



**2023-11 Politics and Power in Your Morning Coffee**

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*Dawn Johnson:* Museum of Natural History Science Cafe. It's great to see everybody. I'm gonna introduce myself. My name is Dawn Johnson. I am the associate director at the museum. I also am fortunate to be the interim director as we transition through Amy Harris's retirement, which we are very sad about, but we also wish her lots of luck and enjoyment in her new adventures. We're very thankful to Conor O'Neill's for being our venue for 15 years and hosting us.

Also, I just wanna acknowledge Kira Berman, Nora Webber, Madeline Zerial who are making this event happen between technology and setup, appreciate them. Also, appreciate all of your participation in this program. If you weren't here, if you weren't engaged, we wouldn't be able to do this. I do want to remind you that we have a donation box that helps support this program. It's back where Nora is. Because I'm a—

*Kira Berman:* It's very powerful, that little box.

*Dawn Johnson:* Very powerful. Because I'm a newbie to Science Cafe, this is my first time, which I'm very excited about, I've got my cheat sheet 'cause I wanna make sure I don't leave anything out or forget anything. Also, very thankful to our presenters tonight, Ivette Perfecto and John Vandermeer who Kira is going to introduce in a couple moments to you. Also, a couple things we have going on at the museum, upcoming events, we have a Scientist Spotlight December 2nd, 11:00 a.m. to 4:00 p.m. if you wanna meet more researchers. This is part of our Science Communication Fellows Program.

Also, on Giving Tuesday, which is coming up November 28th, we would love to have your support for the museum on that day as well. The museum is one of 15 projects that was chosen. If we get halfway to our amount that we wanna raise for our Dino Discovery exhibit that's coming in February, it'll be matched by the university. The quicker we get there, if we get there first, then we'll be able to—we'll get that support for that. I'm gonna let Kira introduce our speakers. Again, thank you so much for being here this evening. I'm looking forward to having a chance to meet and talk with some of you.



■ *Kira Berman:*

Thank you so much, Dawn, and welcome to Science Cafe. I see some faces who I recognize and also some new faces. Can't see any of you with my glasses on but I can read. Just a review of our format. We have a quick presentation, about 15 minutes for each of our speakers. They'll review some of their research and some of the issues that they faced during their research and in their education efforts. Then there will be a break, and there are some discussion questions and some information on your tables. After the short presentations, we'll have a break. You can discuss, ask each other questions at the tables.

Then we'll come back together for the last half hour from about 7:00 to around 7:30 in order to have a group discussion. That's a great time to address your questions to the speakers or to other members of the audience. Again, thanks to Conor's because they make this whole thing possible. Please remember to turn off your cell phones so they don't ring during the presentation 'cause that would be annoying.

With that, I will introduce our two wonderful speakers. Ivette Perfecto is the Bunyan Bryant Collegiate Professor of Environmental Justice, and I'm really happy that she's here. She works in agroecology focusing on the intersection between biodiversity, agriculture and food sovereignty. Her research examines arthropod-mediated ecosystem services—that's insects in general, right? Just checking—in agricultural and agroforestry systems with an emphasis on understanding ecological interactions that result with autonomous pest control and reduction of pesticide use. Really important work.

She's interested more broadly in the links between small-scale sustainable agriculture, biodiversity and food sovereignty in Latin America. She co-authored four books and is a member of the National Academy of Sciences and a fellow of the American Academy of Arts and Sciences, the American Association for the Advancement of Science and a Senior Fellow of the Ecological Society of America. She also received an Honorary Doctoral Degree in Education from the—help me here.

Ivette Perfecto: Universidad Sagrado Corazon.



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*Kira Berman:* Universidad Sagrado Corazon—did I do that okay? Awesome. Her alma mater in Puerto Rico. She is a longtime member of Science for the People and the New World Agriculture and Ecology Group. Please welcome Ivette Perfecto.

*[Applause 00:05:30 - 00:05:35]*

*Kira Berman:* I also wanna welcome John Vandermeer. John Vandermeer is the Asa Gray Distinguished University Professor and Arthur Thurnau Professor of Ecology and Evolutionary Biology and a professor in the Program in the Environment at the University of Michigan. He teaches three courses: Food, Energy and Environmental Justice; the Ecology of Agroecosystems; and Complex Systems in Ecology. His research focuses on the coffee agroecosystem for which he delves into recent advances in complex systems in attempting to understand the biological, social and political aspects of this important ecosystem.

He is author or editor of 16 books and over 300 scientific publications. Needless to say, I'm not gonna list those here. He's also a political activist, a founding member of the New World Agriculture and Ecology Group, a current member of the revived organization Science for the People and a founding member of the University of Michigan's Sustainable Food System Initiative. Both of our speakers are longtime friends of the museum. Please welcome John Vandermeer.

*[Applause 00:06:45 - 00:06:50]*

*Kira Berman:* Take us away, Ivette.

*Ivette Perfecto:* Si. Okay. Great. Well, thank you. Thank you, Kira, and thank you all of you for being here. Today we're gonna talk about coffee. This is the Science Cafe, and so it's very appropriate to talk about coffee. Before we get to the topic of coffee, I want to take us to think broadly about agriculture. If I ask you what are the images that come to mind when you think about agriculture, what are some of those images?

*[Unintelligible 00:07:27]*

*Ivette Perfecto:* Huh?



[Unintelligible 00:07:31]

*Ivette Perfecto:* Cornfields. That's very typical, one of the main images that come to mind especially for people in the Midwest. We get out of Ann Arbor, and that's what we see, cornfields, soybean fields, monocultures. Usually implicit in that image is the application of fertilizer, pesticides, other chemicals, *et cetera, et cetera*. No? Because this is the image that usually come to mind to a lotta people's mind, it's no surprise that when we think about agriculture, we think of agriculture as an enemy of biodiversity or perhaps the enemy of biodiversity. There's this very common-held assumption that there's tradeoff between our need to produce food and the need to conserve biodiversity or the desire to conserve biodiversity. Now I'm hear to tell you that that doesn't have to be the case. There a lot of agricultural systems that are very diverse and can help conserve biodiversity.

One of those systems is the system we're gonna talk with you today, the coffee agroecosystem. There you can see in that video an image of a coffee farm where we work in Mexico. Although today we're gonna be talking about coffee in Puerto Rico, but there is a—this is a video from a farm in Mexico. They are a lot of trees there. Coffee is a plant that was domesticated from the highland forest of Northeast Africa, mostly in Ethiopia and Yemin. Because this plant is adapted to grow under the shade of the trees in the forest, when it was brought to the Americas, it was planted with a bunch of other trees. No? You have the coffee plant and then a bunch out of trees that were used for a variety of purposes.

Now this system is called an agroforestry system. Agro because the crop is there, which is coffee, and the forestry, all the trees that are growing there. Because the system resembles a forest, it is a refuge for biodiversity. Our lab, my lab, John's lab have been—over the last 30 years, we've been doing research in this system. Documenting how this shaded—people call it shaded coffee system—how this shaded coffee system conserve biodiversity. Can I have the next slide, Kira? We have documented how—

*Kira Berman:* [Unintelligible 00:10:18]



■ *Ivette Perfecto:*

Well, just advance it with the arrow. There you go. We have documented how this system conserve biodiversity, trees, epiphytes, ants and other insects, reptiles, amphibians, birds, bats, other mammals. There are a lot of people that have done research on this system basically demonstrating that it's a system that conserve biological diversity. Now unfortunately in the—well, actually, before I get to that, let me say that because—so this system conserve a lot of biodiversity. That means that it's good not just for the intrinsic value of biodiversity. We all want to conserve wildlife and biodiversity in general, but also that biodiversity provide benefits for humanity. No? In the agricultural systems, this biodiversity provide what we ecologists call ecosystem services. Those are services that are provided by this biodiversity to us humans.

That includes for example—can you show the next one? That include for example pollination, no, the bees and the butterflies and some birds, so pollination services. About 75 percent of the food that we eat benefit from those pollination services, the insects and birds, and that also can help in the control of pests in the system. A lot of the work that we do in my lab is related to that pest control service of biodiversity. Actually, some of our colleagues estimated for coffee farms in Costa Rica and in Jamaica that birds and perhaps probably also bats 'cause bats are active at night and are insectivores, were responsible for \$310 per hectare in terms of the benefit for the farmers because of the reduction of one single pest, which is the coffee berry borer. It's an insect pest that damage the coffee.

This in addition to these pest control services, you have also a decomposition that takes place by a lot of insects and also soil removal, aeration of the soil and then you have all those trees that are in the shaded coffee farms that provide organic matter if the trees are nitrogen-fixing trees. That means trees that have an association with nitrogen-fixing bacteria. They also add nitrogen to the soil. In addition to that, you have the control of weeds because you have that canopy, and that helps control the weeds and buffer microclimatic conditions in the coffee farms and also suppressor of carbon. That helps mitigate climate change. You have all these benefits that are provided by the biodiversity that's found in this system. Can I have the next one?



Oh, let me just show you. What happen in Latin America and throughout the Caribbean and Latin America is that more intensified systems were promoted. This happened in the '80s and '90s, and this was with an intention to increase yields. The idea was to eliminate all those shade trees, plant new varieties of coffee that can tolerate being grown in the open, but that requires a whole technological package. Because when you eliminate trees, then you have to apply more fertilizer. You have to apply herbicides, *et cetera, et cetera*, No? It's a whole kind of green revolution-type technology co-package associated with it.

The program was partially successful in terms of eliminating the trees from the coffee farms. Not everybody did it, and so now when you go to this region, if you travel through a coffee growing region in Central America, you're gonna find a lot of different type of systems that can be classified as an intensification gradient. That's what I want to show you here. This is a very diverse system with this is what is called rustic or mountain coffee where the coffee is planted under the canopy of the original forest. Very, very diverse. The next one. We have a system that's still very diverse, but all these trees and are planted. No, they were not the original trees from the forest but they're planted. The next one. You have now in this commercial polyculture you still have trees, the diversity of trees there, but it's lower diversity, lower density of trees. The next one.

This system is called a shaded monoculture because you have some trees there, but they are all from the same species. They are usually pruned, and they are not allowed to grow big, *et cetera*. Then finally a coffee monoculture where you don't have any trees. You travel to Central America you're gonna find all of these system. This is kind of a gradient of intensification. Can I have the next one? What our labs as well as some other researchers have shown is that there is a decline in biodiversity as you move along this intensification gradient. Can you put the next one?

As you move along that intensification gradient, obviously you're eliminating a lot of the vegetation, the diversity of vegetation in the system, and you decrease the amount of wildlife that can live in that area. Can I have the next one? In addition to conserving biodiversity inside this, now within the farm, this shaded coffee systems are excellent for maintaining biodiversity at the landscape



level because they represent a high-quality matrix. The picture that I'm showing you here is not coffee. It's soybeans. You might have seen this picture before, but it is a soybean plantation in Brazil. There are fragments of forest.

In areas where the forest is highly fragmented like the picture that I show you there, there's a lot of fragments of forest in this landscape. They are embedded in a matrix of a soybean monoculture with a lot of pesticide and agrochemicals in general. What happens is that organisms that are forest specialists, let's say, that live in those fragments of forest, eventually they are going to go extinct. At the landscape level if they are coming from other fragments, for example, there are some fragments of forest up there. If they can travel through that very hostile matrix and get to the other fragment, they could be maintained as a metapopulation. Can I have the next one?

That's very unlikely to happen in a low-quality matrix like this. Now if you have a frog, for example, that need to travel that distance in an area that is applyin' a lot of herbicide that have been shown like Roundup, which is used in the soybean plantations because they're genetically engineered soybean plants that are engineered to resist, so Roundup have been shown to be lethal for the frogs. You have a little frog species that live in those fragments, eventually they're gonna go extinct, and they can't recolonize the fragments. However, so that means that at the landscape level or the regional level eventually they will go extinct.

Now compare that with this other landscape which is the shaded coffee farms. Can I have the next one there? These are two fragments of forest that are connected through a matrix that is a shaded coffee farm. Can I have the next one? Here you can see this is a division between an actual fragment of forest in the forefront and a shaded coffee farm next to it. You can barely tell the difference between these two. No? This little frog will have no problem traveling especially because that's also an organic farm that doesn't use herbicides and other pesticide. Well, the frog is gonna have less—it's gonna easily move through that matrix and get to the forest. That's some of the research that we've been doing related to biodiversity in coffee farms. Can I have the last one?



To promote farmers to maintain this type of very diverse system, to stimulate them, the Smithsonian Migratory Bird developed this bird-friendly coffee certification. There's a series of certification programs. This one in particular was developed by the Smithsonian Migratory Bird Center. We collaborated with them in the development of this program. Essentially it requires the farms to be organic because they assume—because due to the research they know that farms that use a lot of pesticides are not good habitat for the birds or a biodiversity. In addition to that, there are certain criteria related to the diversity and density of shade trees, the height of the shade trees, *et cetera, et cetera*.

There are other programs that stimulate farms to be more diverse and to conserve biodiversity and conserve resources. One of those is the Fair-Trade Certification which usually work with small-scale farmers, smallholders throughout the *[unintelligible 00:20:56]* and basically even though they don't require the farms to be organic, most of these farms that are part of the Fair Trade Program are small-scale farms that are organic and are moving toward a more agroecological system. With that I think I'm gonna pass the microphone to my colleague here to talk about our program in Puerto Rico.

*John Vandermeer:* Okay. Thank you, Ivette. Could I have the next slide, please? Okay. Now I have to be able to read that at the same time I'm reading my notes here. I have to go back and forth with these glasses and non-glasses. Since we're talking about agriculture we're talking about farmers and people who do agriculture. Once we start entering people into the whole thing—Ivette didn't talk about the people. Mainly she just talked about the production technology and everything.

Once you get people, you're gonna have to deal with politics. My job here is to talk about the sociopolitical aspects of this and specifically about the sociopolitical aspects of a project that we're involved with. You have a handout there I think that one side of the handout talks about the Gran Batey Farm which is basically what I'll talk about. Before I get to there, let me give you just a little bit of background. We're gonna move now from Central America and Mexico, which Ivette was focused on, and we're gonna talk about Puerto Rico.





■ Puerto Rico, one of the main crops in Puerto Rico actually is coffee. Coffee is produced in the central mountains areas of Puerto Rico and is mainly produced by small-scale farmers, small-scale family farmers. It was introduced in Puerto Rico in 1730 approximately, by the Spanish, and it's been a major crop in Puerto Rico ever since that time. Puerto Rico, also talking about the politics of it, Puerto Rico as you probably know is a colony. I mean, it's a real, honest-to-God colony like the English used to have colonies. The United States has a colony. It's the last major colony in the world. The United Nations says almost every year that the United States is mandated to leave Puerto Rico. The United States of course ignores United Nations.

As part of development policy in Puerto Rico, it was a program called Operation Bootstrap. It was in the late '50s, early '60s. Ivette and I were just talking about it. We can't remember exactly what the years were, and I didn't bother to look it up. I'm sorry. It was a program instituted by the United States to sort of industrialize Puerto Rico, yeah, incentivize industries to come to Puerto Rico who would build factories which make—basically make a working class and a middle class in Puerto Rico to advance the economy of this colony.

To some extent it worked, but one of the things it did as far as agriculture is concerned, a lot of the farmers that were farmers, they came into the cities to work in the factories. Agriculture in general began to decline at that time. Then when the bottom fell out of the industrial economy of Puerto Rico for a variety of reasons, well, that basically left the country with a paucity of farmers. One of the major economic activities prior to that Operation Bootstrap was farming, and that was no longer there. Basically, it led to a big out migration from Puerto Rico into the United States.

Puerto Rico developed a major debt. It was a major debt crisis partially because of all these things that were happening. Let's see, now I have to get these glasses on. In 2016 it became a huge problem. Under President Obama they formed the Puerto Rican Oversight Management and Economic Stability Act which the acronym for that is PROMESA, which ironically in Spanish means 'promise'. Okay? Puerto Ricans don't view that as much of a promise any more I don't think. When it first got together there in



the initial analysis of what the debt crisis was in Puerto Rico at the time that it was established, the very first assessment of debt was that if Puerto Rico sold everything in Puerto Rico down to the last coconut on the island, why they would have enough money to pay their creditors 22 cents on the dollar. Okay. That's how bad the whole situation was.

Now obviously that made many of their creditors really pissed off. Let me just say something about when I say creditors, I wanna elaborate on that just a little bit. What I mean by creditors here are people who need to get the money from the government of Puerto Rico. Okay. I mean, creditors in kind of expanded way. Who needs the money? Well, the healthcare system in Puerto Rico critically needs the money. The pension system in Puerto Rico critically needs the money. The educational system in Puerto Rico critically needs the money. Most importantly, the hedge fund guys who own most of the debt, they're the ones who really need the money. Now I'm gonna ask you to guess who is being prioritized by PROMESA out of those four people?

*Interviewee 3:* The hedge fund.

*John Vandermeer:* Think so? Yeah. I think you're probably right. Yeah. That is true. Anyway, that's a little bit of the background. Now coffee, as I say, coffee has been a major crop in Puerto Rico. One of the problems now is that coffee, which has been a small-scale family business ever since it's been in Puerto Rico, it's in decline. Younger people that used to be on the farm, since there's no jobs in the factory and they mainly wanna go to the factories. They don't wanna be farmers, why they're migrating to the United States.

That creates a crisis in the coffee sector also. Many coffee farmers, most coffee farmers I would say, are rather elderly now and getting on towards retirement, so there is that crisis. Let me see, where am I going here? Given that crisis, it looks like the coffee system as an agricultural system is gonna continue on its decline. Now that's very bad news because coffee still is a major crop. Puerto Rico has the perfect climate, perfect soils, *et cetera* to grow coffee. That's why the Spanish started there in the first place and why it kept going for such a long time.



Well, there are a lot of new farmers, that is younger people who really want to be farmers. Another problem with Puerto Rico right now, the farming sector, not just coffee but the rest of the farming sector also has been in decline. Right now as we speak, Puerto Rico imports about 80 percent of the food into the country. Puerto Rico imports things like bananas because I guess you can't grow bananas in Puerto Rico. They import things like mangos. You go to the supermarket and you see—you go to the coffee farms, and on the coffee farms you see oranges and mangos rotting on the ground. You go to the supermarket and you see mangos imported from Dominican Republic. You see bananas imported from Ecuador, *et cetera*. That's one of the crises in Puerto Rico is the fact that there's no—there's very little food that's actually produced that the Puerto Rican people eat.

As a consequence of this, why you have a lot of young farmers, young Puerto Rican farmers, very idealistic, who want to become farmers and are trying very hard to become farmers partially to propel Puerto Rico into the zone of food security and food sovereignty and to be self-sufficient at least in food. These younger farmers, they're not particularly interested in coffee at the present time. There're two reasons for that. First of all, many of them are very politically astute. They're aware of the fact that they live in a colony. They're aware of the fact that that colony is probably illegal as a matter of fact. They don't wanna have anything to do with the history or the legacy of colonialism. For them, coffee represents that.

There's a kind of a prejudice. This is my opinion at least. Kind of a prejudice that the younger farmers have against coffee. That's one thing. The second thing is if you wanna grow coffee, you plant coffee and you have to wait two years before you get any fruit. They're prejudiced against that also. It's a real shame as far as we're concerned because coffee still represents a tremendous potential for not just—well, for a tremendous cash potential for Puerto Rico.

Now there is one guy, there's one guy who realizes that coffee has a huge role to play in the future of Puerto Rico and basically is black gold so to speak, and his name is Coca-Cola. You may have heard of him. The Coca-Cola Company has got into Puerto Rico, and they established a subsidiary called the Puerto Rican Coffee



Roasters. It's a fully-owned subsidiary of Coca-Cola. The first thing that they did is they purchased all of the traditional varieties of coffee that—excuse me, traditional brands of coffee that you buy in the supermarket. This is not all that well popularized in Puerto Rico, so Puerto Ricans continue buying that coffee. That's the first thing that Coca-Cola did. It's now engaged in moving into the coffee sector at the agrarian level. It's not clear exactly where they're gonna go or what they're gonna do. In my mind, and I think Ivette agrees with me, in my mind it's a shame that Coca-Cola moves in where all of these young farmers should be moving in. That brings us to our project. Okay?

We've been working with an organization now called the Institute for Agroecology Puerto Rico. It's an agency that's mainly a land trust agency. They're purchasing land in Puerto Rico for the purpose of maintaining it in agriculture. They're purchasing land so that it doesn't get zapped up by land grabbers, that is people who wanna grab it to develop it, make hotels or Airbnbs and that sorta thing. It's to preserve agricultural land in Puerto Rico. With our cooperation they have purchased a farm. The farm that I have the information on that—we have the information on the sheet for you. It's called the Gran Batey Farm.

We're involved in the transformation of that farm, first of all, to change it from what it actually is or was until several months ago, a conventional coffee farm which relies a tremendous amount on NPK fertilizer and chemical fertilizer, pesticides, herbicides, *et cetera*. We're trying to convert that into an organic agroecological farm. That's the first thing that we're trying to do. Second of all, we're trying to use it then along with that conversion to convince all of these younger farmers—not all of them perhaps—but convince these younger farmers that, yes, coffee is a thing that they can do.

What sometimes is not realized is that in coffee I think, as Ivette sort of implied in one of her slides there, in coffee there is no coffee farm in Puerto Rico that doesn't also produce food. When we first started working Puerto Rico, we surveyed over 80 different farms to see what they're actually producing. We found not even one farm that produced just coffee. You can go and you could say to the farmer, "What do you produce?" He or she will say, "It's coffee, just coffee." You say, "What's that there?" "Oh,



that's a banana plant." "Oh. What's that there?" "Oh, that's a yautia plant."

In other words, there's a tremendous amount of food that's being produced on coffee farms, most of those rotting. A lot of it is used by the farmers themselves, but without the infrastructure necessary to get it to the market, why most of it is going—most of it is going to waste. Our job here now is to convince those young farmers that not only is coffee a great cash crop for them, but also it's a way that you can produce food, the kind of food that Puerto Ricans are used to eating. The kind of foods that they wanna eat, *et cetera*. It's a way of on the one hand giving yourself a good sort of insurance policy with a cash crop, a cash crop that's actually pretty valuable, while at the same time contributing to food sovereignty in Puerto Rico. Our Gran Batey Farm is gonna be converted to an organic agroecological farm and to be a training center and a outdoor classroom for the new farmers. Sorry I took so long. Okay. Thank you.

[Applause 00:34:26 - 00:34:35]

*Kira Berman:* Oh, here we go. Hi. Thank you very much. Thank you so much. That was a great introduction to some of these issues. We're gonna break for a few minutes for discussions at your tables. It's a great time also to remember your wait staff and order another drink if you'd like one. In a few minutes we will get back together for a group conversation. I am now rethinking all of my coffee and some of my drink choices, and I hope you are too. It's a good thing we have folks like John and Ivette who are trying to change the world and make it a better place. We'll get back to talk about the details in a few minutes. Thanks. Would anybody like to start us off with a question, comment, observation, thought? I will go over here first.

*Audience Member 1:* In Puerto Rico how does a small farmer bring their coffee to the market? Are they a part of a co-op, or Coca-Cola just buys it right off the tree and does what it wants to? How's that work?

[Pause 00:35:50 - 00:35:57]

*John Vandermeer:* Well, it's highly variable. The coffee farm that we're talking about, Gran Batey, we have our own equipment for depulping and roasting. When you buy coffee at Gran Batey, you're getting



■ something directly, everything happens with us. We also, but I say we, the people who ran it before the agency that we're working with ran it, they purchased beans from other farmers also. It's a question of the other farmers are friends of theirs, and we buy beans from them also.

Coca-Cola, now it really is complicated. I just laid them out to be evil villains, which ultimately I think they are, but anyway, we've been to their facilities. We talked to the people in Coca-Cola. The agronomists who are working with them are really good, and they're really trying to do a lot of good work. Coca-Cola, the company as a whole, they would like to—they would like to dominate coffee obviously, but it's not clear how they want to do that. They would like to, like a lot of agricultural agencies do, they would like to let the farmers take all the risks. Their preference really is to buy the beans from the farmers who are taking the risk.

Now right now, because like I said, all the farmers are elderly and they're sort of giving up on coffee production, Coca-Cola now is planting their own coffee. They're planting their own coffee. They now have at least three different plantations, relatively small plantations that I'm not sure that they're actually productive yet. Anyway, it's not clear to me, and I don't think it's clear to them exactly what they want to do in the future.

In general then you have other roasters that are bigger than Gran Batey is. They have somewhere usually on the order of I think maybe 40 or 50 different farmers that they buy beans from. Okay? Sometimes that's a brand roaster. Sometimes it's a roaster that has several different brands. It's highly variable. Puerto Rico, for such a small place, it's really variable the structures that you have in terms of processing and marketing.

*Ivette Perfecto:*

I'll just add to that that cooperatives are not that common in Puerto Rico as they are in places like Costa Rica. For example, they have a lot of farmers cooperatives. One thing that we do have, at some point in time in the past the government gave incentives for family farmers to buy equipment for processing the coffee. There are a number of families, small-scale production, that have their own processing plants and their own brand that they manage to buy. This is the case for *[unintelligible 00:38:45]* Gran Batey. No? They manage to buy the processing and the roasting and have their



own brand of coffee. You have a lot of really small-scale brands of coffee. Some of those farmers will buy from their neighbors, but the majority of the farmers do sell their beans to a processor. Yeah.

*Kira Berman:* Let me go back here and then we can also—go ahead.

*Audience Member 2:* Hi. Thanks for your presentation. I want ya to help me shop. I can walk into a—you have the slide with Fair Trade, but it also had organic and then it had the Migratory Birds. I can walk into a store and get a locally roasted coffee, but it may or may not be Fair Trade. I can get a Fair Trade coffee that's nationally distributed. I can go to the People's Food Co-op and support local business, or I can go to Kroger and try to change the dynamics of a much larger distribution system. What do I do? I mean, how do you think about all these different choices and affecting the systems?

*Ivette Perfecto:* Yeah. That's a great question that always emerge because we all are concerned about what we buy and how it's produced and stuff like that. In the case of coffee, there are all these different labels. I just mentioned those three because those are the ones that I'm more familiar with. We participated in the bird friendly which is a very little-bitty, teeny-tiny piece of the market of coffee. However, Fair Trade, I think it—like I was telling somebody in another table, when in doubt, buy Fair Trade coffee. Fair Trade coffee assure that a fair price is gonna be paid to the farmers and they tend to be—because they're small-scale farmers that can't afford the pesticides and all that, they tend to be organic, and the Fair Trade organization also promote that. I will go with Fair Trade coffee that is also locally roast, so that would be my preferred choice.

*John Vandermeer:* Just quickly adding. I promote the bird-friendly coffee frankly. The reason is that the bird-friendly coffee has as a piece of its requirement that you have to be organic. Probably the oldest certification system that you have in coffee is organic coffee, but there are a lot of organic coffee plantations that are pretty ugly plantations for a variety of other reasons, working conditions or other ecological reasons with no shade and everything like that. Bird friendly has you have to be organic to start with but then you have to have trees. You have to be all sorts of ecological. Like Ivette says, it's a very, very tiny fraction of what we have out there, but my recommendation is go bird friendly if you possibly can. Smithsonian. Smithsonian Migratory Bird Center bird friendly.



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■  
*Kira Berman:* Just a second.

*Audience Member 3:* The coffee that you're talking about that is produced by these farmers, is this all for domestic consumption?

*Ivette Perfecto:* [Unintelligible 00:42:15] Gran Batey coffee. The Gran Batey coffee—

*Audience Member 3:* Well, no, no, no. You talked about the coffee—excuse me. You talked about how coffee was a major product for Puerto Rico. Some of that was export I assume. Correct?

*John Vandermeer:* That's true.

*Audience Member 3:* Okay.

*John Vandermeer:* Some of it was exported.

*Audience Member 3:* Okay.

*John Vandermeer:* In Puerto Rico it's really it's strange, and it varies from time to time. In the past Puerto Rico has exported up to 30 percent. I just read that, but Puerto Rico has exported up to 30 percent of the coffee that's produced.

*Audience Member 3:* Okay.

*John Vandermeer:* Right now the local demand—right now the local demand, because Puerto Ricans do drink a lot of coffee, is way beyond what you can produce—what is being produced on the island.

*Audience Member 3:* They currently import coffee.

*John Vandermeer:* They currently import beans from Mexico which is—

*Audience Member 3:* Okay.

*Ivette Perfecto:* [Crosstalk 00:43:06] other places. [Unintelligible 00:43:08]

*John Vandermeer:* Other places also. I think the majority come from Mexico or something.





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*Audience Member 3:* They process the beans themselves.

*John Vandermeer:* They do process the beans themselves. Yeah.

*Audience Member 3:* They buy green coffee and they process it.

*John Vandermeer:* Yeah. From what I read, almost all of the imported coffee goes to Coca-Cola.

*Ivette Perfecto:* Yeah. Let me—

*Audience Member 3:* I'm sorry. Goes to Coca-Cola?

*Ivette Perfecto:* Well, yeah, the Puerto Rican Coffee—

*Audience Member 3:* They buy the—

*Ivette Perfecto:* Puerto Rican Coffee Roaster which is owned by Coca-Cola. This brings up another interesting aspect.

*Audience Member 3:* Clarification. Coca-Cola processes a lot more coffee in Puerto Rico than is actually grown in Puerto Rico.

*Ivette Perfecto:* Yes.

*John Vandermeer:* Yes.

*Audience Member 3:* Okay.

*Ivette Perfecto:* Yes.

*Audience Member 3:* All these processing facilities is part of what Coca-Cola bought.

*Ivette Perfecto:* Yes.

*John Vandermeer:* [Unintelligible 00:43:57]

*Ivette Perfecto:* Yeah. At the beginning it's a 10 percent, 100 percent Puerto Rican coffee. Then because by law that's not true. No, when they started—and by law they're supposed to say the truth there, so they say 100 percent Puerto Rican coffee and imported coffee. They put



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10 percent Puerto Rican coffee and 90 percent imported coffee, and they call it Puerto Rican coffee. Yeah.

[Pause 00:44:30 - 00:44:37]

*Audience Member 4:* Thank you for a great talk, John and Ivette. I had a question, if you have talked to people about this in Puerto Rico, if you've noticed any change in the perception of these young farmers and small-scale farmers about the importance of food sovereignty following COVID, inflation and supply chain issues? This question is fueled by my interests studying small-scale fisheries in the Bahamas and that being a common theme among fishers, the importance of food sovereignty.

*Ivette Perfecto:* Yeah. Definitely. After the hurricane—is it working? Yeah. After Hurricane Maria that basically the ships that were coming with food were not able to land in Puerto Rico, and so there was a food crisis. People didn't have access to food for a while. Then also after the COVID and all the issues related to getting access to the food and all that, a lot of small-scale farmers came up with all sorts of alternatives. Also the younger farmers that John mentioned at the beginning, when he was talking he mentioned these younger farmers. Well, these farmers there's a very strong agroecological movement in Puerto Rico of these small basically younger farmers that want to do agriculture.

They want to stay in Puerto Rico. They want to contribute to food security and food sovereignty in Puerto Rico, but they don't have any capital. They don't have any money. They don't have the money to buy the land and that's why the institute, IALA, is actually, that's one of their main program is to be able to buy land to secure land for agriculture. The combination of COVID and the hurricane really raised the awareness about food insecurity in Puerto Rico.

*John Vandermeer:* Can I add something to that? Everything Ivette said is true, but also I think you gotta realize— I don't know about the small fishers—but in Puerto Rico we have the situation of a colony. Most of these young people that wanna be small farmers—maybe Ivette doesn't agree with this—but in my view, my experience, most of them are very, very political, very attuned to the fact that Puerto Rico is still a colony and think a lot about independence. They tend



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to be on the radical side, sort of left-wing radical side of the political spectrum.

*Ivette Perfecto:* Yes, that's true. Yeah. I agree.

*Audience Member 4:* Thanks, John and Ivette. I have a question about your actual physical role in all this. Are you people down there in Puerto Rico? Are you meeting with committees? How have you kind of been accomplishing and working in this?

*John Vandermeer:* Well, down there as much as we possibly can be. Right now we're here.

*Ivette Perfecto:* We're leaving in December, mid December.

*John Vandermeer:* We're leaving in mid December. No, we're there as much as we possibly can. We still do research there. Our main job is still research, and we do research on this Gran Batey farm. We didn't tell you about that. If you'd like to hear about these mathematical models and everything like that—you prob'ly don't wanna hear about that. We're physically there all the time. We participate with IALA quite a lot. Ivette's on the board of directors of IALA. Former students of ours are the director of IALA. The director of IALA is a matter of fact, is a former student of Ivette's. We're working with the organization there. We're not in any way leading it, but we are working alongside of it.

*Ivette Perfecto:* Yeah. We have our field house. We rent a house there. Now we kind of bought this house within this farm, and it's our field house. That's where our students stay when they come to do research with us, usually during the summer, but sometimes in the winter as well. Yeah. We sometimes work with students in the University of Puerto Rico Utuado, which is a campus that serve the center part of the island of our University of Puerto Rico, and we teach courses there and things like that. Yeah.

*Kira Berman:* There was a question back here. Yes.

[Pause 00:49:01 - 00:49:07]

*Audience Member 5:* Hi, I was very thankful that you came over and told us about how the actual harvesting differs between the sun crops and the shade



crops, which are obviously much better for biodiversification. You also had mentioned about how obviously the biodiversification, basically the shadier the better. How do you communicate the biodiverse surfaces, as you talked about them, to the farmers, whether they be the ones who are already there or the ones who are thinking about going sun crops or the young ones that you'd like to actually plant the coffee?

*Ivette Perfecto:*

Yeah. That's a great question. How you communicate the results of your studies and your science to the farmers. For a long time we were just givin' talks and first talkin' informally with the farmers themselves and talking about what our results are and this and that. There're some farmers that actually appreciate biodiversity. The farmer where we work—with whom we work in Mexico is a bird watcher. He keeps tracks of the birds that—he's been doing that for 60 or some years and has an excellent record of the birds and actually is a—this is an aside, but have been noticing the changes with climate change. Anyway.

There are other farmers that could care less about the biodiversity. How do you convince them that, yeah, this is important? Because we've been doin' a lot of work related to pest control and the role of these organisms in the farm, especially ants on pest control. One of the things that we came up with is a game. We have a game that's called the Azteca Chess game. We developed this with a colleague of ours in Mexico, a Mexican ecologist who has developed other games for other purposes. This is like a chess game where the—

*[Unintelligible 00:51:23]*

*Ivette Perfecto:*

Azteca is the name of the genus of one of the keystone ant species in the system that is connected with a lot of other organisms. That complex of interactions contribute to the pest control of various pest, not just one pest but several pests in coffee. To communicate that, we have this game. We did a lot of workshops with the farmers. Mainly he was the one doing them, but we participated in some of them. We also did it with farmers in Puerto Rico.

Then after they played—we had tournaments of the Azteca Chess game. Then after the tournament, we'll get together with the farmers, talk about the organisms in the—and did also a little bit of



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an evaluation of how they absorbed this information after playing the game versus just a plain presentation. The game obviously have a very strong affect in them remembering these interactions and getting excited about these interactions and about the biodiversity in their farms.

*John Vandermeer:* Just quickly. That game of Azteca Chess has been really, really fairly influential it seems to me. The problem that we face right now it's about Azteca, which is a genus of ants that doesn't occur in Puerto Rico.

*[Laughter]*

*John Vandermeer:* What we have been thinking about—although we're really behind on developing this—

*Ivette Perfecto:* Yes.

*John Vandermeer:* We've been thinking about modifying that game or somehow changing the game so that we have a similar thing for the situation as it exists in Puerto Rican coffee as opposed to trying to pretend that Puerto Rican farmers are interested in Mexican coffee production.

*Ivette Perfecto:* It's a board game. I actually play it with my students here as well in my class.

*Audience Member 6:* I think that's great. Gamification is wonderful science communication.

*Ivette Perfecto:* Mm-hmm.

*Audience Member 6:* I had just read an article that if you do something in play, it takes about 10 repetitions to remember it. Whereas, if you do something not in play, it may take up to 400.

*Ivette Perfecto:* Yeah. No. We do notice that in doing this with the farmers. Yeah.

*Kira Berman:* We have another question over here. If you wanna lean that way so you're not right next to the speaker. Otherwise, you'll get feedback.



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*Audience Member 7:* This builds upon the question a couple minutes ago about certification, and so on. I was reading the table question, it says are there any advantages to the multi mega corporations? One thing that comes to my mind is marketing. They're very good at that. I don't drink coffee, but when I go to Costa Rica I see bread wherever I go. I can't get away from it. That structure would seem to be important here, that they heard that co-ops don't really exist. Is there a mechanism for the advertising and promotion, and how does that come about if it's not there?

*John Vandermeer:* That's a super-good question. I don't know how to answer that question, frankly. It's a question that we're very much concerned with. The farmer that used to run Gran Batey, which is the one that we're concerned with now, let me just tell ya personal stories about them. Okay. We know them very well. We're really close friends with them in the matter of fact. They are the worst possible capitalists that you can possibly imagine. When I see the way they ran their farm, just in terms of trying to make a profit, they didn't seem to care about a profit at all.

The woman, Lotty is her name. I mean, people would come for visits. They gave tours of their farm. People would come to visit. People like you all would come to visit. She would spend four or five hours taking them around the farm. Then she would make coffee for them, and she always had cake for them to eat with their coffee. She refused to take any money from them at all. Okay? The only thing she wanted them to do was buy a bag of coffee. Okay?

I mean, I could go on and on and on about that. Some of the tourists I know at one time, one case at least, they felt so guilty that they paid the granddaughter. They gave the granddaughter \$20 because she helped do the tour because Lotty wouldn't take the money. Okay? They have a different attitude. They had a different attitude. Now, that sort of attitude, which is frankly is really charming and I respect a lot. I really do but I have mixed feelings about whether that's a really good way to run a farm. Ivette prob'ly wants to say something about that.

*Ivette Perfecto:* No. I'm fine.

*Kira Berman:* Other questions, observations, comments, thoughts? Oh. Sure.



[Pause 00:56:31 - 00:56:37]

*Audience Member 8:* [Foreign language 00:56:37] When I was a kid, all the coffee came from mountains down in South America. What is the level of the ground in Puerto Rico? Is it level, mountainous or what? If it's not level, or is a shaded tree, the experiment to get the things just right for the level of the earth wherever they're grown? In other words, can you vary the trees by where it should be in the mountains or somethin' like that?

*Ivette Perfecto:* Yeah. Coffee, there are two kinds of coffee. There's arabica coffee. This is two different species actually of plants. Arabica coffee is the high-quality coffee, and that's what is grown in the mid elevations in the mountains. No? Then there's robusta coffee which is the low-quality coffee is the coffee that is used for Folgers and for instant coffee and things like that. That is *Coffea canephora* which is a different species, and that's what's grown in Brazil primarily and Vietnam. That is grown in the lowlands.

There're two different crops. Most of the coffee that is high-quality coffee, the coffee that we buy in the coffee shops and all that, that's arabica coffee, and it's the highland coffee. In Puerto Rico, Puerto Rico have big mountains, but because of the climatic conditions, even at this farm that we're talking about is about 300 to 400 meters in elevation. That's really marginally low for coffee. Coffee normally in Central America it will grow between 500 to 2,000 more or less. Two thousand could be a little bit too high depending 'cause sometimes you get froze, frost? Frost and things like that. That's the range that you find coffee in Central America and South America. Yeah.

[Pause 00:58:40 - 00:58:45]

*Kira Berman:* Other thoughts or questions? Yeah. Sure.

[Pause 00:58:52 - 00:58:58]

*Audience Member 9:* Obviously, all the discussion that we'd had today was about the arabica because that's what you'd be growing in Puerto Rico. Something that came up as we were talking about it was obviously this is something that would be sold as a premium product, not your Folgers or Maxwell House sorta thing. As a result, higher



price tag, higher—but how much of that—I know a lot of it is, as you discussed, is being used within Puerto Rico. Even when we're talking about outside of Puerto Rico, how much of the premium side of things are the growers actually going to see compared to the distributors, the roasters, and everybody else down the line? How much more do they make from making the superior product?

*Ivette Perfecto:*

I have seen studies that break that down, and it could be as little as—if you go to a coffee shop here and you pay, let's say 2.50, for a coffee, about one cent goes to the farmer. If the farmer is just selling the beans to a processing company and things like that, they get one cent for every 2.50 that you pay. Also the other thing is that you have a number of cooperatives, so there are ways to have more value added to the coffee. When the farmers are organizing to cooperatives when they have the processing plant, when they have the roasting, they get more and more of a percentage.

I was telling somebody in another table that there's this coffee brand that's called Pachamama. Pachamama Coffee. I don't know how many of you have heard of Pachamama Coffee, but there is a coffee shop in Davis and Sacramento that is owned by the farmers. This is a cooperative of farmers. It's an international cooperative of small-scale farmers from Ethiopia, Nicaragua, Mexico and several other countries. They own their processing plant. They own the roasting, and they own the coffee shop. They get about 40 percent of what you pay for that coffee in the coffee shop, it goes directly to the farmer. There are these arrangements that can actually enhance the percentage that gets to the farmer.

*John Vandermeer:*

Then to get even better, if you buy Gran Batey coffee, 100 percent of that goes to the farmer.

*Kira Berman:*

That's available online, right?

*John Vandermeer:*

That is theoretically available online. Okay? We're in the transition phase right now. I encourage you to go look for it online, but don't get frustrated if you aren't able to order it.

*Ivette Perfecto:*

Maybe a year from now.

*John Vandermeer:*

Maybe a year from now.





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*Kira Berman:* Okay. We'll figure that out. We're still worrying about trying to get our planetarium tickets available online at the museum, so we understand the challenges therein. Any other thoughts or questions? It's certainly given me a lot to think about as I do my coffee drinking and shopping. Yeah. Any other questions?

*Ivette Perfecto:* I have a question for people.

*Kira Berman:* Yes.

*Ivette Perfecto:* How many of you are coffee drinkers? Oh, okay. *[Chuckle]* Is there any non-coffee drinker? Oh okay. Yeah. There're a couple of people. I always get this question when I give talks about coffee. I'm a heavy coffee drinker, so you'll see me in the coffee shops here all the time.

*Kira Berman:* Where do you go?

*Ivette Perfecto:* I go to the Comet. I go to Hyperion. I go to the what is it roaster?

*[Unintelligible 01:03:27]*

*Ivette Perfecto:* RoosRoaster. Yeah. Mostly those.

*Kira Berman:* Awesome. Those are all great places for coffee.

*Ivette Perfecto:* Sweet waters every once in a while.

*Kira Berman:* Right. I'm noting that no money changed hands in terms of the mention of the coffee shops, but maybe it should have. Okay. I think we have time for one more question. Before I let that go to that question, I just wanna say there are little blue evaluations and little yellow pencils. Note the blue and yellow theme. They are on your tables. That is the way that, A, you get added to the list to know when the next Science Cafes are and what they're gonna be about. The next one is in late January. We'll take a break for the Christmas season. The next one is in late January. I don't have the topic yet, but it will come out over email very soon. It's also how you can suggest topics that you would be interested in learning more about, and I do read those. Please take a minute to fill those out, and we'll go to our last question.



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*Audience Member 10:*

It's more of a comment than a question, but I work for RoosRoast Coffee here in Ann Arbor. *[Applause]* Thank you. Thank you. If there's any questions about how we process our beans and how we try to trade more than Fair Trade, I'd be happy to try to stick around and answer anything.

*Ivette Perfecto:* Well, yeah, I have—I want to hear more about it.

*Audience Member 10:*

Okay.

*Kira Berman:*

All right. Okay. I can see a meeting is gonna happen here. I wanna thank all of you and thank our speakers for their generous time and expertise. As I said, the next Science Cafe will be in late January. It will be on a very exciting topic which is yet to be determined. *[Chuckle]* It will be awesome, and I hope to see you there. Thanks so much, John and Ivette.

*[End of Audio]*