that it's feel good.

ERIC SCHROFF: And part of what we're selling here is the feel, you know, it's feel-good wood.

VALERIE LANGER: Iisaak fails to make any money, it gives fodder to say you see it doesn't work any other way. We just have to go out and destroy things. It's the only economically viable model. And so it's important for us to show that there are other models other than industrial forestry.

BILL MOYERS, V/O: But most large timber companies are adamant that this approach can not work for them.

LINDA COADY: I'll be honest and say Clayoquot is a sore point. It's not a winner. I mean, if you go into a room full of people from industry and government and you start talking about well, we're doing this in Clayoquot [laughs] I mean, they just want to kick you out of the room.

BILL MOYERS, V/O: The people here have their fingers crossed, hoping consumers and corporations

around the world will agree that protecting the rainforest is worth the price.

LINDA COADY: Lisaak is putting the question with the environmental groups to the International Marketplace, how much are you willing to pay? And the cynics will tell you not a penny. They won't pay a penny. The world will not pay any more for your products than it will from a forest that's managed differently. So, we'll see. We're doing it. We're asking the question. We'll see.

ALTON HARESTAD: If people around the world don't learn to change, then you're toast. You can't take take take take. You take a bit. And uh, and the ecosystem can sustain that. But at some point, you just can't take it all.

In this decade, demand for wood will increase up to 40%.  
- *World Resources Institute*

ADRIAN FORSYTH: People compare those kinds of forests to cathedrals because of the light and the elevation, but also because of the silence. It's not a forest that's noisy or full of a lot of singing and chirping and trilling the way a tropical forest is. It's a very calm, peaceful place. I'd say majesty is the sort of feeling you get when you're in a place like that.

BILL MOYERS: What takes you into the forest? What exactly is the nature of your work?

ADRIAN FORSYTH: Well, I'm interested in how these systems work. I mean I think if you're a biologist you're attracted to the in - intricacy of life, and so the forest is a giant puzzle that you're trying to solve. And you'll never solve it, but it's fun to try it.

BILL MOYERS: What's the puzzle?

ADRIAN FORSYTH: The puzzle is how it all works, I think, without any grand architect or planner behind it. I mean, these things are composed of thousands of different elements and species and year after year they give us fish, they give us oxygen, they give us clean water, and, uh, so if we're ever to sort of somehow live in balance on the planet, we actually - and if we're going to tinker with them, then we've ultimately got to understand, you know, how to tinker with them more intelligently. Tinkering would be a charitable ...

BILL MOYERS: I started to say, that seems a rather modest word compared to what we saw with these ...

ADRIAN FORSYTH: Yeah, if we're to massively alter them and still have them work, then we've got to know a lot more about how they do, you know, fit together.

BILL MOYERS: Are we massively altering them? I've talked to scientists who say that our impact on the world is so profound and unprecedented that the change that is coming because of our behavior is like nothing else before. Do you - is that an over statement?

ADRIAN FORSYTH: No, I don't think so. I look back on when I first started doing this as a college student, you know, I can remember going to western Ecuador in the early 70's and being at the base of the Andes and looking at the foothills covered with ridge after ridge after ridge of dark forest receding into the distance and just sort of blithely assuming that that would be there forever. And, uh, then a road was built from the highlands to the lowlands and, you know, 20 years later there were half a million people living there and not a shred of forest as far as the eye could see.

BILL MOYERS: Are we not preserving enough forests to enable species diversity to make it?

ADRIAN FORSYTH: You've really got to have a lot of area, it seems, big areas, for animals to persist and be viable.

BILL MOYERS: When I was growing up I was taught that ecosystems are resilient, that nature heals itself.

ADRIAN FORSYTH: I think nature is resilient as long as you still have the basic, uh, things to repopulate. But once you lose species, of course, they're not going to come back. You know, once the ivory billed woodpecker or the dodo or anything else goes extinct, you can't go to the laboratory and cook it up again.

Over 33,000 species of plants in the world are threatened with extinction.  
-*World Resources 2000-2001 Report*

BRIAN VAN WILGEN: I think that people don't realize that a whole lot more species of plants are threatened with extinction or have become extinct than animals.

And I think we tend to forget sometimes, as human beings, how dependent we are on plants. We are dependent on plants for food, we are dependent on plants for cleaning the air, we are dependent on plants for storing carbon, we are dependent on plants for producing medicine, we are dependent on plants for aesthetic reasons, for religious reasons, for cultural reasons. Basically, without plants we won't survive.

What feeds us is a very small number of species. It's something less than 20 or a dozen species that supply almost 80% of the food that human beings eat. If you take away wheat, rice, potatoes, sorghum and a few grain species, that's about it. That's what we live on.

The threat is really if something happens to an important crop species. What if a disease comes along, like AIDS for example, that would threaten a crop species, it could wipe out a huge proportion of - of the earth's food supply, for humans, that is.

ADRIAN FORSYTH: Every year we find some obscure species becoming important. The fireflies that you take for granted flying around in your suburban backyard turn out to provide some, you know, diagnostic tool in medicine that 20 years ago people had no clue that firefly genes would be important in medicine the way they are today. So I don't think we have the knowledge or will ever have the knowledge to say what - what will count to our descendants or not. So I just think the no regrets policy is to keep it all, you know.

BILL MOYERS: Do we know what's actually threatened?

MICHAEL NOVACEK: I'd love to say that we knew in very precise terms what's happening to the living things on the planet.

BILL MOYERS, V/O: Michael Novacek travels the world studying the evolution of mammals.

MICHAEL NOVACEK: 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? Why don't we have a better database?

MICHAEL NOVACEK: 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 the lions and tigers and bears, as I like to say.

But when it comes to the lowly worms and the bacteria and the fungi and, you know, 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.

MELANIE STIASSNY: It's almost as if we know more about water and the history of water on Mars than we actually know about water on our planet today - how it's distributed - how much of it we can use . So it's very clear that there has to be a coordinated effort to really assemble that kind of baseline information, because without it, how on earth are we ever going to be able to save what's left? How are we going to be able to manage it rationally, efficiently and sensibly?

## MONGOLIA: GRASSLANDS

BILL MOYERS, V/O: The largest stretch of grassland we have left is the Asian Steppe. Long winters, dry summers, assault the soil. Grass and roots bind it in place. Strain those ties and grassland can turn to desert. Even a country with few people - like Mongolia - can lose a balance that supported it for centuries.

NAISURENDORJ: [English translation] I always tell my children to love and respect nature the way they love and respect their parents. Mother nature supports us, allows us to live. From birth onward we have an inseparable connection to nature.

BILL MOYERS, V/O: Naisurendorj is a herder. He and his family have long lived in this remote region in central Mongolia. Here it is the size of your herd that determines your wealth. And the health of your animals and your family, depends on how well you adjust to changes in this fragile environment.

NAISURENDORJ: [English translation] Everything that we use comes from nature. Nature is important for our livestock and it's important for our lifestyle as well. Our animals, meat, milk, everything we get from well-fed animals we get because they eat nutritious grassland.

BILL MOYERS, V/O: It's an age-old marriage with nature that for thousands of years has helped herders like Naisurendorj survive. And these grasslands thrived because herders rotated their flocks allowing the grass to recover year after year. As often as twice a season, he and his family will pack their portable homes, called "Gers," into a truck and head to the next camp. Naisurendorj sheltered his animals in these hills through the long winter and spring, then left the grass on the slopes to re-grow and moved his herd here, to the steppe for the summer.

NAISURENDORJ : [English translation] If you stay in one place and you feed your livestock with the same thing over and over again in spring, fall, and winter. The pasture's quality will worsen. Cattle that switch pastures a lot become cattle of good quality and nature.

BILL MOYERS, V/O: Everything depends on these grasslands. It's too dry here to farm. The natural vegetation is all the animals have to produce the meat and milk and wool that the herders live on. Naisurendorj learned how to herd from his parents and will pass this knowledge onto his sons. But now there's a threat to the land and their way of life. The grass is in trouble.

NAISURENDORJ: [English translation] The grasses that you see right now were so high in my childhood years. No matter how much the horses and oxen ate, it would be still the same height as my stirrups. Now you see they all have become sparse. It is becoming more and more like desert.

BILL MOYERS, V/O: When the grass is overgrazed or parched by drought, it can't protect the topsoil which makes it possible for the grass to grow. Mongolia's scientists are increasingly concerned. Batbuyan, a geographer, is among them.

BATBUYAN: The way how we're living now is changing quickly, very quickly. People moving less they should be. They grazing some of the area during the whole year and if we now will not stop this process

which is happening at the moment then it will be too late.

BILL MOYERS, V/O: All of Mongolia is changing... You see it most clearly in the capital city of Ulaanbaator. Ten years ago Communism collapsed. Trade with the Soviet Union ended. State run businesses shut down. Now the country is trying to develop a market economy - struggling to bring technology, infrastructure, and business to this ancient land.

Tens of thousands of people were forced to find a new way of life. Many of them -- whether they knew how to or not -- took up herding, tripling the number of people who depend directly on these grasslands. Under Communism, Naisurendorj, like all herders, worked for the state. His job was to be sure the other herders rotated their flocks.

NAISURENDORJ: [English translation] Cooperative herdsmen were given orders and directed: "you, go there and spend the summer, autumn, winter spring".

BILL MOYERS, V/O: In those days, the state provided a salary and support, care and extra feed for the animals, and transportation. Herders were used to being told where to graze their herds. Now they are on their own. They can move at their own discretion, or not move at all. And, in this new market economy, any profit is theirs to keep.

Naisurendorj knows he can make a better living by increasing the size of his herd, so do most Mongolian herders. The goats that provide wool for cashmere are their cash crop. Raw cashmere is one of Mongolia's few thriving exports. In the global marketplace they are second only to China. But increasing these exports requires more goats, and more goats mean more stress on the pastures.

GANBAT: Of course, the government and the uh, cashmere industry would try to have the goats to increase, as soon as possible.

BILL MOYERS, V/O: Ganbat is a manager at one of Mongolia's leading mills. He'll do whatever he can to expand his exports quickly. But he knows that in the Chinese province next door, the grasslands are already suffering from the increased production there.

The misuse of land and the large number of goats has exposed the soil to erosion and contributed to the dust storms that have choked Beijing. To regenerate the pasture, the Chinese government announced that they will slaughter part of their herd.

GANBAT: When the number of goats will increase, then. Mongolia would have uh, problems like China is having right now with not sufficient pasture land. We already need to start at least thinking about uh, how to manage the pasture lands in the future, when the goats number will increase.

BILL MOYERS, V/O: Herders focus more on the present -- getting their goods to the market in Ulaanbaator and making whatever income they can. It is a grueling and expensive trip over rough roads. So difficult that these herders want to move their families permanently. They join a migration that is putting enormous pressure on the most convenient pastures near main roads and towns. This dilemma has caught the attention of an international scientific community.

MARIA FERNANDEZ-GIMENEZ: They had a very bad winter where they came from and they're moving near Ulaanbaatar and they'll be closer to the market.

BILL MOYERS, V/O: Maria Fernandez-Gimenez, an American rangeland ecologist has worked with Batbuyan for the past seven years to study the changes here.

MARIA FERNANDEZ-GIMENEZ: At some point, uh, there's a limit to what the land can support. So

how do you know when you're approaching the limit? That's what we're - we're trying to figure out now. This is in the foothills of the Hungai Mountains, which are the central mountain range in Mongolia. In the old days those herders that did more migrations would generally just come here in the summer time, come here for the cooler air, the amount of plant material there for the animals to eat, and the cool water.

BILL MOYERS, V/O: Today, these same qualities entice people to stay here year round.

BATBUYAN: Most of the herders now, more interest in a comfortable life. It's natural. People like - have hot water, closer to the market, get all the thing which normal people get. And if you go to some of the gers you see they are more interested in this settlement style of life.

DONDOGSAMBOO: [English translation] The main problem that we're facing now is a pasture shortage. Because each year the number of livestock in our sum is increasing, our animals can't survive the harsh winter. Yes. Feelings are tender about that.

BILL MOYERS, V/O: Dondogsambo is a herder who has been an elected leader in his district, called a sum, for the past four years. In that time the population has grown by 20 percent and the number of animals has increased by a third. People aren't moving as much as they should for the good of the land.

BATBUYAN: So he's putting the first position the problem of shortage of territory ...

MARIA FERNANDEZ-GIMENEZ: Hmmm

BATBUYAN: ...second, they put the lack of the access to transportation. Third one is poverty issue....

MARIA FERNANDEZ-GIMENEZ: Hmmm

BATBUYAN: And the fourth, lack access to the market.

MARIA FERNANDEZ-GIMENEZ: People who would normally move at least a little bit are now hanging out near their winter areas year round. And by staying there they, themselves are inadvertently overusing them. And so you have a downward cycle of decreasing mobility and increasing overuse and conflicts over, uh, access to pasture.

DONDOGSAMBOO: I'm very worried, but I can't solve this problem. We hope for the best and wait.

BILL MOYERS, V/O: But waiting will take a toll on these grasslands -- the lifeblood of the people and the animals they depend on.

MARIA FERNANDEZ-GIMENEZ: The economy somehow must diversify, so that there are alternative ways of people to make a living and not everybody has to be a herder.

BILL MOYERS, V/O: Soon Naisurendorj will head to new pastures for the fall. But as much as he moves it might not be enough.

If herds in Mongolia continue to grow at the current rate Mongolian scientists estimate that in ten years the pastures will barely be able to support life here.

Naisurendorj has appealed to the government to help herders in his region find a better way to share the land. This will depend on balancing the needs of the future with some of the practices and wisdom of the past.

NAISURENDORJ: What else should we honor if not the world we live in? What else should we honor if not these mountains and waters. Indeed we must.

In April a Mongolian dust storm spread industrial pollution from China across the U.S.  
*-Associated Press 2001*

MICHAEL NOVACEK: I work in the Gobi Desert. One of the emptiest places on Earth.

BILL MOYERS, V/O: Michael Novacek has spent the last eleven summers in Mongolia, digging for dinosaur fossils.

MICHAEL NOVACEK: 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.

BILL MOYERS, V/O: As a paleontologist, Novacek has studied how life on earth has changed through thousands of millennia. What he sees happening now could just rival what happened to the dinosaur.

MICHAEL NOVACEK: We have a sort of full frontal assault on the planet from several different directions. The destruction of land, the diminishment of land has an impact on the millions of species that live in natural habitats.

Current assessments, and we don't have exact figures, we're making estimates, is that we're losing 30,000 species or so a year. We have tremendous amounts of species loss. If we lose 30 percent of all the millions of species on earth by the middle of the century, that's a mass extinction event.

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: Isn't it part of the natural cycle for species to die and then rebound?

MICHAEL NOVACEK: The paleontologist knows better than perhaps anybody else that the extinction of life is part of the natural reality of life and the history of life. But you're talking about scenarios for recovery that are extraordinarily long. It's shown that after a big event like the event that killed all the dinosaurs 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 the extinction event.

BILL MOYERS: Is it conceivable to you as the paleontologist that a similar kind of thing could happen, that there could be what you call an event, as climactic, as dramatic as apocalyptic as that again?

MICHAEL NOVACEK: Yes. The answer is emphatically yes. First of all, we've seen mass extinction as a reality in the history of this planet. That's what we do for our job. That's our business. We know. We've got good evidence for that. What happened in the past can happen again.

There were perhaps different causes at different times. Asteroids, climate, some biological, perhaps maybe even things we can't measure, like viruses or disease. So there were different agents for those different extinction events. That all points to the possibility of something in our present or our future in those terms. Mass extinction is quite feasible.

BILL MOYERS: Things die out?

MICHAEL NOVACEK: Things die out, and they're replaced by other species. There's sort of this sturm und drang, and you know, you get old species, and they die out, and there are new species that take their place. But every once in awhile, we think about five times, during this 3.5 billion history, there have been some really bad things that have happened.

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.

BILL MOYERS: 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 a driver, an equivalent driver to a massive extinction event. I think you multiply the number of people and their needs and the huge needs in food and food production and frankly, the over-consumption in areas where that - that kind of use, 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 we take for granted now, and I think there are many landbased 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 safety valve here. 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 where the earth is 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.

BILL MOYERS: If that seemingly inconceivable possibility were to happen, what would the earth look like? Did you ever think about that?

MICHAEL NOVACEK: You know, it's hard to predict. But it's not a world I'd want to live in, I mean, not a world I'd feel comfortable living in.

In some ways, we can look at that forecast by looking at urban environments where the rats and the cockroaches, as well as some more benign creatures, have taken over. I think what you'll get is survival of life. But life with much less diversity, much less of the bounty, the cornucopia of things that we have today.

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.

BRAZIL: COASTAL

BILL MOYERS, V/O: Where land approaches the water's edge - then drops under its waves: all that is the unique world of the coast. Not entirely land, nor completely water, the coast balances both. Green and Blue. Sand and Mud. Mangrove and Reef. They need and feed one another.

In most of the world, most of us still live and draw our food from that thin, rich margin of coast. Like a bright ribbon, it runs over the globe. Here passing round the Atlantic shoulder of Brazil, through the mangrove trees and reefs of Tamandare.

One-third of all the fish we eat feed off reefs. In fact, nearly nine million different kinds of creatures live on coral reefs: those submerged shelves of sandstone that give microbes a scaffold for building living stone.

BEATRICE FERREIRA: You see color. A lot of color. It's like a rain forest. Because fishes are like birds in the rain forest. They have different colors.

MAURO MAIDA: You also see an Equilibrium, very stable environment, like very harmonic environment.

BILL MOYERS, V/O: The husband and wife team of Beatrice Ferreira and Mauro Maida, both marine biologists, moved to Tamandare seven years ago to study this coastal ecosystem: the reef, the rivers that feed it and the people who use it.

BEATRICE FERREIRA: There is a big culture in Brazil, a beach culture. People like to go to the beach, play beach sports, and be there for carnival. There are a lot rituals, traditional rituals that are made by the sea. So there is a lot of relationship, cultural relationship with the sea and with the seaside.

MAURO MAIDA: The reef systems in Brazil they are distributed along 3,000 kilometers along the northeast coast of Brazil. This area has been recognized as a risk area for the health of coral reefs.

BILL MOYERS, V/O: Over the years, the coastal reef at Tamandare had been loved too much by tourists - and harvested too much by fishermen.

MAURO MAIDA: We could see that this reef was in a very bad process of degradation because we didn't see a lot of fish. We couldn't see a very high coral cover. And those are factors that could indicate a bad stage ecosystem. So it was clear to me that we should try to reverse this process.

BILL MOYERS, V/O: The reef was bleached, ragged and nearly devoid of fish. The Inter-American Development Bank together with the government of Brazil gave 4 million dollars to find out if the coral could recover from human footsteps, to find out if fish could be lured back to a barren reef, to find out how to protect the reef. The purpose of this pilot project was to educate the people in this community about coastal ecosystems - and to involve them in their preservation.

MAURO MAIDA: It was very important in our work here to bring these old fishermen to the discussions because they would teach us a lot of things. It was a learning experience for both sides.

BEATRICE FERREIRA: They fish one area. Then, they leave this area alone for a while because they know if they do when they get back their there will be a lot of fish. So they don't tell anyone. And they leave this place without fishing. So they can go back there when they need and catch fish again. So they rotate the fisheries spontaneously.

BILL MOYERS, V/O: So Beatrice and Mauro recommended and the government agreed to create the largest marine protected area in Brazil: 1000 acres of the Tamandare reef, roped off and closed to tourist and fisherman alike.

MAURO MAIDA: The protected areas work. And what happens? You are gonna have fish growing, getting fat. Because just leave the place alone and things will grow and that's what we've been seeing here. After only eight months of closure you could see an increase four times the number of octopus, four times the number of lobsters.

BEATRICE FERREIRA: For resource like octopus they only live one to two years. These you can see a result pretty fast. That's why we chose octopus as one of the targeted species to follow. Because we were hoping to have results in a short period of time.

BEATRICE FERREIRA: The fishermen that dive with us tell -- spread the word around. Because people here really -- all relative of each other and these news spread very fast. And that's one way of getting the message across.

BILL MOYERS, V/O: The restored fishery at the Tamandare reef has increased the catch for a community of 20,000 fisherman. But this success doesn't mean that the reef is out of danger. Not yet. This reef is one coastal ecosystem that depends on other ecosystems to survive. The health of this and every reef begins inland.

BEATRICE FERREIRA: Deforestation started here when the Portuguese arrived. They had the deforestation for sugarcane. And then the deforestation for human development is still going on. And what happens when you take the forest out, the soil it's exposed.

MAURO MAIDA: What happens is that the first rain carries away the sediment. This sediment goes through rivers and the rivers take the sediment to the sea. As you have the reef very close to those rivers, all of a sudden that goes to the reef and the light cannot penetrate anymore. So you probably are going to have a dying reef.

BEATRICE FERREIRA: The reefs are coastal. And so they have a lot of relationship with what goes on in the land. Because whatever goes on in the land gets to the reefs as well through the rivers. This big river passes through big cities and gets all the sewage and things that they dump in the river as well. So, a lot of garbage comes down this river.

BILL MOYERS, V/O: Upcoast and upstream from the reef at Tamandare is the town of Rio Formoso. Over half the families here live from catching or selling fish. Chico Assis de Santana is the organizer of the fishing cooperative here. Every day, the Atlantic tides carry a crop of fish two miles up this river and into the forest of mangrove trees.

CHICO ASSIS DE SANTANA: [English translation] There are areas of just pure mud in the mangroves where the fish go to feed. The crabs and oysters and mussels, they couldn't live without the mangroves. There is so much protein here for them. That's what the mangrove has.

BILL MOYERS, V/O: Like coral reefs, mangroves grow only at the coast -- where fresh and salt water mingle. But mangrove and reef are not just neighbors, they are kin. The forest of mangrove extends from the river's mouth back toward the coastal plain. The slender trees take root, then their branches bend down and take root - until there is no separating trunk from root. The fish that live on the reef are born in this tangle of mud and branch. They mature here. Then they migrate to the sea. The mangrove trees catch the mud that would smother the reef. And the mangrove sustains all those who rely on it for their daily bread.

CLAUDIO CORREIRA DA SILVA: [English translation] I was born right over there, fifty-four years ago. The mangrove has everything, all the things we need for life. What would I do if I couldn't catch any fish here?

That one is called the cage. When the tide comes in then we begin tying up the nets and putting up these wooden poles, then the tide goes out. Whatever fish are in the net get caught.

BILL MOYERS, V/O: There are more than 8,000 square miles of mangroves in Brazil. These trees spread quickly - if given half a chance. But the number of ways to harm a mangrove has grown faster than the mangrove can keep up.

CHICO ASSIS DE SANTANA: [English translation] The threats here are herbicides that the sugar cane farmers use on their fields. It runs down the river when it rains. There are even those who want to cut down about 10% of the mangroves to build shrimp farms. This just helps a small group of people - but it hurts thousands of families.

BILL MOYERS, V/O: Mangroves are well-suited for shrimp farming. The nutrient-rich waters feed the shrimp. The tides flush away their waste. Brazilian shrimp farmers say that increasing their production by a

factor of six over the next three years won't hurt the mangroves. But you only have to fly directly overhead to see that they're wrong, that they're bulldozing mangroves in the name of profit.

While Mauro and Beatrice got \$4 million to preserve the reef, banks have lent developers \$800 million dollars to turn the Tamandare reefs and the Rio Formoso mangroves into a tourist mecca. Over a dozen luxury hotels will be built right at the water's edge. This place is already going, going and could be gone within a few years.

CHICO ASSIS DE SANTANA: [English translation] These mangroves have something for all of us: the trees, the fish and shellfish we take from here, all of these things. It sustains family after family. And if we let people destroy it, just imagine the problems we will have then.

BEATRICE FERREIRA: This is a country which - which has very delicate balance between man and environment. The development is increasing and increasing by the year. That's not by chance, is it. The reefs here are very close to the coast so they're very easy to get to them. It's very user-friendly because it's beautiful, it's shallow, it's calm, it's clear water, good temperature. The corals like that and the people like that, too. So that's why it's so necessary to organize the way things are going to develop, so everyone can use it but not destroy it.

MAURO MAIDA: Nature doesn't work only in the short-term. They work in the long term and problems in the long-term can be catastrophic and there is no way back. I'm worried about my kids. The future of my kids. BILL MOYERS, V/O: Worldwide, 70% of all reefs are at risk. 60% of all mangroves have already been destroyed. The rest are disappearing at a rate of 5% a year.

BEATRICE FERREIRA: You may feel this sense that why should you care, you know. But no man is an island, no ecosystem is an island, everything's interconnected, and there is a meaning for all of this. Everything depends on everything. So you might feel the effects much later when it's too late. That's why you should care to begin with.

BILL MOYERS: That coral reef survived millions and millions of years, despite everything else that was going on. And yet, it's very vulnerable now to us.

CARL SAFINA: Right.

BILL MOYERS: It may not survive us.

CARL SAFINA: Right

BILL MOYERS, V/O: Carl Safina, a marine biologist, founded the Living Oceans Program at the National Audubon Society.

CARL SAFINA: We're doing all kinds of things to coral reefs and almost none of it is good for corals or for people in the long run. We are mining corals, we are cutting forests and sending the silt down rivers and the silt is clogging the corals and killing it. The corals are living at their upper thermal tolerance. They're living in the warmest water that they can tolerate. Now we're adding just enough warmth on top of that to make them start to die. And that's an unprecedented thing and people did not recognize that 20 years ago.

In fact as far as I can tell, the death of corals and the decline of coral reefs around the world is the first and only instance so far of an entire kind of ecosystem that is being sickened and is beginning to die because of the warming of the earth.

BILL MOYERS: You took part in this worldwide study of global change, climate change?

HABIBA GITAY: Yes, I was one of the lead authors, leading authors.

BILL MOYERS: You have no doubt that it's happening?

HABIBA GITAY: Oh global warming is definitely occurring.

BILL MOYERS: (Overlaps) Stake your reputation on it?

HABIBA GITAY: Yes, I mean I'm not the only person. We have hundreds of scientists who have staked their reputation on it, that it is occurring. We are making the earth warmer. We are doing it through our fossil fuel emissions but we're also doing it through the land clearance as well. So it is occurring, it is having consequences in our natural ecosystem.

BILL MOYERS: And are the oceans a kind of early warning to what's happening to the earth's environment?

CARL SAFINA: There were plenty of early warnings. I think we're pretty well into the warning phase now. I hear buzzers going off all around me. 80 percent of the world's fisheries are either at their very limit of what they can produce without going into major long term decline, or are already in major decline, or depleted. If you go to the cooler oceans and the deeper areas where people are fishing, you would find giant trawlers, absolutely the most sophisticated machinery and electronics that the space age and the industrial age could possibly bring to bear. With one pull of a net, bringing up 20 tons of fish.

BILL MOYERS: You mean we're taking out fish faster than the oceans can sustain us if we keep doing it?

CARL SAFINA: We're taking fish much faster than the fish reproduce in many cases. We've seen what was for 500 years the most important fishery in the world, in New England and maritime Canada, the fishery for cod that fueled the settlement of North America. For 500 years it was the most important fishery in the world, and it has collapsed. It's a shadow of what it once was.

BILL MOYERS: What do you mean when you say it's collapsed? It's hard for me to imagine a fishing area collapsing.

CARL SAFINA: For about 30 years we fished so hard on that area that we caught most of the fish. Many of the major populations declined by 80 or 90 percent and boats went out of business in large numbers. That's what I mean by collapse. We ate our way through that resource and it couldn't feed us any longer.

BILL MOYERS: But there is a paradox, and that is that I can go to almost any one of a number of shops in New York City and the shops are full with different kinds of fish, fish from all over the world, and it looks as if there's an endless supply in that one store. I'm serious about that.

CARL SAFINA: Well of course it looks like there's an endless supply. Those fish are from all over the world because the local place is fished out. It used to be that all the swordfish in New York were from the waters off New York and New England. It used to be that all the Salmon in Oregon were from the west coast. Now, you can buy Swordfish here that comes from New Zealand or South Africa because people have to buy and sell from all over the world to keep this supply going.

In the early 90s we had a new fish appeared .Orange Roughy. Nobody ever heard of it before, suddenly it was in all the restaurants. It was very trendy. Where is it now? You don't see it anymore because we demolished it. Now the thing is Chilean Sea Bass. We're on our way to demolishing that too.

BILL MOYERS: You've described today's fishing practices as the last buffalo hunt. Can we really take it that far so that we would - might pull the last fish out of the ocean the way we shot the last buffalo on the

plains?

CARL SAFINA: Well, remember two things, the buffalo is not endangered and it still exists. But what changed is that it went from a population of 60 million animals that supported human cultures, to curios. Those animals are no longer important to people, but at one time they were everything to people.

What we're doing in the ocean is exactly the same thing. We thought it was inexhaustible. You go to the beach, you look out and you say, I don't even see very many boats out there. How could we possibly make a dent?

BILL MOYERS: But we have built a civilization without the buffalo. Can we build a civilization without fish?

CARL SAFINA: We've built a civilization on fish, on forests, on soil. The question is can we sustain a civilization that destroys those things it was built on?

BILL MOYERS, V/O: This question won't go away.

There are times when the most difficult decision of all is to acknowledge the obvious.  
-*World Resources 2000-2001 Report*

CLOSING

BILL MOYERS, V/O: We count on the Earth's ability to support us. Our lives depend on it.

Peter Jennings: "The United Nations has issued a very tough report on global warming today..." (ABC, 2/19/01)

BILL MOYERS, V/O: But everyday the Earth sends an SOS.

Peter Jennings: "Man-made climate change will lead to more freak weather changes including cyclones, drought and floods..." (ABC, 2/19/01)

BILL MOYERS, V/O: Although the distress signals keep coming, they're not sinking in.

Andrew Carey: "In some places in Hungary the river has reached it's highest level in more than a century pointing to massive deforestation programs in Ukraine and neighboring Romania." (CNN, 3/10/01)

Dan Rather: "Around the world glaciers are in full retreat. Some could be gone in a decade or two." (CBS, 2/19/01)

CARL SAFINA: We don't like to react to the first warning light that comes on the dashboard. We like to wait and make sure that we're really hearing a big grinding noise before we can all agree that maybe we should stop and get out and take a look at what's wrong.

Wolf Blitzer: "President Bush reversed course today on a campaign pledge to regulate carbon dioxide emissions from power plants. Once critic labeled the decision..." (CNN, 3/13/01)

HABIBA GITAY: So if you stop all our greenhouse gas emissions, all our carbon dioxide emissions today, we will still be living with a changed, uh, climate system, a warmer world, for the next hundred years.  
President Bush: "And you bet I want to open up a small part of Alaska, because when that field is online it will produce a million barrels a day." (10/3/00)

Campbell Brown: "Their drinking water contains what the government deems acceptable levels of cancer-causing arsenic. Today environmental and consumer advocates stunned..." (NBC, 3/21/01)

Barry Serafin: "... the administration has also signaled that it may be rethinking a Clinton decision to ban logging in one third of the national forests..." (ABC, 3/21/01)

CARL SAFINA: This tendency toward denial is a very common thing throughout the human psyche. It's just part of how we're made up.

President Bush: "We will not do anything that harms our economy because first thing's first are the people who live in America. That's that that's my priority." (3/29/01)

BILL MOYERS, V/O: That's part of our psyche too - to want to care for our own. But economies, as we've seen, depend on ecosystems, and ecosystems have no political boundaries.

MICHAEL NOVACEK: The connections across these habitats are global now, and they've been global for 3.5 billion years. It's a high risk to say we can stand to lose a little of this and go on.

BILL MOYERS, V/O: And what about all those who have no voice and no vote.

BATBUYAN: I'm very concerned about for the people who use this environment. I wanted to make the people to use very proper way to give it chance, for next generation.

MELANIE STIASSNY: I do believe we have the potential to make it okay. We have, I think, the window of time where we can do it. I think we're reaching a very critical point where decisions made now and probably within the next decade are going to be incredibly important.

BILL MOYERS: We've seen it in our documentary reports from South Africa, British Columbia, Mongolia, Brazil and the American Midwest in Kansas. There are people who are trying to do it differently.

HABIBA GITAY: Yes. And it takes a long time. Some of them, if you follow the story through might have started 30 years ago. And they're starting to get the positive benefits now.

MICHAEL NOVACEK: You can sometimes lose heart with the fight. But there's a lot left. And some things have even been revitalized, that have come back, and those are areas of hope for us.

BRIAN VAN WILGEN: It seems to have worked. We've got a really good program going now.

CARL SAFINA: I think in the sea it's not too late. I sometimes tell people that what you were told the first time anyone ever took you fishing is all you need to really know. We'll throw back the little ones, and we'll leave some for tomorrow.

BILL MOYERS: We almost have to find an alternative, don't we?

CHARLIE MELANDER: Yes we do and we could, if we had the political will to do it.

BILL MOYERS: To provide incentives?

CHARLIE MELANDER: Exactly. To change attitudes.

LINDA COADY: I think we can win support in the market place. I think we can convince the politicians and you know we've got some of them listening now. Not all, but you don't need all. You just need a few.

HABIBA GITAY: Let's convince the decision-makers, let's convince the public that we need to have some changes going on.

NOVACEK: 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: So what's the answer to our opening question: Earth on the Edge of what? Well I take from what these scientists are telling us that we're on the edge of the greatest challenge humanity has ever confronted, an environmental crisis that could determine the quality of life on this planet. Some of them think the next three decades will be make or break. Thirty years are what we have; they say, thirty years to transform our relationship to the natural world; thirty years to reverse longstanding patterns of production and consumption; thirty years to learn how to take care of the ecosystems that sustain us. It's not very long, thirty years - especially when our ability to alter our life-support systems is greater than our understanding of how they really work. So a lot rides on what these scientists learn, and on how quickly we can act on it.

BILL MOYERS: If you had to give a grade to the world's environmental health, what would you give it today?

MELANIE STIASSNY: I'd have to give a D which is almost a grade that no American student has heard of for the past 20 years. But I would have to give a D.

HABIBA GITAY: Most of the time, I'm afraid, it's D for a lot of systems.

CARL SAFINA: I'd give it a C. There's a lot of life left. There are incredibly beautiful vibrant things. There's plenty left to save. And it's really worth spending a lot of energy, worth saving. But in the comments section of the report card, I would say, needs a lot of remedial action to prevent failure.

WEB OFFER: Earth on Edge continues at PBS Online. Examine the science behind the stories, find out what you can do to make a difference, and learn more about our dependence on the environment - all at PBS.org.

## CREDITS

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BOOK OFFER: The companion book People and Ecosystems: The Fraying Web of Life is available for \$27.00 plus shipping. To order call 1-800-336-1917 or write to the address on your screen.

VIDEO OFFER: Earth on Edge is available on home video cassette for \$29.95 plus shipping. To order call 1-800-336-1917 or write to the address on your screen.