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***1 EARTH DEMOCRACY: SUSTAINABILITY, JUSTICE, AND PEACE**

We need to do nothing less than renew our Earth-being. We are beings of the Earth, not outside her. We live under this illusion of being separate, being masters, being conquerors, being owners, but it's a very short period during which this illusion has dominated human thought. The First Nations of this land didn't think that way. They were around for thousands of years; many of them disappeared when the "other thinking" came up. This has been aggravated by non-renewability--both of our primary energy source (which became fossil fuels) and our capacity for justice and peace (which also is becoming an exhaustible resource and being hugely tested and tried).

For me, the term Earth Democracy emerged in a very natural way, from the idea around which Indian civilization is based: *Vasudhaiva Kutumbakam*; "the Earth as one family." Evolved minds know that the whole world is one family. Anyone who thinks, "this is a friend and this is a foe, this person belongs and that person doesn't belong," has a petty mind. Earth Democracy is nothing more than recognizing that we are part of the Earth family in ecological terms, that we are animals. We forget that--that's what I keep telling the animal rights movement: include the human! When you have deep values, you first live them. When you have deep values, you don't begin by imposing them on someone else. Because that is part of the imperial urge, you begin by civilizing the barbarians. It wasn't that they went around killing five hundred years ago just for nothing, *they were civilizing us*. For them it was serious, very serious: we weren't whites, we weren't Europeans, we weren't Christians. The whole world was not Europe, so the whole world was a problem, it had to be sorted out.

I wrote the book *Seed Sovereignty, Food Security*¹ because I had been involved since 1987 with dealing with free trade and the

***2** GATT.² I happened to be at a meeting that year where the oil-chemical industry was saying:

we will now have to own the seed, we will have to patent it, and the way to patent seed is through using the tools of recombinant DNA to proclaim we made something new. We define it as an invention. We take a patent. But it is not good enough because at the end of the day, the United States and Europe are very small agricultural countries compared to the world. So we've got to have a free trade agreement where these laws of patenting are imposed.

That's the day I started to save seeds and started Navdanya, the movement for seed saving. I started to learn everything on intellectual property rights and patents. I learned everything about the GATT negotiations, and we managed then for India to implement laws according to Earth Democracy. Laws that say plants, animals, and seeds are not human inventions. Just this week we won once more against Monsanto trying to dismantle Article 3J of India's Patent Act³--the exclusion clause, which is consistent with the TRIPS clause (something we also worked on) which has the right to exclude life forms from patenting.⁴

But the other side of these agreements was the World Trade Organizations (WTO's) Agreement on Agriculture, which literally reduced food to a commodity. Cargill wrote the agreement; that's why its president was deputed as the U.S agriculture representative.⁵ Does Cargill grow food? No, they don't grow food. What they do is ***3** *trade* in food. They were among the

five merchants of grain, they are now the four because they bought out the second biggest merchant of grain, Continental.⁶ They were looking for market access, but also seeking to change domestic agriculture policies to remove support for farmers. That effort led to the domestic support clause.⁷ While support for agro-business continues to grow, the support for small farmers comes down.

The system works because subsidies distort prices. There are \$400 billion of subsidies that can reduce any high cost production to very cheap food. For example, Mexico was food self-sufficient before the North American Free Trade Agreement (NAFTA).⁸ Today everything that's gone wrong with Mexico, including the problem of migration, is related to the destruction of their agriculture, their farms, their food sovereignty. Though I have to say, that they have managed it in all these years--even though the President signed a decree that six million acres would be handed over to genetically modified (GMO) corn⁹--they have managed to create a viticulture, legal cases, and to keep low at least Mexico-GMO corn. Because they say, "we are the culture of corn; we are corn." And this separation, which I call "eco-apartheid" (apartheid means separation). Eco-apartheid is our pretending to be separate from nature and from the Earth and then creating instruments, which we feel are *4 improving the human condition. Food and agriculture is one area where it was assumed that industrial farming would work: "Of course, we will wipe out the prairies, but it creates more food."

A mechanistic way of thinking has gone into our food culture. We think that if we leave more food for animals, we have less. All my work has shown when animals have good food, we have more food. We think if you return to the soil we are wasting. But when you give to the soil more food, she gives you an abundance. The assumption is that if corn and soy are the big commodities, grow more of them and that's food security. It's not. Ninety percent of corn and soy of the world is used for biofuel and animal feed--ninety percent. Where is it in the food system? It sneaks into the food system because some products are not GMO-labeled. In Europe, animal feed is not GMO-labeled. In this country, nothing is GMO-labeled. The United States is among the very few countries that does not have the right to know what you are eating. GMO labeling is mandatory in sixty-four countries of the world. It's been adopted.

I got involved in agriculture because of my experience at the University in Punjab. I decided to look at what was happening. I was working for the United Nations University on a major program on natural resources, and I said I want to look at what's going on. That same year, in the city of Bhopal, the pesticide plant had leaked. According to local people, 7,000 people died that night. Children are still being born maimed and crippled. I did this book, called *The Violence of the Green Revolution*, where I learned that we aren't really producing more food.¹⁰ We were producing more rice and wheat, and a lot of it was rotting--two million tons. But we were growing no dahls, no oil seeds, no vegetables, and there was actually malnutrition.¹¹ Meantime, the soils had died, the water had disappeared.¹² There were water wars, water conflicts.¹³ They used to grow two hundred fifty species of crops in Punjab before the Green Revolution, which reduced Punjab to wheat in one season and rice *5 in one season. This redesigning was done so that more chemicals could be used, but the traditional varieties are tall varieties because they are for animals and humans.¹⁴ The straw goes to animals, the grain goes to humans. But when you put in chemical fertilizers, the tall varieties lodge. I call this the satyagraha of the plants. Satyagraha is Gandhi's word for the force of truth. So the plants said no, I don't need chemicals, I want organic. So they lodged. They went on strike. The plant was reoriented to be a dwarf variety, so you could pump in more chemicals.¹⁵ But it also needed more water. It required ten times more water to produce the same amount of food.

The dwarf varieties are harvested with a combined harvester. They leave the stalk, and the stalk is inedible by animals. Now there's a big issue of pollution from burning the stalk. We should bring back the old varieties; let people get good wheat, let the animals get good food, and you won't have to burn. On the wheat issue, let me just mention: Punjab's wheat is now being rejected for being nutritionally empty. The protein has fallen to less than 4 percent. The traditional wheat we saved has as much as nine percent protein. But more than that, the wheat is actually healthy. Now, everything thinks "wheat-gluten allergy." Traditional wheats have a process of suppressing the expression of gluten. It's not that they don't have it, but it's not expressed.

But when you do industrial processing, you want elasticity. You breed for those wheats that have high elasticity and high gluten expression. Then uniformity ends up being another way in which our gut experiences food as an attack.

Besides us not being separate from the Earth, our gut is not separate from the food we eat. In our old tradition of Ayurveda, it was recognized that the digestive system is the most important system for health. They call the digestive process *agni*, which is the word for energy in our language. That is the heart of the matter. Now ten years of research is showing that the gut microbiome is the key to health. And what does the gut microbiome do? It doesn't send text messages does it? It's basically taking the distilled environment--soil, biodiversity, the sunshine, the pollination by the bees, the *6 water, all of it--and converting it to food with our work. We have amazing senses that are looking for all the taste. Ayurveda also says you must have six tastes in your food, because the biodiversity in the gut needs that diversity. Diversity in the field and diversity in the gut is deeply, deeply integrated, but we turn agriculture into a commodity-producing system and industrialize it with inputs that are leftovers of war.

As Rachel Carson wrote in *Silent Spring*, the pesticides really came out of the war.¹⁶ The chemical fertilizers were made in the same factories that made explosives and ammunition in Germany. Herbicides of course, like Agent Orange, were very much a part of the arsenal in Vietnam. Not only are they leftovers of actual wars that people have been engaged in, they come out of a militarized mind that now sees all of nature as an enemy that must be exterminated. Otherwise why would we have herbicides that are advertised like "kills everything green?" You should nourish everything green! To even have something like Roundup! If you look at the name of the chemicals, they are war names. All of them are war names. Of course, the companies learn fast and quickly to move to lovely names like Terra.

Finally, we are in conflict. Punjab was really about protest: farmers were saying if we can't decide what we grow, if we can't determine the price, if we can't decide when the water of our rivers will reach our lands, we are living under slavery. They wanted an agriculture where they had prosperity because they were getting into debt. The military was sent to the Golden Temple. The prime minister at the time was assassinated, and a vicious cycle of violence continued to increase. The military silenced the protest, but the military could not end the tragedy. So now farmers are committing suicide. There are four epicenters in India where farmer suicides are happening. And there is a cancer train that leaves Punjab. This was the most prosperous state of India. The proudest state of India. And now there is a train, whose name has become the Cancer Train, leaving from there.

*7 There is a recent report out from a UN agency called the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES). It is a science policy platform for biodiversity and ecosystem services that recently released a report showing that the threat to soils, biodiversity, and desertification are severe.¹⁷

I believe that every wrong action with respect to the land is a wrong action with respect to biodiversity, is a wrong action that leads to consequences for our health, is a wrong action that creates conflicts and the end of peace, and is a wrong action that leads to more emissions. Land degradation, biodiversity, erosion, public health, women's situations, climate change, are not separate. They are just different facets of the same process, which is an indifference to the ecological processes of the Earth, and living at war with the Earth. Imagining that that war is generating goods and services for the humans. What is doing is increasing the profits of a handful of people. You have all these commodities, but is there less hunger? No. A billion people are permanently, structurally hungry now. This never happened before in human history. There were famines because of injustice, there were famines because of drought, but you bounce right back. The wars end, the drought ends. Hunger in the past was localized in space and time. Today, it is everywhere in every society to the extent that there are food deserts in the United States. How could we create, in the most affluent economy of the world, a food desert?

Food deserts are a result of the same processes that are desertifying the land, and the rise from the desertification of our minds to be militarized minds and monoculture minds, and the desertification of our hearts. We forget compassion, forget relationships, forget care, and forget the ability to anticipate harm to others knowing that that harm becomes harm to us. We are insulated because we are interconnected.

According to this new UN study, twenty-four billion tons of soil are being eroded every year in the world. Good agriculture *8 protects soil, and there is no erosion of soil for two reasons. First, when you apply organic farming methods, soil becomes aggregate and it forms humus, and when the rain comes, it doesn't wash away. Whereas when you plant chemical fertilizers, the humus is dead, there is no aggregate, there is just disaggregated soil that washes away. But also, good farming is diversity, always cover crops, always protection from the sun, the wind, and the water. The monocultures of singular commodities are hugely exposed. I see them as naked. And this is what is leading to desertification.

The word human comes from the root humus, which is soil. And in ancient India, five-thousand-year-old veda, says "in this hand full of soil is your future. Take care of it, it will take care of you. Destroy it, it will destroy you." Every civilization that disappeared, disappeared because it stopped caring for its soil, it overexploited its soil. It forgot what I call the law of return, the law of care, the law of giving back. This lenient extractive method of thinking of more production, more growth, more profits, actually is a poverty-creating system. It extracts from the Earth, it extracts water from aquifers, and you get less water. It extracts social wealth from society and you get poverty.

Last night I was in Richmond, Virginia and I was absolutely amazed at how many homeless people there are. Anywhere they took me, there were five homeless people coming to the car to beg. Just like food deserts, there is extreme poverty in this country. And this is the fiftieth anniversary of Martin Luther King's assassination, we mustn't forget it. Because towards the end he enlarged the idea of civil rights, to be the idea of living with dignity and economic justice. I think if he lived today, he'd have expanded it to be Earth Democracy too. Because there wasn't a deep ecological crisis of the kind we are witnessing today.

Shocking statistics are released daily: 75 percent of the erosion of soil, 93 percent of cultivated crop diversity, 75 percent of the destruction of bees, insects, birds. In the United States, 90 percent of the destruction of Monarch butterflies and 75 percent of the destruction of water are all related to industrial agriculture and monoculture systems of producing commodities. I won't call it the food system, because it's not producing food. It's not even a non-food system, it's *9 anti-food system because it's damaging our gut microbiome. At least let's take the intelligence of our gut seriously, when those amazing microbes are giving an answer just like the plant gave an answer to say no to chemicals, the gut microbiomes are responding.

Seventy-five percent of the new diseases, which are related to chronic diseases, are non-communicable. We used to worry about communicable diseases. One place where communicable diseases is still a problem is because we pump so much antibiotics in factory farms, and create antibiotic resistance. Today, you can go into a hospital with a little cut, and come out with a super-resistant bacteria that can't be killed. In 2009, before the Copenhagen summit on climate change, we were already facing climate extremes and climate disasters. We had the Orissa (now Odisha) Super Cyclone, and on the other hand our work in navdanya with ecological farming, biodiversity, was showing how there is an amazing solution, but agriculture was a missing piece in the climate discussions.

If you actually add the different elements, look at land use / deconstruct land use, what is the conversion of the Amazon to grow GM soil? The destruction of the rainforest of Indonesia to grow palm oil? According to the UN, there will be no more rainforests left in Indonesia after 2030 at the rate of destruction of the original rainforest. Instead of growing food locally, we are shipping everything from 10,000 miles away. We created such a strange fossil fuel efficiency. I think it was in Spain, the pigs that are reared intensively in the Netherlands are shipped down to clean and then shipped back to process. And this happening to everything because the subsidies are what makes high cost production cheap, and we have the illusion of cheap food. But even cheap food is not accessible in the food deserts. So whether you take into account the human right to food, or you take into account the high costs of non-sustainable food systems of the Earth, we have to learn and renew our ability to feed ourselves. That means remembering we are the Earth because as I said, food is that one aspect of what the Earth gives which becomes us. Of course, the air also becomes us, but food in the sense that every tissue, every cell is based in what we are eating. If we eat healthy, we grow it healthy, we are healthy. The health of the soil, the health of the plants, the health of our gut, and the health of our *10 brains is one continuum. The gut is the second brain, the enteric nervous system. Where do soils get their nutrition from? From the organic matter where the organisms make the nutrition.

Where do soils get their minerals from? We recently completed a twenty-year study on our valley comparing emissions from organic farms and chemical farms. Greenhouse gas emissions are driving climate change: carbon dioxide of course, but also nitrous oxide from nitrogen fertilizers, and methane from factory farms, as well as food waste. When you make food artificially cheap, you buy this much instead of that much, and then you throw it away. Instead of serving yourself this much in the cafeteria, you fill your plate and throw away what you don't eat. Food waste is the other side of the food desert. Nitrous oxide comes from the fact that fossil fuels go into making chemical fertilizers. One kilogram of nitrogen fertilizer requires the energy equivalent of two liters of diesel. Energy used during fertilizer manufacturing requires the equivalent of 191 billion liters of diesel in 2000, and it will be 277 billion in 2030. These are the neglected issues; this is why I wrote the book *Soil Not Oil*; because when you give back organic matter to the soil, not only has the organic matter increased by up to ninety-nine percent in organic soil, it's gone down 14 percent in chemical soil. Nitrogen fertilizer applied to soil has depleted nitrogen 22 percent, increased nitrogen content in soils where we are not applying nitrogen fertilizer 200 percent, some if it is coming from nitrogen fixing crops, a lot of it is coming from the fact that so many organisms produce nitrogen including the little earthworm.

Darwin had written a book, which should be more famous than the *Origin of Species*. It is called *The Mould*, the earthworm mould.¹⁸ He says at the end of it when the history of humanity is written, we will recognize that this species played the biggest role in our survival. Nowadays, worming culture, worming compost, and urban gardening is increasing.

We also have huge amounts of micronutrient and trace element deficiencies because when you put NPK (nitrogen, phosphorus, *11 potassium) and you don't leave the soil organisms that are able to produce other things, what you get is deficiency. Across the world in the United States, England, even in my country, chemical farming is depleting the soil. This means food is depleted of micronutrients and trace elements up to 60 percent. This leads to the epidemic of micronutrient deficiencies. I had public health people visiting me from Australia and they couldn't believe it. They said your soils are able to give plants with zinc? Zinc deficiency according to them is a major cause of depression among teenagers. There's a chef called the Naked Chef in England who managed to get a big program to feed children organic food in cafeterias, and the magnesium content in the food went up. With magnesium, attention deficit disorder went down. Now these I think are very important areas of deepening research.

Chemical farming also uses ten times more water to produce the same amount of food. And meantime it is not just mining the water, look at the aquifers that are going dry, including fossil aquifers in this country. But it destroys the soils water-holding capacity. The soil is the world's biggest water reservoir. When we have organic matter in the soil, with 0.5 percent organic soil we can hold 80,000 liters of water in a hectare.

For me, the most important part of these interconnections is the conservation of biodiversity. I conserve biodiversity simply by being an Earth citizen. We have no right to drive diversity out of extinction. The idea that a company should own seeds through patents is wrong--just save seeds, and save seeds, and save seeds. In the process we saved the bundi and the calumbuk and the lunabuckra, all of which names tell you in Oriya that these are soil-deterrent varieties that the peasants had bred. When the cyclone hit in 1999, and one of the issues about climate change is that is not that we haven't had droughts and cyclones. Having saved all these seeds, we were able to reach a venite _____ agriculture in Orissa. In 2014, two truckloads of these seeds were given by the peasants of Orissa to the peasants of Tamil Nadu.

Can you imagine if these, seeds were patented? Genetic engineering is working on single gene traits, but resilience is a complex trait. They've been evolved by nature, they've been evolved by *12 farmers' breeding--flood-tolerant rices, drought-tolerant crops. My favorite is the forgotten foods. I mentioned how we were the primitives and the barbarians that had to be wiped out. The crops were also primitive and had to be wiped out. The millets, for example, are called primitive grains. The millets get the name from the fact that one grain gives you a million seeds, that's why they're millets. The sorghum, the pearl millet, the finger millet, they are more nutritious than any other food. I weaned my son on ragi when I was in Bangalore. Ragi is the finger millet, one of the most nutritious crops. Uses 200 mm of rain, in the middle of a drought you can have the crop. Needs next to no water, can draw on marginal land, fixes carbon. The ultimate solar cell is in the plant. We need solar panels and solar energy, but we have to work with the amazing capacity, so we call the millets and other forgotten food "Foods of the Future" because they are the only kinds of foods that will be able to address climate vulnerabilities. Our research show that when disaster hits--

it could be a flood, it could be a drought--they stand tall. They don't collapse. With a green revolution seed variety, one drought and you can't even plant it. It needs so much water, the rain isn't coming, the reservoirs are empty.

Another phrase that has come out of the sense that we are outside nature is the idea that we have to become "free" of the monsoon. You can't become free of the monsoon because the monsoon brings the water. Even your reservoirs get their water from there. You can build more reservoirs, but if climate change disrupts the monsoon, you still have a drought. Drought resilience, then, becomes very important. Drought resilience, as my work has shown, from diversity because diversity in itself is resilient. Our research is showing that the more diverse a farm, the more it can deal with climate variability, the more it can deal with pests and diseases, but more interestingly, it produces more food. That's why we look at the health per acre and nutrition per acre and not the yield per acre which is fine for measuring the output in a monoculture commodity, but is not adequate when you want to look at how you grow healthy food with a small footprint for local communities.

Nutrition per acre data shows we could feed two times India's population. Another aspect is that the more diverse the farm *13 --not only the more diverse the crops in it, the more the diversity of the varieties in it, and the more the diversity of functions. Because we bred monocultures with one function, the collapse is quicker and vulnerability is quicker.

Then there's of course the diversity of the knowledges that we have to recognize and honor. A lot of people [say] "Oh you're lucky, you have an ancient farming civilization, you know, but we just have two hundred years." I say "no, you have ten thousand years too, just turn to the First Nations." They grew the three sisters, they never grew corn in a lonely monoculture. It wants the bean, it wants those companions. They are in fact called companion crops. You can look at the Earth as something that we are masters of, we can keep destroying its capacity to sustain us, and then as this capacity shrinks, we unleash more walls of injustice, thinking, "Those guys don't have a share. They're extra." I won't go into the debates that are taking place right now on the fact that there is a growing refugee crisis as the soil is destroyed, biodiversity is destroyed, local economy is destroyed. Half of Syrians are refugees today, the problem began in 2009 with the drought and unsustainable systems of farming that had left them with no water. One million peasants came to the cities as refugees. We've got a very messy war now.

Even Lake Chad, in the heart of Africa, used to be 22,000 square kilometers. It's just got a few spots of water, nine million people used to be supported by that lake: fishers, farmers, pastoralists. As the resources shrink, conflicts begin, and there's a dominant narrative which constantly takes every ecological conflict because of ecological degradation, and names it as a religious conflict. And I see it as defending a failed model, rather than say this way of living with the soil is wrong, this way of producing food is wrong, we say that has to carry on but every religion has to fight with each other as the inevitable way we deal with it. That's why the issue of sustainability, justice, and peace is so interrelated.

But the heart of Earth Democracy for me is the recognition that we are not only part of one Earth family, every species has its rights in this beautiful matrix of life. And we have an ancient, ancient Upanishad, and this is from where Gandhi picked up his wonderful phrase "the Earth gives enough for everyone's needs, but *14 not for a few people's greed." The Isha Upanishad says "the Universe is the creation of supreme power, and is meant for the benefit of all creation, each life form must therefore learn to enjoy its benefits by forming a part of the system in close relationship with other species, not let any one species encroach upon the rights of others. Enjoy the gifts of the Earth without greed." Magirah? _____. Abhor greed. Then it goes on to say, "A selfish man over utilizing the resources of nature to satisfy his own ever-increasing needs is nothing but a thief, because using resources beyond one's needs would result in the utilization of resources over which others have a right." And the others are all species, all human beings, and all future generations to come.

There's a lot of discussion now on the fact that within a century human-beings might be extinct like all of the species we've driven to extinction, if you look at the ecological context in which our species thrived for a few thousand years. In my view extinction is not inevitable, and escape is not an option. That too, "I'll make a mess and walk away." The "I'll make a mess and walk away" doesn't work at the planetary level, it doesn't work at the personal level. These are the reasons we have to learn from women to care and share and clean up the mess.

At our farm at the Earth University, everyone washes their dishes. And I'd seen government servants come for a training [and say] "we've never washed our dishes; our wife and our maids do that." I said, "Sir you go hungry, or wash your dishes." And they washed their dishes. And now they're grateful, because to reclaim your humanity through cleaning your mess is liberating. Mastery over others is not. We are at this moment where some people are afraid we will be extinct. Most people. The children, the butterflies, the bees, the earthworms, women, indigenous cultures, are all ready to shape another future based on Earth democracy.

Thank you.

Footnotes

- ^{d1} April 20, 2018, University at Buffalo Center for the Arts.
- ¹ Vandana Shiva, *Seed Sovereignty, Food Security* (North Atlantic Books 2016).
- ² The GATT is the General Agreement on Tariffs and Trade. It is a free trade agreement that is a precursor to the World Trade Organization (WTO).
- ³ Vandana Shiva, *Reflections on the Conclusion of the Satyagraha Yatra*, Seed Freedom (April 25, 2017) <https://seedfreedom.info/art-3-j-of-indias-patent-law-central-to-our-national-sovereignty-and-national-interest>.
- ⁴ Trade-Related Aspects of Intellectual Property Rights art. 27(3)(b), Apr. 15, 1994, 33 I.L.M. 1125. TRIPS sets the minimum standards for international regulation of intellectual property rights.
- ⁵ Vandana Shiva, *Earth Democracy* 35 (South End Press 2005).
- ⁶ Allen R. Myerson, *Cargill Set to Buy Main Unit of Continental Grain, Its Chief Rival*, N.Y. Times (Nov. 11, 1998) <https://www.nytimes.com/1998/11/11/buisness/cargill-set-to-buy-main-unit-of-continental-grain-its-chief-rival.html>.
- ⁷ Vandana Shiva, *The World Trade Organization and Developing World Agriculture*, in *The Case Against the Global Economy: and the Turn Towards Localization* (2d ed. Jerry Mander & Edward Goldsmith eds. 2001) (explaining that the WTO's Agreement on Agriculture contains clauses on domestic support that require nations to reduce their domestic support for agricultural producers).
- ⁸ See Lauren Carlsen, *Under NAFTA Mexico Suffered, and the United States Felt its Pain*, N.Y. Times (Nov. 24, 2013) <https://www.nytimes.com/roomfordebate/2013/11/24/what-weve-learned-from-nafta/under-nafta-mexico-suffered-and-the-united-states-felt-its-pain> (telling about the harm to farmers and food security under NAFTA).
- ⁹ Jack Adam Weber, *Monsanto in Mexico: Stop GMO Corn Now*, Wake Up World (Nov. 21, 2012), <https://wakeup-world.com/2012/11/21/monsanto-in-mexico-stop-gmo-corn-now/>.
- ¹⁰ Vandana Shiva, *The Violence of the Green Revolution* (Zed Book Ltd. 1991).
- ¹¹ *Id.* at 181.
- ¹² *Id.* at 121.
- ¹³ *Id.* at 150.
- ¹⁴ *Id.* at 62.
- ¹⁵ *Id.*
- ¹⁶ Rachel Carson, *Silent Spring: Anniversary Edition* (Houghton Mifflin Company 2002).
- ¹⁷ IPBES Assessment Report on Land Degradation and Restoration (2018).

18 Charles Darwin, *The Formation of Vegetable Mould Through the Action of Worms* (Benediction Books 2009).

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