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Revista Espinhaço interviews Dickson D. Despommier (Columbia University)

Introduction Dr. Dickson D. Despommier was interviewed by Revista Espinhaço during the Geography 2050: exploring our future in an urbanized world, that took place in New York (US) during November 19th and 20th, 2015. To this issue of Revista Espinhaço, Dr. Despommier, professor at the *Columbia University* and expert on urban agriculture, brings significant reflections about his research field in an informal interview. Alyssa Fico (CIESIN/Columbia University) and Douglas Sathler (FIH/Cegeo/UFVJM) conducted this interview.

Revista Espinhaço: How do you start your interest in vertical farming and urban farming?

For most of my adult life as a professor I did biomedical research in Laboratory. Biological training. As you know, that requires money. Federal grants. So, I had a federal grant from 1971 to 1997, uninterrupted. After six renewal, I could not get the seven renewal. So I had a middle life crises and I began teaching, because I love teaching. One of the courses I developed it is called medical ecology. I had seven students taking the course in the first year. In that year, this idea arose of vertical farming. I did not starting as vertical farming. It was sort of rooftop gardening in Manhattan. In the end of the semester, they realized that they could not feed too many people. Only 2% of Manhattan, from rice grown on rooftops. So I said to them, take a good idea and move it in the building itself and now you have six or seven times more room. And maybe this problem will be solved in that way. I did know for sure of course. That was the last day of class. And they looked at me and said: oh, so you can grow crops inside? And I said, of course you can. And of course I went home and started to read about it (laughs). Next year we had the same course and we advanced the idea. So I published the book called the vertical farm, and in the back of the book you can see all 106 students´ names that contributed to this concept. That´s how it is done. Crazy, crazy, crazy idea. Who could ever think of growing food in the middle of the city? It´s nuts. You should not do it! It is too expensive. It´s too light intensive, it is too energetic. Every time I hear the word can´t, I hear the word can at the same time.

Revista Espinhaço: Tell us about some recent success experiences.

For ten years, it was just a classroom exercise and then one day I received a notification through e-mail that someone actually built a vertical farm. It was remarkable! It was in Korea. That was the beginning. That was in 2009. In 2011 the book came out. In 2012 there were about 20 vertical farms. Now there are hundreds of vertical farms, and this is only 2016. I think you are now looking a logarithmic increase of the number.

Revista Espinhaço: Do you think these are from your books?

No. I can´t possibly say that. That would be wrong. I could say that but no one would believe me. But I think the idea got out on the internet, not from the book but rather from the project, when the word vertical farm (was mentioned), (people said) what is a vertical farm? I would say a vertical farm is a two story green house. One story green house is a green house. A two story green house is a vertical farm. It has to be two or more.

There are many vertical farms in world. There are 145 in Japan alone. There are many in Taiwan. They have a similar problem: no growing space and lots of people. They import a lot of food and they do not want to do it anymore. I think the popularity of this is growing because of that.

Revista Espinhaço: What makes vertical farm feasible?

Fortunately, I know the answer. If you compare indoor farming in general with outdoor farming it has an advantage to do it indoors. Maybe not in Brazil because it is a tropical country. So you can grow it all year. But you know, we have rainy season and dry season. We have fire, floods, insect pests and animals that eat crops. We know that the rainforest is a target for slash and burn agriculture. We have to have an alternative. The alternative is indoor farming. In indoor farming we have: 1) no seasons; 2) much less water; 3) it can be done anywhere. You do not have to do it in the middle of the city where the proprieties are so expensive that you can´t afford them. You can do it at the outskirts of the city. And still be within the city. You can be less than one hour away from where you produce the food and sell the food. Or you can invite the people out to the periphery of the city. Like an indoor market to participate in the selling of the food. We see a lot of those examples. In the beginning, five years ago, lighting was very expensive. Electricity was very expensive. Throughout the globe, it is about ten cents for kilowatt / hour. Everybody pays around the same amount for it. In most cases, it is generated by burning coal, oil or natural gas to make electricity, which is crazy because that is part of the problem of rapid climate change. What if we could do it another way. What if I was a

country like Iceland or Italy or the southwestern part of the US where geothermal energy was developed, when energy is free then you are not worried with the cost of the lights because it takes off the expense. The efficiency of the LED lights, which is a choice now for growing food indoors, went from in one day, three years ago, from 28% (efficient) efficiency to 68%. That is an enormous amount of savings. Everybody said: ok, now we can be a vertical farmer. That was the change. The company that invented that light is Philips. And Philips now has an experimental vertical farm on their research campus in the Netherlands to show the people that are involved in making grow lights what they are used for. When they go to lunch they can eat what they grow on the site. There is a building in Japan called Pasona O2. This building is nine stories tall and is in Tokyo. The outer wall is green. They have plants growing on the outside. But it is not the important part. What is important is what is growing inside. This is a building of human resources. People who work in that building design retirement plans for people, they work with taxes, they do life insurance policies, they are not involved with farming at all. Another group comes into manage what is going on inside this building. On the first floor there is rice. On the second floor there are tomatoes. On the third floor, green beans. On the fourth floor you take it to the chef, sit down, wait 20 minutes and out comes a hot meal. That they cooked from the vegetables that were grown in the building. That´s really good. So, I want to see a samba group in Rio during carnaval that celebrates indoor farming (laughs).

You know, my favorite movie all time, and I am not saying it because you are from Brazil, is Black Orpheus. It is fabulous by the way. So now we call it Green Orpheus (laughs).

Revista Espinhaço: How can vertical farming help us to face current environmental changes?

It is a very big question. There is no easy answer to this question. Because we have many problems that all mesh together. As we heard this morning someone likened it to a big ball of yarn all tangled up. In order to unravel it into the individual strands, and lay them side by side it will be a big job. But the biggest challenge I think we face is a rapid climate change. The biggest. Because it affects everybody´s life. But particularly it affects the life of farmers. The farmers have no option to move when the climate changes to where it is optimum. It was optimum through the time they lived there as children, maybe their fathers had optimum farming conditions, maybe their grandfathers. They now are experiencing change. And this change is brought on by greenhouse gases. And we did that. So climate change now forces us to rethink food systems and, to be honest, I do not think we ever had a food system. I think we called it a food system but I do not think it was system. Because there are a lot of special interests. Brazil produces probably the most sugar cane of any country. And because of that, you can make ethanol from it by fermenting the sugar and making fuel for your cars, which then creates a circle rather than linearity. So you (Brazil) are not guilty of the global climate change issue on the basis of automobiles. However, when you cut out a patch of rainforest, and cut down all the trees and burn them, those gases are going into the air too. So that is contributing to climate change. We have a lot of these problems and have rapid urbanization. Rapid climate change, rapid urbanization. Because people living in the country, are now losing your jobs and they have to move to the city. So now we have two problems. Maybe three, maybe four, maybe one hundred. Let´s start some place. Start conserving water. That is indoor farming. Start moving food close to where people live. That is urban. So, save water, urban farming. Look like that could be a partial solution to some issues, right? A lot of people live in cities nowadays used to be farmers, and they want to farm still. But there is nothing for them to farm. Here is something for them to farm. It is easy to learn. *It is easier to learn than not to farm.* It is not dangerous. There are no animals that you use to plow fields with. You do not have to slash and burn. You do not have to worry about mosquitos coming and giving you malaria. Chagas disease or all these other horrible things. We know these are diseases that are acquired by farmers when they farm outdoors. We can keep them all out of these buildings. And make them secure. So, farming becomes a safe urban practice. And the more people realize that, the more they will want it. I now see the industry going from flat to a little bit of a curve, and in some places starting in a logarithmic curve.

I was born in 1940. Old! I am old. Trust me (laughs). I feel old. But I am not old enough to not still think young. I think I will live long enough to see vertical farming became a dominant force in urban life. And when that occurs, it will transform the outside areas. Farmers who abandon farms. What happens with those farms? They grow back into what they used to be. In most cases they used to be hardwood farms (forests). If you burn and slash in a tropical forest, that is horrible because the regenerative power of the soil that is only two inches thick is dependent upon fungi. And the fungi are killed by the fire. So it takes hundreds of years for this to come back.

So you have a Brazilian tribe called Yanomami. Yanomamis are brilliant. Although they learn by experience of course. *For* the villages, they do not like each other, so they keep fighting each other. Unfortunately. That is too bad. But for themselves they cut out a circle. They drag all the brush to one side and they burn it. They get a big pile of ash. And they use the ash for fertilize. They farm and they can get four years out of that. And then they move to another circle. In the meanwhile this circle starts to recover. They have so many circles that by the time they come back they cannot find the first circle. It is remarkable. They are not a primitive people, at all. They just live close to the earth and they are dependent completely on the earth. Because it is their life they understand everything about that. We do not understand everything. We do not behave like they do. We behave in a spendthrift fashion. We think there is infinite supply of everything, because we can afford it, we have money. But the people without money. We know these people, because they live in Rio too. They live on the hills. That is too bad. In the favelas. So, I love Brazilian music too by the way (laughs). Part of the solution of the food supply is to include everybody in the process. Not a farmer, a packager, a seller and a buyer. But a farmer

who is also the user, and their family helps other people from just two things: so you farm it and you either give it away or you sell it. In some cases they would give it away because everybody needs to eat. You know, I said something yesterday that I think a lot of people appreciated hearing, and that was that the human species is the only animal of the planet that sells its food to each other. No other animal does that. Honeybees share their honey. Termites share their wood. Ants share their leaves. We sell it. And if you can´t afford it you can die. Is that the way species should behave? The answer is no! We think that each language is a species. Right? But that´s not true. We all share the same common genome. There is no difference among us. Ever. But that is a very difficult concept for people to understand. We not only sell, but we also tax food.

I heard something horrible when I was in conference in Copenhagen last week. A guy from Spain said, Spain has wonderful solar factories in the middle of the country to collect all the sunlight. In Spain the people want to copy the solar collectors by making solar panels. If you do, the government taxes you for using your solar panel. Why? Because you are not using it from their energy grid, so they can´t sell it to you. So they are going to tax you so high that you will be forced to not use the solar panel. You have to use it from the government. That´s crazy. That´s because unemployment is so high in Spain, their tax base is so low. The only things they can tax are things that should not be taxed. This creates revolution. And makes people angry and hungry. And willing to do things they should not ever do.
Food is the most important peacemaker. If you are not hungry, you can think about your future. If you are hungry, the only future you can think about is eating.

Revista Espinhaço: How to stimulate policies that help us to integrate both public and private initiatives?

You save water by indoor farming and generate food by indoor farming. It doesn't matter how much it coast. We should be doing it because governments already support outdoor farmers, and outdoor farming is failing. So why are we not subsidizing indoor farms? That raises another big question of politics and social will.

Indoor farming is not difficult to learn. It is not expensive but it does cost something, especially if you use old buildings and you retrofit inside with growth systems. The best way to start without support from the government is to find a group of likeminded people, maybe 100 or 200, pool resources, buy or rent the equipment, develope a business model, pay each other back as you sell and then get bigger, get more people, and finally you have collectors. So I learned about this in Copenhagen, because they have energy collectors. In Denmark they allow you to own the energy grid. So a hundred citizens would by a windmill and they will use the energy for their homes and they will sell it. Fantastic! The entire ridge of Denmark will be a wind farm. The whole country will be off the grid.

Revista Espinhaço: Thank you very much.