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As a novelist, a writer of fiction, I have to say that it's an honor to be addressing the First Israeli Food and Sustainability Conference. I am very happy to be here.

Fiction writers, especially fiction writers who write about social issues, often find themselves in strange situations. Last year I was invited to attend an international symposium, convened by the Materials Integration Institute at Tohoku University, in northern Japan. The Materials Integration Institute is one of the top materials science research facilities in the world, and the theme of the symposium was "Citizens and Science for a Sustainable Future." I was one of a multidisciplinary group of educators, environmentalists, writers and artists – we were the "citizens" – invited to meet with the Japanese scientists & share ideas about citizenry and sustainability and the future.

Now, these scientists were doing ground breaking research in fields like solar technology, ceramics, hydrogen energy, biomaterials, electron microscopy and super-computer modelling. They were writing papers with titles like:

- "Calcium phosphate films coated on titanium by RF magnetron sputtering for medical applications"
- "Quantum-chemical design of covalent linkages for interconnecting carbon nanotubes"

The research they do will radically transform, in the most real and concrete and measurable ways, the physical reality of the world we live in. And these scientists were looking to us, the citizens, to share some insight into a sustainable vision for our planet. Needless to say, as a fiction writer, I felt utterly useless. What could I possibly say?

But since they were scientists, I decided to start my talk with an experiment. It's a thought experiment, and if you don't mind, I'd like to try the same experiment now

with you.

Would that be okay?

Don't worry, it isn't difficult. You don't have to be a materials scientist to do this.

Okay, here we go...

First, please put down your pens and close your notebooks. Close your computers.

If you have cellphones, please make sure they're off.

I'm going to give you a series of very simple instructions, and I'd like to ask you to follow them. Nothing difficult.

So, first, please sit up tall and straight in your chairs.

Lengthen your spine -- imagine there's a string attached to the crown of your head, gently tugging and lifting you upwards.

Plant both feet firmly on the floor, and be aware of the feeling of your hips sinking into the chair. You can rock back and forth a little, or from side to side, until your body feels balanced and comfortable. It's good to feel comfortable. This is important.

Good. Now please close your eyes, and take a deep and comfortable breath in through your nose....hold it for a moment, then breathe out.

Once, again, take a slow breath in through your nose...hold it for a moment, then breathe slowly out again.

If you notice any tension in your body, just let it go. Neck, jaw, shoulders.... stomach, hands, legs... just relax and let it go.

One more time. Deep breath in....and out, nice and slow.

Now, with your eyes still closed, just breathe normally, keeping your mind open, your ears open, your body relaxed yet alert, your senses receptive. You don't have to do anything. Just notice what's going on around you.

Notice the feeling of your hands, resting on your lap. The feeling of the chair, pressing against your legs. Your feet touching the floor. All the places where your body makes contact with the world around you...

Notice the sounds in the room....You don't have to name or identify them. Just hear them as they arise and fade...

Now, with all your senses open, bring your attention to rest lightly on your breathing. Just gently pay attention to your breathing.

If you find your mind wandering, that's normal and not a problem. Just bring your attention back to your breath.

And let's sit together like this for another minute or so...

<Sit for 1 more minute>

Now slowly open your eyes.

So, this is probably one of the most ancient thought experiments in human history, transmitted from India to China to Japan and now all over the world. You could call it a thought experiment, or you could call it meditation, but its purpose is to allow us to stop for a moment, and take a backward step, away from the relentless forward motion of our lives, and experience the feeling of simply being in time, in the here and now, in the world.

It's a valuable technique – you could even call it a technology – with a rapidly growing body of scientific evidence substantiating its benefits for physical & mental health & wellbeing. It's relaxing, it improves performance and focus. It's practiced by people in all professions, from neurosurgeons to professional sports teams, and it's also practiced by religious people of all faiths. My friend, Norman Fischer, who is a Jewish Zen teacher teaches a class in this technology at Google headquarters in Mountain View,

California. His class is called "Search Inside Yourself". Cute, right?

But actually, this is what I do when I write. I search inside myself. Of course, I search outside myself, too, in the so-called external world, where I look for material to incorporate into my stories, but the most important searching I do is internal.

So this is one reason I wanted to start my talk like this. I wanted to share with you what I do every day as a novelist, living in a rain forest on a remote island, in the middle of a place called Desolation Sound, in British Columbia, Canada, half a world away from here, on the other side of the planet.

I spend days and months and years, sitting in silence, engaged in a contemplative practice called fiction writing, studying the world and my mind as a model for my characters' worlds and minds, tracking my thoughts, my likes and dislikes, my judgments, my conscience and beliefs...

Then I use all this to create a kind of thought experiment called a novel.

This novel, which is a fiction, then goes out into the real world as an invitation to others to participate in a parallel contemplative practice called reading...

My goal, as a writer, is to spark my readers' curiosity and to invite them to open their minds, as I have, to the world of my characters and my story.

I'd like to read you the opening paragraph of All Over Creation.

In the Beginning

It starts with the earth. How can it not? Imagine the planet like a split peach, whose pit forms the core, whose flesh its mantle, and whose fuzzy skin its crust--no, that doesn't do justice to the crust, which is, after all, where all of life takes place. The earth's crust must be more like the rind of the orange, thicker and more durable, quite unlike the thin skin of a bruisable peach. Or is it? Funny, how you never think to wonder.

One of the wisest comments I've ever heard about the proposition of art-making was made by a painter friend of mine. He was sitting at the kitchen table, drawing the

view outside the window, and what he said was:

“As soon as I put a mark on the paper, I have a problem...The rest of the painting is my attempt to work out that problem.”

The same can be said for novel writing. As soon as you put one word on the page, you have a problem. Because one word quickly turns into a sentence, literally, sentencing you to put in the time it takes to work out the problem you’ve created.

The first sentence I wrote down for *All Over Creation* was: “**It starts with the earth.**”

Okay, so now I had a big problem. Really big. Global, even. And the problem only got worse, because in the subsequent paragraphs, I somehow managed to go and sentence myself to writing a novel about potatoes.

Potaotes? Why potatoes? This was my editor’s question when I told her my idea, though she was kind enough not to voice it. But I could see the worry on her face.

Potatoes? Are you nuts?

And we’re not talking just about a single spud, mind you. We’re talking potatoes on a planetary scale.

Of course, the novel isn't just about potatoes. It’s also about a prodigal daughter who returns home after 25 years to care for her dying father and is forced to confront her past and reconcile with her parents. So it’s **also** a novel about family and forgiveness and love.

When I wrote those first damning paragraphs, I knew something about family. I knew about fathers, and even a bit about forgiveness and love.

But it’s fair to say that I knew almost **nothing** about potatoes. So I started reading books...

I read about the ethnobotany of the first ancestral potatoes in South America; and about the conquest of South America by the Spanish and the introduction of the potato into Europe;

I read about the 1845 Irish potato famine, a colossal agricultural disaster that reduced the Irish population by 25%--killing one million people and forcing another million to emigrate--which was brought about by the then new agricultural practice of monocropping.

I read about the re-invigoration and refinement of the potato by Luther Burbank, the "father of the modern potato," who designed the Russet Burbank, which is the gold standard for every French fry consumed in America today...

One of the things that I love about my job is that it gives me time to **wonder**. In fact, it's almost a job requirement, to sit in silence and wonder about the craziest things. And it's a remarkable feature of this complex world of ours that if you're curious about something, even the most humble and abject object, you can **unpack** it and find stories inside.

Have you ever thought of all the stories that are inside your shoe, for example? Or inside the silicon chip in your computer, or in the potato chip that you pop in your mouth? Think about all the human lives and hands and minds that have touched these common, everyday objects.

Take my sneaker: there were the designers, who designed the shoe, and the executives and accountants who approved the design and made the decision to put it into production. There were the cotton plantation owners who oversaw the planting of the cotton to make the canvas, the field workers who harvested it, and the factory workers who cleaned and carded and spun and wove and dyed it and rolled it onto bolts. There were the workers who manufactured the plastic bits and the metal grommets and laces, and then the sweat shop laborers in China who cut and stitched and put the sneaker together. Then there were the packagers and promoters who designed the marketing campaign and created the ads that made me want this particular sneaker over any other, and the guy who designed the website that enabled

me to buy it. And then there were all the shippers and handlers and postal workers who delivered it to me on my remote island in the middle of Desolation Sound...

Each of these people has a name and a family. Now, imagine if you had a superpower -- special eyes, say, with special vision-- and you could see the shadows of all these people, whose lives have somehow touched my sneaker, clustering around it now, like a cloud of ghosts. Now, look around this room. Look at all the stuff here! Can you see all the ghosts? It's awfully crowded in here!

There's a Zen haiku that goes: Inside one potato, there are mountains and rivers. This is what I was discovering, mountains and rivers and so much more.

In the course of my research, I visited large-scale industrial potato farms and small organic farms. I talked to seed farmers, and environmentalists, and food safety activists, and consulted with small town newspaper reporters, agricultural extension officers, and community supported agriculture organizers.

I spent time at the University of Wisconsin, meeting with experts in the fields of potato breeding, taxonomy, and potato pathologies, as well as with rural sociologists and wild potato collectors, who travel to the wilds of South America, looking for new varieties of spuds.

One of my favorite experts was a wild potato collector named Dave Spooner, who's the author of a fascinating book called "Potatoes and their Wild Relatives." Don't you love that title? It makes me think of this large family of trashy white potatoes living in a trailer park, drinking cases of Budweiser beer and partying every night until their neighbors, the Carrots or the Rutabagas, call the police...

One of my favorite stops was the USDA Potato **Introduction** Center, in Sturgeon Bay, Wisconsin, which is the entry point for all potato germplasm into the nation's potato breeding programs and from there into the American food chain.

And I have to tell you that when I first saw the sign for the Potato Introduction Center, I misread it. I thought it said the Potato *Induction* Center, and now I have this

stupid image of all these brave little potatoes lined up like little soldiers, saluting, and marching off to enlist in the American food chain, to become dinner. I can't get the image out of my mind.

The USDA Potato **Introduction** Center, or NRSP-6, as it's known in the trade, is a gene bank for U.S. potatoes. NRSP-6 is a part of the American National Plant Germplasm System, which includes similar gene banks for almost every other major food crop. like wheat, tomatoes, corn, etc.. The National Plant Germplasm System works with the Global Crop Diversity Trust and other international seed banks to protect the world's crop diversity. You may have heard about the Svalbard Global Seed Vault? Nicknamed the "Doomday Vault"? It's one of the projects of the Crop Diversity Trust, and it opened in 2008 to serve as the "ultimate safety net" for the planet's seeds, which are housed this astonishing repository dug deep inside a frozen mountain in Norway.

Okay, getting back to NRSP-6... The mission of this potato genebank is "to facilitate improvements in the potato of the future by promoting the use of valuable exotic genes...." In other words, part of their mandate is to disseminate wild potato genes, and NRSP-6 gives potato DNA freely to all interested users. Most users are professional plant breeders and researchers affiliated with university or corporate breeding programs, but anyone, even amateur breeders, can receive germplasm, too, which is really an astonishing example of open source and public access in this day and age of corporate privatization.

So if you want to invent a new potato, the folks at NRSP-6 are the ones you should get in touch with. They ship internationally, and when I was there, they were preserving 4709 collections or varieties of potatoes. That's a lot of potatoes, and a lot of work.

It's a lot of work, because in order to preserve the germplasm and provide access to it, they have to keep the collections viable and alive, which means they have to

reproduce the seed from all these 4709 collections every year or so. To do this, they have to grow out the plants, which requires a program of extensive and carefully controlled hand pollination in order to maintain the purity and integrity of each variety of potato, because God knows, plants are highly promiscuous. If left to their own devices, they will have sex with just about anyone.

<Warning: the following contains material of a sexually explicit nature. Listener discretion is advised...>

In nature, the bumblebee is the primary pollinator of potato plants. And for those of you who don't remember this from Intro Biology or your sex education classes, here's how it works:

- The bee comes along and buzzes a male potato flower, causing his **anther** to vibrate.
- This vibration knocks off the pollen, which sticks to the bee's fuzzy hindquarters.
- The bee then bumbles off, taking its sticky load to a nearby female flower and depositing it there, completing the sexual act...
- Now, **hand** pollination, by contrast, is **manual** stimulation, which is basically giving a potato a —....well...I think you know what I mean.

The head gardener at the USDA Potato **Introduction** Center was this guy named Chico. Chico had this little contraption that he'd made from a door buzzer, which he used to simulate the bee and to fool the male potato flower into releasing his pollen. It's basically a vibrator, and I imagine it's very sexy, if you happen to be a male potato.

So...as you can see, this is all extremely exciting stuff. I brought my research back home to my cabin in the woods, and I began to write. And write. And write. My friend read an early draft of the book, which totalled about 900 pages. Weeks—well, actually it

was a few months—later, she called me up and said, “Congratulations, Ruth. You’ve just written the Moby Dick of potatoes.”

This did not bode well, but I turned in the manuscript anyway. My editor, as I've mentioned, is a very kind person, and as she carefully trimmed about a third of the manuscript, she gently but firmly assured me that my readers did not need to know *everything* there was to know about breeding potatoes...

But it's so *interesting!*, I said, hopefully.

At which point she reminded me that Herman Melville would never have gotten a publishing contract in this day and age of corporate publishing. Of course, she was right. She always is.

But I bring up this story to illustrate something that was brought home to me over and over again during my research, which is the utter impossibility of human beings replicating or preserving what Nature, unthinkingly and effortlessly, provides.

Seed banks are an heroic attempt to preserve and disseminate the genetic materials of the myriad species of food plants and potential food crops on earth, but even Svalbard, the "ultimate safety net", can't counter or compensate for the loss of biodiversity in the wild. An army of Chico's can't do what a single hive of bees can do, and as we all know, bee hives around the world are mysteriously collapsing.

One out of every three bites of food we eat is thanks to a pollinator. Food **is** sustainability, and human sustainability depends entirely on plants. A catastrophic failure of our global food system may be triggered **not** by peak oil or climate change, but by something unexpected and indirectly related, like the die-off of our tiniest plant pollinators. Human ingenuity has its limits, and we forget this at our peril.

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So, why potatoes? The truth is that when I first started thinking about writing this

novel, I was drawn not to potatoes, but to the controversy around genetically modified organisms, or GMOs. I had written an earlier novel about industrial meat production, in which I explored issues of food safety, the use of human pharmaceuticals in meat production, and the inhuman treatment of animals in feedlots and slaughterhouses. I'd been thinking a lot about the phrase, "You are what you eat," and the ramifications of that simple aphorism in our junk- and fast-food culture. If we are what we eat, and what we eat is not real food anymore, but rather what journalist and food activist Michael Pollan calls the "edible food-like substances" that are the endproducts of our industrial food chain, what does that mean about us? Who are we, and how real can we be?

Genetically engineered crops—tomatoes spliced with the genes from a flounder to increase frost tolerance, or potatoes spliced with the genes of a soil bacterium to induce the tuber to manufacture its own pesticide—these seemed to embody the quintessence of this faux food and identity conundrum, which was why the topic of GMOs appealed to me. And there were other reasons, too.

As an environmentalist, and a consumer, and as someone who routinely eats food, I was concerned about the safety of GMOs. Frankly, genetic engineering worried me, and the way GMOs were being aggressively marketed made me very uncomfortable. I figured that if I was going to spend years writing a novel, I might as well use the time to learn about this subject, so then at least I'd know if I needed to be worried, and if so, then why.

And frankly, as a novelist, I was drawn by the dramatic potential. There's a long and distinguished lineage in western literature of stories dealing with mankind's hubris. Tales warning of the dangers of ingenious technology coupled with carelessness have been around ever since Daedalus first fashioned waxy wings, strapped them to his son's slim shoulders and sent him flying toward the sun, or Dr. Frankenstein stitched up his sad monster.

Something about these brand new organisms and this brand new biotechnology was tapping into our deepest and oldest human fears and desires: our desire to control life and to trespass into the realm of the gods; our fears of the unknown, and of defying the laws of God or Nature. The controversy over GMOs seemed almost Biblical, and I remember re-reading Genesis, and thinking about the Tree of Knowledge and the Tree of Life, and getting very excited about the mythic elements in this struggle. The hubristic God-like biotech corporations were trying to re-engineer Life, itself, trying to force their chimera down consumers' throats, and the grassroots environmentalists were up in arms. All the dramatic elements were there.

So I felt I had a tale worth telling. All I needed was a crop. I was considering corn, cotton, soy and canola — all food crops that were being genetically modified — when I opened the New York Times one Sunday and saw, on the cover of the magazine section, a picture of a potato. But not just any potato. It was a demented Mr. Potato Head. Do you remember those toys? This one had two huge bolts stuck in its neck and a badly stitched scar on its forehead, and he was wearing a tin skullcap on his head that was attached to an electrical coil that spiraled off the top of the page. His wonky plastic eyes were looking in opposite directions, and the tag line read, "Fried, Mashed, or Zapped with DNA?"

The accompanying article, written by Michael Pollan, whom I quoted earlier, was entitled "Playing God in the Garden" and in it, Pollan talked about how the potato, with its long history of breeding, cloning, and now genetic engineering, satisfies our human desire for control.

Pollan's article delivered exactly what I was looking for: a food crop that co-evolved with and enabled our human desire for control. I made my decision on the spot. I would write about potatoes, and the way we humans try to play God, seeking the fruit of knowledge that enables us to exercise, through gene splicing and genetic engineering, control over life, itself.

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Of course, now I had created a really big problem. I had to learn about genetic engineering. This was truly a challenge because it's a brand new field, and nobody really understands the complex behavior of genes, and new research is always emerging to turn what we thought we knew upside down. And it was a challenge because the long-term ecological impacts of this emerging and imperfectly understood technology, which is being applied and commercialized and released into our environment, are still unknown and untested.

However, I was curious, and I had lots of questions, so I started visiting biotech labs and meeting with specialists in plant genetics and molecular biology. It was fascinating research, and incredibly exciting, and I learned quite a bit about gene splicing, and in the process, I learned a lot about scientists, and about novelists, too. I learned that we have a lot in common, and this was somewhat surprising.

The truth is that scientists and novelists are quite similar. We're problem solvers, but it's more than that. We create the problems in the first place. It's like my friend, the painter, said. We look at the world and immediately we start to problematize it. We problematize the world, then we pick it apart to see how it works so we can understand it and make it better. And we do this because we are curious and ambitious, but also because we are control freaks.

It comes back to the notion of control. The world isn't good enough as it is, and so we're not content with simply understanding it, we feel compelled to rewrite it, too. We have to recreate it, to make reality conform to our sense of narrative propriety—the way we think the world *ought* to be. This is what I try to do, as a novelist, and this is what the scientists I talked to were doing, too.

It was a bit of an epiphany, and it occurred to me that if I had been a bit more scientifically minded, I might have been a geneticist or a molecular biologist, too. Gene

splicing and biotechnology are cutting edge. These scientists are real visionaries. They have really, really good imaginations. They are creating surreal and novel lifeforms. Quite literally. Novel creations! Think about it.

Of course, so am I, but my novel creations are fictional. Theirs are real.

And that's the difference, and the danger: It starts when what was scientifically theoretical becomes technologically practical; when so-called "pure" science becomes "applied" science; when novel creations leave the laboratory, become privatized and commercialized, and enter the "real" world.

Now I'm just a fiction writer. I can sit in that little cabin of mine, wondering about the world and re-imagining it to my liking, and yet feel safe in the knowledge that nobody is going to take my little creations and try to actualize them, apply them, or make them real. As a result, there's a limit to the amount of damage I can do.

But the same is not true for scientists. Science cannot remain "pure," because unlike **literature**, science is **profitable**. Science will always be applied, and this is increasingly true as public funding is cut, and universities have to rely on corporate dollars to fund their science and technology programs. When corporate profit is the engine driving scientific investigation, the motivation for inquiry shifts from curiosity and wonder to product design and development, and along the way, unsexy and unprofitable line items like precaution and rigorous long-term testing are eliminated from the bottom line in the rush to capture market shares.

So, after all that research and even after writing the novel, I find myself still worrying. I worry that:

1. GMO technology is being sold to worried citizens like me as the best and only means of increasing crop yields and producing enough food to feed the 10 billion people or so with whom we will presumably be sharing the planet in the next couple of decades. But this promise, of increased crop yield, is simply that. A promise. GMOs allow fewer farmers to control more land. GMOs allow farmers to spray more

herbicides without damaging their crops. But in the 20 year history of this technology, and despite industry promises, there's no credible evidence to support the claim that GMOs increase crop yield.

The real increases in yields have come from conventional breeding, which is, according to many experts, a better way to tackle the problem of feeding the planet.

2. I'm worried that GMOs will further threaten genetic diversity. Science is embedded in the culture that produces it, and to some extent shares those cultural values. The cultural context that produced GMOs is monoculture. Genetic engineering is a technology that serves the interests of monoculture, and monoculture is a technology that serves the interest of big business. Why? Because monoculture is efficient. Monoculture produces a large return of a very few crops—mostly the commodity crops like corn, soy and wheat and rice—which are the mainstays of the immensely profitable industrial processed food chain.

The problem--as we know from the Irish Potato Famine--is that monocultures are extremely brittle and vulnerable, and can easily be broken. Nature on the other hand, is extremely resilient, precisely because Nature is **not** efficient. Nature is **inefficient**, in that anything it does, it does many times over. Nature is profligate, promiscuous, rampant, and filled with redundancies, and as a result, natural systems, polycultures, are tremendously resilient and can withstand shocks to the system. And one thing we can be absolutely sure of: there are going to be shocks to the system, either oil shocks, as we run out of the fossil fuels upon which our industrial and chemical agriculture depends, or climate shocks, or new pathogens, or terrorism.

In the face of all this, it seems to me that if we're worried about sustainability, we ought to focus on technologies that head us in the direction towards diversification, localization, and redundancy, rather than GMOs which grow out of the context of monoculture and are designed to serve the interests of consolidation, privatization, and big business and monopolies.

3. I'm really worried about privatization, patents and intellectual property rights. The real advantage of GMO technology is that it can be patented, and therefore tightly controlled by the Life Science and biotech corporations, like Monsanto, Dupont, and Syngenta, who own the seeds and the patents. It's that human desire for control again. A genetically engineered seed is patented and owned. When a farmer plants GMO seeds, he is required to sign a technology agreement with the patent holder, which makes it illegal for him to save any of that seed for replanting, and forces him to buy new seed from the corporation every year. Some farmers, banking on the advertising promises of higher yields and greater efficiency, sign the agreement, and that is their choice, but what about the guy next door? There have been many widely published cases of farmers being sued for patent infringement because some of the corporation's genetic material blew into the neighboring farmer's field and took root and grew there.

The infamous "terminator" technology, which is method of genetically engineering a seed that renders it sterile, is biotech's answer to genetic pollution and trespassing genes, but it's real function is once again as an enforcement mechanism to control intellectual property. What good is planting sterile seed?

And it gets worse. One thing you may not know, and I say this only because it came as a surprise to me, is that the biotech and life sciences corporations are able to use copyright law to curtail independent research, which amounts to censorship of curiosity, itself. If a scientist is curious about a Monsanto product, for example Round-Up Ready Corn or New Leaf Potatoes, and wants to study it, she has to first get permission from Monsanto to carry out her research, and then sign a contract giving Monsanto prior approval before she can publish the results of her study.

Censorship has extended to the press, too. There have been many instances of journalists who have written articles criticizing genetic engineering practices, only to then be sued by these corporations for libel and for slandering their products. These cases are called "SLAPP" suits: Strategic Litigation Against Public Participation," and

their purpose is to censor, intimidate and silence critics by forcing them to shoulder the prohibitively high costs of legal defense until they run out of money and are forced to give up and shut up.

This effort to seize control, censor curiosity, patent **life** and privatize **nature's** bounty troubles me the most. Nature is, by nature, generative, generous, and open source. Wind blows. Bees buzz and pollinate. Living organisms reproduce, and this is as it should be. The problem is that with genetically engineered organisms, once you release them, you can't recall them the way you might recall a faulty tire if you find there's something wrong with your design a few years down the road. And this is worrisome, because the outcomes of applied science and commercialized technology are often unexpected and deadly--as we are finally beginning to understand now, in this industrialized, toxified, rapidly warming and ecologically depleted world of ours.

There's a lot of controversy about GMOs, and many techno-utopian ideologues, even ones who identify themselves as environmentalists, vociferously defend genetic engineering. They are comforted by the vision of a technological fix to the problem of world hunger, and perhaps they are partly right. In spite of all my worries, I'm not convinced that genetic engineering, **per se**, is a bad idea. In a less draconian research environment, where information is shared and allowed to flow freely, this biotechnology may hold some very important answers, and we're certainly going to need our scientists to help come up with some novel solutions to the challenges we will face in the future.

But we're going to need more than just the scientists. We're also going to need all of us citizens, too--the farmers, and backyard gardeners, and urban agriculturalists, and permaculturists, and chefs and mothers and teachers and everyone who eats--to be a part of the solution.

There will be no simple, singular, monocultural solution to the problem of food and sustainability. The solution is going to be polycultural, because diversification is Nature's way of solving problems, and sustainability is a problem that Nature is going to solve, one way or another, with or without our help.

And actually, Nature doesn't have a problem. It's us, the humans, who do. So if we want to help solve this problem that we've created, we need to embrace a model of problem-solving that is diverse, pluralistic, messy, chaotic, anarchic and multiplicitous. I think the solutions will come from an enormous variety of sources, big and small; global, national, and local; governmental, corporate, and grassroots.

They'll come from the burgeoning organic farming, local food, and fair trade movements; and from legislators working on farm policy, and labeling and organic standards;

They'll come from mothers, who want to see their children fed right; and from experts working on climate change, energy, public health, and national security, because these four sectors are inextricably linked and affected by our agricultural practices and the way we grow our food;

They'll come from subscription farming, and community supported agriculture, and the farmer's markets that are springing up all over the place, like mushrooms after a rain, allowing farmers to market directly to consumers, and consumers to build relationships of trust with the farmers who feed them:

They'll come from the school lunch and home economics and gardening programs that are educating children's palattes and teaching kids how to grow and cook and enjoy the taste of real food;

They'll come from indigenous farmers, like the Peruvian women who continue their traditional work of saving thousands of varieties of potatoes in the high mountains of the Andes;

and they'll come from scientists and writers and artists, willing to challenge the

corporate monocultural paradigm;

Urban farms are cropping up in inner cities, like Detroit and Havana and Mumbai and Cairo and Shenzhen... And here I want to tell you about Will Allen, a visionary African-American basketball player-turned-urban farmer, who's growing huge amounts of food on two acres in the middle of inner city Milwaukee. He has plans to feed 10% of that city from his farm. He teaches thousands of people every year to grow their own food, and sees farming as a way of fighting racism. "I don't build gardens with fences," he says. "It's all about relationship." You'll see him in the documentary movie, "Fresh" that I think we'll be screening here later on.

Solutions will also come from the new breed of agriculturalist like Joel Salatin, the grass farmer you'll also see in "Fresh." These are agriculturalists who, instead of using chemical inputs, practice information-intensive farming--their intimate and extensive knowledge of soil science, geology, chemistry, biology, botany, zoology, entymology and climatology enables them to develop systems of rotational grazing that produce huge yields of crops and meat from very little land...modeling a kind of efficiency that is based on diversity rather than on monoculture.

Solutions will come from international environmental education centers, like the Arava Institute and the Heschel Center, who understand that nature doesn't recognize political borders, and that the first step to sustainability is learning to work together in a peaceful and harmonious relationship with nature and with each other;

And, finally, solutions will come from ordinary people like us, people who are worried, and who come together to puzzle out ways we can help.

I'm optimistic. I think that yes, the old system--which really isn't so old, when you think about it, and has only been around since WWII-- is broken and falling apart, and thank God for that! What a wonderful opportunity for us to find new and sustainable ways of doing things.

So my suggestion is simply that we recognize that we're all in this together, that the solution is not going to be neat and clean and efficient and coming out of a lab, but rather messy and fecund and redundant and confusing, but all of that is necessary, and no one of us has the right or only answer, so let's just embrace it, and pitch in, and help, however we can, to the best of our abilities.

And when we're feeling overwhelmed by all the information and confusion and chaos, then let's try to remember to take a moment to close our eyes, and focus on our breathing, and then take that small backward step that enables us to feel our real and intimate connection with the earth, and with our life, and with each other. Words are great, but it's there, in those moments of silence, that we're truly able to find time to wonder.