**TRANSCRIPT: Now I am an Axolotl**

***Note: Episodes of Outside/In are made as pieces of audio, and some context and nuance may be lost on the page. Transcripts are generated using a combination of speech recognition software and human transcribers, and may contain errors.***

Luis Zambrano: [reading] Fue su quietud la que me hizo inclinarme fascinado la primera vez que vi a los axolotl. Oscuramente me pareció comprender su voluntad secreta, abolir el espacio y el tiempo con una inmovilidad indiferente. Después supe mejor, la contracción de las branquias, el tanteo de las finas patas en las piedras, la repentina natación (algunos de ellos nadan con la simple ondulación del cuerpo) me probó que eran capaz de evadirse de ese sopor mineral en el que pasaban horas enteras. Sus ojos sobre todo me obsesionaban. Al lado de ellos en los restantes acuarios, diversos peces me mostraban la simple estupidez de sus hermosos ojos semejantes a los nuestros. Los ojos de los axolotl me decían de la presencia de una vida diferente, de otra manera de mirar.

*[English translation] It was their quietness that made me lean toward them fascinated the first time I saw the axolotls. Obscurely I seemed to understand their secret will, to abolish space and time with an indifferent immobility. I knew better later; the gill contraction, the tentative reckoning of the delicate feet on the stones, the abrupt swimming (some of them swim with a simple undulation of the body) proved to me that they were capable of escaping that mineral lethargy in which they spent whole hours. Above all else, their eyes obsessed me. In the standing tanks on either side of them, different fishes showed me the simple stupidity of their handsome eyes so similar to our own. The eyes of the axolotls spoke to me of the presence of a different life, of another way of seeing.*

Sam Evans-Brown: This is Luis Zambrano.

Luis Zambrano: Well, I am a biologist and an ecologist.

Justine Paradis: He is an ecologist from Mexico City.

Sam Evans-Brown: And that’s our producer Justine Paradis. We spoke to Luis together.

Justine Paradis: And this moment was really special for me, because this short story that Luis just read from is one of my favorite short stories, and we got to hear it in its original Spanish.So the story is called “Axolotl”, by the Argentinean writer Julio Cortázar, and it’s how I found out about this animal, the axolotl. This story is kind of in the magical realist tradition—and it’s about a man who becomes perilously obsessed with the creature also known as the Mexican salamander.

Luis Zambrano: Well, the axolotl is a salamander. It’s an amphibian, actually. It’s like a large, chubby lizard. And at the... behind her head, or his head, it has the gills... it has a crown of gills.

Justine Paradis: So these gills are really striking and like Luis said, they sort of look like a crown or mane, like maybe kind of like they’re made of coral. It’s also got this big head and tiny eyes and this perfect little smile.

Luis Zambrano: When they stare at you—which happened with Julio Cortázar in the story—it's a very, very funny and interesting moment. If they stare at you, it’s… something happens between you and the animal.

Justine Paradis: Luis started studying the axolotl about 15 years ago.

Luis Zambrano: Well I’ve heard in English its ASH-oh-lotl, and ajolote is in Spanish version.

Justine Paradis: Yeah I think just phonetically only having ever read the word, I always pronounced it AXE-oh-lotl

Luis Zambrano: oh… okay, well yeah. I don’t know. I really don’t know how you can pronounce in English.

Justine Paradis: no, it’s definitely wrong [laughing].

Sam Evans-Brown: Yeah.

Justine Paradis: So, axolotls are unusual for a couple different reasons. First: they never reach adulthood but remain in a perpetual state of what’s called neoteny.

Sam Evans-Brown: Kind of like a permanent tadpole, that never becomes a frog.

Justine Paradis: Right, eternal youth. So that’s the first reason that they’re unusual. And the second peculiar power they have is that they have this [ability to regenerate their limbs](https://daily.jstor.org/the-race-to-save-the-axolotl/). So if a limb is amputated they can regrow it perfectly — not only structures like arms or legs, but they can also do that with their spinal cord.

Sam Evans-Brown: [breathily] What?

Justine Paradis: So, the axolotl is significant for humans because of its regenerative ability, so it’s got medical and scientific potential.

Sam Evans-Brown: Well, not only that it’s also… it’s just very supernatural, it’s very godlike.

Justine Paradis: Yes!

Felipe Barrera: Qué tiene de especial? Hijole! Qué pregunta tan tan tan compleja tan difícil. *[English Translation] What's so special about it? Hijole! What complex, difficult question.*

Justine Paradis: This is Felipe Barrera -

Felipe Barrera: Mi nombre es Felipe Barrera, soy productor chinampero—soy chinampero. Y tengo cuarenta y dos años. *[English Translation] My name is Felipe Barrera, I’m a chinampero, and I’m 42-years-old.*

Justine Paradis: He is a farmer in Mexico City who works with Luis—more on that later—and as he’ll explain, the name axolotl actually comes from the Aztec god, Xolotl.

Felipe Barrera: Pues el ajolote culturalmente es importante para todos nosotros para todos los xochimilcas es la representación de Dios Xolotl. *[English Translation] Because the axolotl is culturally important for all of us, for all the Xochimilcas it is the representation of God Xolotl.*

Justine Paradis: The monstrous dog, god of heavenly fire, of lightning and the underworld. He is the renegade twin brother of Quetzalcoatl, [the plumed serpent, god of wind and rain, and of creation](https://www.ancient.eu/Quetzalcoatl/).

Felipe Barrera: Es la dualidad de Quetzalcoatl. Es la noche, el día, el bien el mal entonces pues tiene un significado bien fuerte y bien profundo. *[English Translation] It is the duality of Quetzalcoatl. It is the night of the day, the good the evil then it has a very strong and deep meaning.*

Justine Paradis: This duality, Felipe says… of night and day, of Xolotl and Quetzalcoatl, is the mythos contained in the axolotl.

Felipe Barrera: Esa dualidad, sería terrible perderla. Sería como... como desaparecer... desaparecer nosotros mismos, no? Transformarnos en no sé qué cosa. *[English Translation]* *It would be terrible to lose that duality. It would be like disappearing disappear ourselves do not transform into I do not know what.*

Luis Zambrano: This is the animal of Mexico. I don’t care about the eagles, I don’t care about jaguars. This is the animal that has to represent Mexico. So I fall in love.

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[THEME]

Sam Evans-Brown: You’re listening to Outside/In, a show about the natural world and how we use it. I’m Sam Evans-Brown. And today, our producer Justine Paradis has the story of a symbol of Mexico: an animal which—long before it was depicted by artists like writer Julio Cortázar—was celebrated in Aztec origin stories. But the wild axolotl’s fate might be bound to the Aztecs by more than myth. Its life in 21st century might rely on a landscape both very old and very human.

[THEME FADE]

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Luis Zambrano: So I hate when I go to the Google and then I put axolotls and the first picture that appears is the baby-like, pinky, axolotl. Which has nothing to do with the real ones, basically..

Justine Paradis: This is Luis Zambrano again, the axolotl ecologist.

Luis Zambrano: Pink axolotls are albino axolotls, such as albino tigers that you will see in Las Vegas. But they are not real axolotls. I mean, normal axolotls, wild axolotls are darker. Are really really dark, almost black, greenish-brownish-black, with a lot of spots. If you see an axolotl that has been grown in a tank, and an axolotl that has been grown in Xochimilco, you will see a difference between a dog and a wolf.

Justine Paradis: The difference between a dog and a wolf. And the wild axolotl lives only in one place: the last remaining fragments of Lake Xochimilco. It’s in a neighborhood of Mexico City, which is one of the densest and largest cities in the world. Now, Xochimilco means a few different things here. It is the name of one of the Nahua tribes of Mexico - the Xochimilcas. It’s also the name of the lake itself - which, as you’ll hear, is actually more like wetland-canal system, and it’s the name of that neighborhood within Mexico City. Xochimilco the lake was once part of an interconnected chain of lakes— together known as Texcoco—in the Valley of Mexico is a high volcanic basin riddled with springs. The system is endorheic - which means there’s no outlet and it doesn’t drain to the ocean. Which means these lakes were kind of like islands in reverse -- dynamic, but isolated ecosystems - beautiful conditions for endemism - which means a species that evolves for one unique place in the world, and nowhere else.

The axolotl is one of these endemic species of Mexico.

Luis Zambrano: Well, there is one these theories that the Aztecs became a really, really important empire, and one of the most important in America before the Spanish came, because of this area, actually.

**The Xochimilcas realized the mud at the bottom of the lake-wetland system was incredibly fertile, and could be gathered during the dry season to create what are known as floating gardens, or chinampas --** [**this started as early as 1000 BC**](https://www.researchgate.net/publication/283712016_The_conservation_of_the_axolotl_Ambystoma_mexicanum_in_Xochimilco_Mexico_City_a_specieshabitat_action_plan)**E. It was an incredibly productive form of agriculture.**

Luis Zambrano: The same thing happened in Egypt, for example, or in China or in Mesopotamia. Once you solve the problem of food, you can start to think of other things such as culture and create a huge empire.

**In 1325, the Aztecs took over the Xochimilcas and their floating garden technique, and proceeded to dominate large parts of Mexico and Central America.**

**One paper I read said that at their peak, the floating gardens themselves supported 100,000 people in the capital city.**

Luis Zambrano: So the relation between the Aztecs and the lake is really really important. Within the lake is the axolotl, and my hypothesis, I don’t know if it is true, and it’s the type of hypothesis that cannot be test… is that when they created these islands, these chinampas, these floating gardens, they increase the habitat of the axolotl. So the axolotl was happy before the Aztecs arrive. When they arrived, they were happier.

**According to this theory, the axolotls thrived and multiplied and became symbols of Aztec civilization. Chubby little lizard gods, drifting uncannily in the maze of chinampas.**

[mux post and fade]

**But then… colonialism.**

Justine Paradis: and that's what the Spanish arrived to see right, this maze?

Luis Zambrano: Mmhm. The spanish when they arrived they saw this maze, actually they got into the city through that area.

**When Hernán Cortés showed up in 1519 from Spain, they were stunned by these floating gardens.**

**Cortés actually wrote about them.**

[mux]

Jimmy Gutierrez: check check check, this is Jimmy G as a colonizer.

*[reading] “When we saw all those towns and villages built in the water, and other great towns on dry land, and that straight and level causeway leading to Mexico, we were astounded. Those great towns… and buildings rising from the water, all made of stone, seemed like an enchanted vision… indeed some of our soldiers asked whether it was not all a dream… it was so wonderful that I do not know how to describe this first glimpse of things never heard of, seen, or dreamed of before.”*

**And in this colonizing, 16th century Spanish naturalist Francisco Hernandez noticed the axolotl, and he named it *piscis ludicrous* -- or ludicrous fish.**

**But in short order of course - true to form - the Spanish conquistadores slaughtered the citizens and infected the entire city with smallpox.**

Luis Zambrano: Well basically the Spanish, after the conquest, they started to colonize. They changed one of the most important relationships to nature that Aztecs used to have, I mean, in terms of water.

**In Mexico City, there’s a powerful rainy season -- and without proper water management, you’ll have flooding. The Aztecs had designed their network of canals with this in mind, to absorb these fluctuations… but the Spanish?**

They decided to dry out the lake. And the few survival areas were, like, Xochimilco. So they kept Xochimilco in order to be sure that they will have food enough for civilization but the number of these islands were reduced really in high numbers.

**And then, skipping ahead a few centuries --**

Luis Zambrano: That was sort of in some way okay until late 50s of the last century, in which the expansion of Mexico City was huge… and since then we are worried that we can lose Xochimilco because of urbanization.

Sam Evans-Brown: I’m looking at a map right now and it’s really striking cuz you’ve just got incredibly dense city all around it, and then this just, island of water and canals.

Luis Zambrano: Yeah. It’s completely surrounded by urbanization at this moment.

[sounds of Xochimilco]

Luis Zambrano: Xochimilco, as it is a very interesting place, is also a highly touristic attraction for many people, foreigns and Mexicans. And there is a huge area, in which as a tourist you can go there and you will see a lot of huge boats that are highly characteristic, and everybody I think internationally have seen these boats, called trajineras.

[YOUTUBE FX RISE]

**If you haven’t seen the trajineras, don’t worry. There are plenty of travel vloggers who have made their experiences available on Youtube.**

Luis Zambrano: These huge boats are flat and with small roof and with flowers in the front of these roofs.

And then you will hear a lot of mariachis.

The first time i went to Xochimilco as an adult was in that area. So i said, Xochimilco is lost.

[YOUTUBE FX POST AND FADE: really crowded, and not as relaxing as I thought it’d be. Just loud. Kind of like a fiesta on the river!]

Luis Zambrano: That is not the real Xochimilco.

**But there is this other part of the lake. It’s quieter with fewer tourist boats, more chinampas… those floating gardens that still survive, 2000 years after they came to be.**

**This part of Xochimilco at the southern outskirts of Mexico City is not far from the University where Luis worked.**

**And it’s there that in 2003, Luis conducted his first census of that wild population.**

 Luis Zambrano: it is very funny because I refer to those moments as when you have very, very bad first date, and then suddenly you fall in love with your partner --

Justine Paradis and Sam Evans-Brown: [laughter]

Luis Zambrano: Something like that! That happened to me with the axolotl. When I started to make this research for National Commission of Biodiversity in Mexico - it was awful because it was very, very difficult to catch them, and still is very difficult to catch them.

**At first they tried catching them with gill nets, then minnow traps.**

Luis Zambrano: but that didn't work at all in the first census. So, basically, the thing we do is, we are in these boats for tourists, now it's for research. They don’t have flowers at the top of the work, but they still working.

Justine Paradis: What?!

Sam Evans-Brown: No alcoholic beverages?

Justine Paradis: ...not drinking tequila?!

Luis Zambrano: And then at the front of the boat goes a local fisherman that knows how the axolotl make bubbles when they go up to breathe. It’s a different type of bubble than other bubbles that appear in the system.

**So every 200 meters, this fisherman would throw a cast net into the water. This is a circular weighted net that drops to the bottom of the canal and in the middle, if they saw a bubble that looked like an axolotl bubble, this fisherman would also throw the net in order to try to catch one.**

**So before Luis did his survey, there was one other scientist who had begun studying axolotl ecology. Her name was Virginia Graue.**

**And in 1998 her research suggested that there were about 6000 axolotls per square kilometer in Xochimilco.**

**So in 2003, Luis and his research team set off in their flowerless boats. Saw the bubbles, cast their cast nets, and calculated that the population had diminished - from 6000 to 1000 per km squared.**

**And same thing, five years later in 2008, the boats - the bubbles - the cast nets -**

**and found that the numbers had fallen still further: from 1000 to 100 per kilometer squared.**

Luis Zambrano:But the worst was in 2014. I mean, because we spent about four months and we didn't find anyone. And that was something like our calculations were wrong, and now they are extinct. Fortunately we found one at the end of that study. So, we said, okay, they still there, uh…

Sam Evans-Brown: So… sorry to interrupt. But in 2014 - the entire census - you found… one axolotl?!

Luis Zambrano: Yeah. Yeah.

Justine Paradis: And then you extrapolate to 36, you said, per…

Luis Zambrano: organisms per kilometer squared.

Justine Paradis: But the experience was you just found one.

Luis Zambrano: Yeah.

Justine Paradis: Oh my god.

Luis Zambrano: We found one. We saw three or four more but we found one only.

Sam Evans-Brown: Sorry to laugh.

Justine Paradis: No, yeah…

Luis Zambrano: Yeah, I know, it's a nervous laugh. Yeah. If we don't do anything, axolotl will be completely extinct in the wild in 2025, something like that.

**But what could they do about it?**

**That’s after the break.**

**--- BREAK ---**

[Sounds of Xochimilco, walking through Victor Velasco’s Chinampa to axolotl refuge]

**Welcome back to Outside/In. I’m Sam Evans-Brown, here with Justine Paradis.**

**Justine Paradis: And you are hearing Victor Velasco, who’s showing us his garden in Xochimilco.**

Victor Velasco: Broccoli… cilantro...

Victor Velasco: Victor Velasco. Mi edad son 61 años y pues soy productor de hortalizas y lácteos.

**Victor is 61 years old, a dairy farmer, and he grows vegetables on a chinampa - a floating garden - in Xochimilco -- the lake on whose sediments Mexico City is built. And the only place in the world to find the axolotl - the Mexican salamander, alive in the wild.**

**Victor actually remembers when the axolotl was abundant in Xochimilco.**

Victor Velasco:Se llega incluso comerlos. [ah si?] De Niño... había una costumbre ya se ha perdido en las fiestas y en muchos barrios. *[English translation] You get to even eat them. [ah yes?] As a child ... there was a habit that has already been lost at parties and in many neighborhoods.*

**He says: we used to eat them. When he was a kid they’d go to neighborhood parties that would last for days, where they’d make mitzmole -**

Victor Velasco: que es el mitzmole. Que se un guisado de tomate picante y que llevó a todas esas especies del canal. *[English translation] That is the mitsmole. That it was a spicy tomato stew and that it led to all those species of the canal.*

 **spicy tomato soup with what they caught in the canals… like that ludicrous fish - the axolotl.**

Victor Velasco: Se pescaba... pues lo que era: la ajolote, la cosi... *[English translation] It was fished ... well what it was: the axolotl, the cosi ...*

**I’ve also read that axolotls were once wrapped and baked in corn husks - axolotl tamales. But Victor says- people don’t know about this mitsmole dish anymore.**

Victor Velasco: pues ya nadie... muchos jóvenes ya no conocen... *[English translation]* *well no one ... many young people no longer know ...*

**That was back when the water quality was better, back when axolotls were much more abundant, and long before axolotl ecologist Luis Zambrano had arrived on the scene to conduct his censuses, which told him the axolotl could be extinct in the wild by 2025 at the latest.**

Luis Zambrano: Uh… okay. Well at the beginning, I was a little bit depressed.

**Luis has wanted to be a biologist since he was in 3rd grade. His family has spent the large part of the last fifty years in Mexico City. It’s where he grew up.**

Luis Zambrano: I mean I think that all the researchers that we are dealing with this type of things, in some moment, we found a very, very ugly data that make us... sad or stressed, basically. I’ve heard stories that the person that found how the oceans will be more acid, and then it will destroy all the coral reefs, when she saw the data, she had to stand up and go to throw up, I mean, to the bathroom, because it was really really stressful. So it didn't happen like that to me, but it was, um, it was really really sad. But after two or three months, I started to see that as a challenge, basically.

[mux]

Something like when you see a mountain, you know that you have to climb it. That was my feeling in the following months. I mean, it’s a huge challenge! I am hired at university to solve huge challenge. So, let's do that.

**The pressure on Xochimilco and on the axolotl, were coming from a couple different sources. First, exotic species of fish: carp and tilapia.**

Luis Zambrano: tilapia came from africa, and carp from asia, basically china.

**Luis says the history here is: that carp and tilapia were introduced in Mexico in the 70s and 80s because the idea was that this animals can reproduce fast, and you can fish them, and then you can increase access to protein for people that doesn’t normally eat have that access in Mexico.**

Luis Zambrano: That didn't work but create a huge problem in terms of biodiversity in lakes and rivers of mexico

**And for the axolotl, it meant that the carp ate their eggs and tilapia ate the juveniles.**

**The second problem was the change in water quality. Xochimilco was once fed by springs, but as Mexico City grew and grew, the city diverted that springwater to meet the population’s water demands instead.**

**And in the 1950’s --**

Luis Zambrano: Xochimilco run out of water, or was close to be completely dried out. The solution of government was to introduce water from treatment plant.

Sam Evans-Brown: So, wastewater.

Luis Zambrano: Wastewater, yeah. Which is a problem because sometimes the treatment plant works, and the wastewater is good quality, but sometimes it doesn’t work properly and then the water is not particularly with good quality. And if we remember axolotls are amphibians and they are susceptible for changes in water quality because they breathe through skin - so the skin is very sensitive.

**Plus, Luis says local governments began adopting new agricultural policies, encouraging the use of fertilizers and pesticides.**

Felipe Barrera: Ya son seis generaciones estamos hablando de 200 años que mi familia ha estado aquí desde entonces seguramente generaciones más atrás…*[English translation] It is already six generations we are talking about 200 years that my family has been here since then surely generations ago ....*

**This is Felipe Barrera. You heard him at the top of the episode speaking about the duality of the Aztec gods. He says his family has been here six generations, two hundred years.**

**And when his father and grandfather started using agrochemicals in their plantings, it was on the advice of engineers and as Felipe describes it, these engineers were selling a story about progress and modernity.**

Felipe Barrera: llegaron ingenieros les marearon la cabeza con este rollo de la modernidad. El resultado es este, no? Xochimilco que tenemos actualmente que es un Xochimilco contaminado que ya no es lo mismo que antes no. *[English translation] No, that’s a story that they sold to my dad and my grandfather… The engineers came, and they made their [dad] heads spin, dizzy with the vision of modernity. The result is this, no? Xochimilco that we currently have is a contaminated Xochimilco that is no longer the same as before.*

**The result is a contaminated Xochimilco - Felipe says when he arrived to work on his family chinampa, it was a disaster-**

Felipe Barrera: y regreso aquí y me doy cuenta del desastre que había en la chinampa de mi pa-- de mi padre, no*[English translation] I return here and I realize the disaster that was in my father's chinampa, no.*

 **practically unusable because of agrochemicals -- which had also of course affected the ecosystem, killing both insects, the main diet of the axolotl, and also directly just killing axolotls.**

**And the last big threat, Luis says, is the noise and bustle of the city,**

[YOUTUBE VLOGGER TOURIST BOATS: Aw, man. This is one of the most, this is most interesting thing we may have ever done, and for being something so touristy...]

Luis Zambrano: Wild axolotls doesn't like people. They hide. They don’t want to be around people or around noise, actually. Once they are surrounded by them, then they started to get ill and they die after a lot of stress. So we found that these three huge threats: exotic species, water quality, and urbanization, are the causes of the reduction of axolotl populations.

**Despite all this… somehow the axolotl is still there. Thinking back to Luis’ hypothesis the idea that the creation of this very human landscape of the chinampas actually helped the axolotl…this is not all that farfetched. In fact, ancient systems of agriculture often were good for certain wild species.**

**In New England, Native Americans managed forests through controlled burns to encourage species like blueberries and deer. That was also true on the plains to manage for bison herds, with all kinds of ripple effects throughout the ecosystem.**

**Why do you think the axolotl is smiling, anyway?**

*Luis Zambrano: so the axolotl was happy before Aztecs arrive. When they arrived, they were happier.*

**Today, there is no wild Xochimilco. The only thing left is the remnants of the chinampas -- most of them abandoned.**

Carlos Uriel Sumano: Pues la información que hay en los libros es muy general no hay información detallada. *[English translation] Well, the information in the books is very general, there is no detailed information.*

**This is Carlos Uriel Sumano.**

Carlos Uriel Sumano: Carlos Uriel Sumano soy colaborador del Laboratorio de Restauración Ecológica en el Instituto de Biología. *[English translation] My name is Carlos Uriel Sumano I am a collaborator of the Laboratory of Ecological Restoration at the Institute of Biology.*

**He’s one of Luis’ collaborators at the Institute of Biology at the National Autonomous University of Mexico.**

**And e says there’s no academic institution in the world that teaches this ancient style of agriculture— chinampería -**

Carlos Uriel Sumano: y te comentaba que no hay institución académica en el mundo que enseñe chinampería… pues se aprende así por tradición, por enseñanza de los padres a los hijos de los de los abuelos *[English translation] I told you that there is no academic institution in the world that teaches chinampería…. because you learn by tradition, by teaching the parents to the children of the grandparents*

**You learn by tradition to grow vegetables organically in polycultures interplanted to support the soil and control pests naturally.**

**Even though Xochimilco’s canal-chinampa system has been** [**listed as a UNESCO world heritage site since 1987, many of the chinampas were abandoned.**](https://whc.unesco.org/en/list/412/) **Of the** [**2077 sq km of remaining chinampas**](https://www.researchgate.net/publication/283712016_The_conservation_of_the_axolotl_Ambystoma_mexicanum_in_Xochimilco_Mexico_City_a_specieshabitat_action_plan) **-- only around 11% were still being farmed.**

Luis Zambrano: When i was working to find out which are the threats - a friend of mine starts to work in Xochimilco. And he told me: if you want to restore axolotl’s populations, you have to work with local people because they know, and they understand and they will work with the area before and after you leave, and they will work there even when the government changes or not. So we have to start to work with them.

**But part of the problem is -**

Luis Zambrano: Local people is completely tired about people like me, a scientist that goes there, and then pays them very very small amount of money to make our research and then leave.

**For instance, government encouragement of chemical agriculture, which ended up degrading Xochimilco.**

**Or one of the other major threats to the axolotl that Luis mentioned, the invasive carp and tilapia - they were actually introduced by the UN.**

**Or you could draw this back to the Spanish conquistadores - who arrived and were completely awed by the chinampas -- thought they had a superior water management strategy, so they drained the lake and totally transformed the city.**

**So if a family had been there for generations - they might have seen ideas come and go, experts parachuting in perhaps with PhDs, state titles, theories and grants - and they would have seen some projects fail, and been left to live with the consequences.**

**So it’s into this environment that Luis, supported by the university and local government, comes in and pitches his idea to the Xochimilcas: let’s keep doing axolotl censuses, but let’s do more than just sit by and watch. Let’s work together! Let’s collaborate to revive more chinampas and grow organic vegetables in the polluted water and figure out how to create a refuge without carp and tilapia…!**

Justine Paradis: What was the process like of recruiting locals to help you on this project… like what were those conversations like?

Luis Zambrano: Oh… they are really, really harsh actually. The first meeting I had with local fisherman: the nicest thing they told me was that… it was like i was a really stupid guy. That I believe, because I had a phd, that didn’t mean i know anything about xochimilco.

**Part of Luis’ strategy has just basically been to stick around. To not go away.**

Sam Evans-Brown: Was it... did you have to go have coffee with them? Was it in public meetings? How did this happen?

Luis Zambrano: All of that - plus get drunk with them.

Sam Evans-Brown: ha!

Luis Zambrano: it's very important actually! To go with them all the time, stay with them. The thing is - I can't do that all the time by myself so I have a very nice team... they have to see you in the bad moments, in the work moments when everybody is working really really hard, and then you have to be with them working hard, and in the good moments when all of them are drunk, and then you have to be drunk with them, in order to see… you are… you are my brother, basically.

**It took a few years, but together, the chinamperos and the biological institute started a project with the dual goal of increasing the amount of chinampas and the amount of axolotl.**

*Victor Velasco: Son las compuertas tiene un dos tres cuatro en este espacio. [English translation] They are the floodgates have a two three four in this space.*

**Since the floating gardens are surrounded by that maze of canals - they did this by constructing small barriers with water filters around the working chinampas--**

Luis Zambrano: 3-4 m barriers, mostly, in which carp and tilapia cannot get into.

*Victor Velasco: Tener mejor control de la tilapia. [English translation] Have better control of tilapia*

**Simple, but effective. One 2014 study found that** [**water transparency went up by 50%**](https://academic.oup.com/bioscience/article/65/12/1134/223981) **- it was working.**

Luis Zambrano: I mean the island is alive. And we saw that the axolotls could survive very well and not only axolotls but also native species such as crayfish and a small silverfish also.

[MUX FADE]

[CHINAMPA FX RISE]

Felipe Barrera: la chinampería no se puede hacer de forma individual. La chinampa es colectiva. *[English translation] chinampería can not be done individually. The chinampa is collective.*

**That’s Felipe Barrera again, chinampero. He says: the chinampería can not be done individually. The chinampa is collective**.

Felipe Barrera: Son ya a varias generaciones que... Son varias generaciones que ya hemos crecido con ese discurso de la competitividad... de... de... Vaya de pasar sobre el vecino. *[They are already several generations that ... They are several generations that we have already grown with that discourse of competitiveness ... of ... of ... Go pass over the neighbor.]*

**He’s saying that for a few generations, farming was defined by competition -**

Felipe Barrera: . competencia... competencia.

**He also says this is from the pressure of industrial agriculture on peasant farmers -- big farms driving vegetables prices down. So, the attitude was: ignore your neighbor, and get the best prices.**

**And that has fractured the social fabric of Xochimilco.**

Felipe Barrera: ... venido a fracturar mucho del tejido social que existe aquí en Xochimilco. Tradicionalmente hace 500 años, las chinampas se construían en comunidad. *[English translation] And that too has since ... It has come to fracture much of the social fabric that exists here in Xochimilco. Traditionally 500 years ago, the chinampas were built in community.*

**Felipe says: five hundred years ago, chinampas were built by hundreds of families coming together**

Felipe Barrera: Esa fragmentación también es resultado de lo que tenemos actualmente. *[English translation] That fragmentation is also a result of what we currently have.*

**But right now - Xochimilco is fragmented. Felipe says: this is not just the story of Xochimilco.**

Felipe Barrera: Gente que se quiere aprovechar del campesino -- y bueno esa no es la historia nada más de aquí de Xochimilco es la historia del campesinado en México

*[English translation] It’s not just the story of Xochimilco, it’s the story of the small farmer in Mexico,*

**It’s the story of the campesino - the peasant farmer in Mexico, which -**

Felipe Barrera: que es un desastre. *[English translation] which is a disaster.*

**is a disaster.**

**Ecologically, it looks like the refuge is a better place for axolotls. But the project itself is still small. Right now there are just 10 working chinampas.**

**Felipe says to return to that construction of that collaborative social fabric…**

Felipe Barrera: Entonces volver hacer esa construcción del tejido social -  *[English translation] So to remake that construction of the social fabric*

**...will be a challenge.**

Felipe Barrera: … es un reto. *[English translation] is a challenge.*

**And for him the big question is: how to find a dignified living through small-scale agriculture.**

Felipe Barrera: Cómo poder vivir de forma digna de la agricultura. Esa es la gran pregunta. *[English translation] How to live a dignified life through farming...that’s the big question.*

Luis Zambrano: I think that the most important thing of this is the change of the attitude. As a scientist I don't go teach them how to do things. As a scientist i go there to understand how this social ecosystem works, and then help to make the process easier, and then receive their ideas, and give another ideas, and generate new ideas from everybody. That is my role. And not to teach everybody because i know everything. So that is the thing that increases the trust, has been increasing the trust in the last year. It is not easy, but has been increasing the trust, basically.

[Sound of working in chinampas]

Carlos Uriel Sumano: … para la producción de alimentos. En términos biológicos es eso muy importante es un indicador de que el ecosistema está en buen estado. Para los chinamperos en términos culturales… *[English translation]* … *for the production of foods. In biological terms that is very important is an indicator that the ecosystem is in good condition. For the chinamperos in cultural terms...*

**Right now Luis is in the process of seeking funding for their next census. If they get it, they’ll be able to add 12 more chinampas as well.**

**Like Carlos Uriel Sumano says - one of Luis’ collaborators at the university - the axolotl are an indicator species, a sign that things are going well.**

**But then we asked him: for you, the axolotl, for you, why is the axolotl specifically important for you?**

Lucina Melesio : y para ti? *[English translation] And for you?*

Carlos Uriel Sumano: Para mí es importante porque... porque en términos biológicos comentaba este es un indicador también yo asumo que eso es de mucha importancia… *[English translation] For me it's important because because in biological terms I was commenting this is an indicator, I also assume that is very important ...*

**And Carlos says - you know, again I’m saying: axolotls, they’re important as a biological indicator species -- but ...**

Carlos Uriel Sumano: y porque en algún momento me gustaría probar un ajolote. *[English translation] ...and because at some point I would like to try an axolotl.*

**He says at some point, he’d love to try an axolotl.**

Carlos Uriel Sumano: … platicó mucho con los chinamperos. *[English translation] I’ve talked a lot with the chinamperos.*

**He’s talked a lot with the chinamperos and they say…**

Carlos Uriel Sumano: ...y ellos dicen que es muy rico *[English translation] And they say that it is very rich that is that someday I have to try it.*

**...it’s pretty delicious.**

Carlos Uriel Sumano: Para mí el día en el que se logre tenerlos ajolote suficientes para poder comerlos otra vez, eso va a significar que por muchos años y por muchas generaciones más va a seguir existiendo. *[English translation] And* f*or me the day in which it is possible to have them axolotl enough to be able to eat them again, that is going to mean that for many years and for many more generations it will continue to exist.*

[rowing through chinampas, faded out]

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**Outside/In was produced this week by Justine Paradis and Sam Evans-Brown with Taylor Quimby, Daniela Allee, and Jimmy Gutierrez - special shout-out to Jimmy G who (much to his displeasure) graciously voiced the role of Cortes for this story.**

**Erika Janik is our executive producer.**

**Maureen McMurray is capable of escaping that mineral lethargy in which she spends whole hours.**

**Music from Komiku, Yan Terrien, Jahzzar, La Venganza de Cheetara.**

**Thank you to Lucina Melesio for helping us connect with the chinamperos in Mexico City.**

**We also relied on *The Book of Barely Imagined Beings: A 21st Century Bestiary* by Caspar Henderson - definitely check that out to learn more about the scientific/cultural/literary history of incredible creatures like the tardigrade, the nautilus, and Quetzalcoatus, which you may remember from our best animal competition a few episodes back.**

**Outside/In is a production of New Hampshire Public Radio.**

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