

15 *Years of Harvard in Chile*
**Lights on
the South**
Stories by Paula Molina



DAVID ROCKEFELLER CENTER
FOR LATIN AMERICAN STUDIES

HARVARD UNIVERSITY

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To Aldo, Bruno and Antonio, fellow travelers
To Berta and Juan, who set me on my path

Para Aldo, Bruno and Antonio, compañeros de viaje
Para Berta y Juan, que me echaron a andar

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Registro de Propiedad Intelectual: N° A-289232

Copy editor: Francisco Maldonado Andréu, Erin Goodman
Book Design: Juan Pablo Salas Fernández - [Monotipo](#)

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PROLOGUE



I am the granddaughter, daughter, and niece of miners, merchants, blacksmiths, traveling salesmen, vendors, and teachers. I am a mother of students; I am part of the people who are born and grow in this landscape and transform it with their work: Chile is the land of my children and my ancestors.

The idea of writing these stories, which speak of Chile from the findings and research done in my country by Harvard scholars, was born in Cambridge, Massachusetts throughout my year as a Nieman Fellow at Harvard. The Nieman Foundation opened its doors to my family and me, in an invitation to pause and reflect on matters beyond the day-to-day, hour-to-hour, and minute-to-minute concerns us journalists are constantly consumed in.

Thousands of kilometers away, I thought about Chile. And upon my return, I reflected on how to share part of this transformative experience of learning and growth. I started looking for the findings made by Harvard scholars working with Chileans and inspired by the landscapes and the people who are my own. Our mountain ranges, our starry skies, our oceans, but also by our earthquakes; both the telluric and the political, social, and economic turbulence we have faced, and our resilience, our ability to get back on our feet and rebuild ourselves.

Seeing Chile through the eyes of others, as I have been able to do in these interviews, has allowed me to learn more about my homeland. I now have a better sense of what it means to grow up in a land that looks directly into the center of the galaxy, or the importance of the historical records kept in the Chilean navy bases in Antarctica to understand the patterns of climate change.

Examining the discoveries made by those who come from abroad often brings about new perspectives about ourselves: the way our nation deals with even the most devastating natural disasters, the initiatives that have tried to attack our deep inequality through the support of

early childhood development, and all the lessons that may surge in education and other areas, from a country with such diverse landscapes and people.

I believe that learning and reflecting about our communities and countries allows us to reflect on the larger world that we are all part of and the phenomenons that are presently happening in other countries as well; how Chile can be portrayed as a microcosm for the perils of extreme wealth inequality, the risks of a hyper globalized economic system, or the limits of our democratic institutions, so well portrayed in Chile's political tragedy in 1973.

Writing these stories, which I have published in this e-book in coincidence with the 15th anniversary of Harvard University's DRCLAS Regional Office, also allowed me to witness how knowledge is developed and new ways of understanding are forged.

I thank Marcela Rentería and her team at the Harvard David Rockefeller Center for Latin American Studies (DRCLAS) which showed an unwavering enthusiasm around this independent project and were crucial in helping me identify and contact the researchers and the Harvard scholars for their time and interest in sharing their work.

I thank Anne Marie Lipinski and the Nieman Foundation for Journalism for selecting me as part of their group of outstanding journalists and giving me the confidence to start and undertake this and other adventures.

I send my gratitude to the friends who welcomed me in Cambridge on my trips, especially to the Ciampa family, for their warm hospitality. To Radio Cooperativa, which gave me the space to travel and work on this project. To the numerous friends with whom I can always discuss and comment on new ideas.

Thanks to my family, and especially my husband Aldo and my sons Bruno and Antonio, companions of adventures from whom I have stolen the time to write, and who enlighten me every day with their love, trust, and support.

Paula Molina Tapia.
Journalist, Harvard Nieman Fellow 2013

CHAPTER 1
A COUNTRY STARING
AT THE CENTER OF THE GALAXY



Robert Kirshner,
Clowes Professor of Science at Harvard University
has been visiting Chile during the last 40 years. This
is a story about the stars that shine over the Atacama
Desert, and how the country turned into a giant of
astronomical observation.

“The first time I went to Chile it was 1974. It wasn’t such a good time. There was a curfew, you couldn’t go out, and there was a sense of, not exaggerating, a sense of unease, dread really, in the air.”

That is one of the few gloomy moments Richard Kirshner evokes from his long-lasting relationship with Chile. Just one year before his first visit, in 1973, a military coup had overthrown the government, and the country was living under a state of emergency imposed by the military.

It was a rough first meeting but it didn’t discourage the energetic Ph.D. in Astronomy and Clowes Professor of Science at Harvard University, who has been visiting Chile and working on its spectacular astronomical facilities regularly over the last 40 years.

Four decades later, from his Harvard office, squinting, Kirshner remembers that first time in Chile, and the first bus he took from Santiago up to the southern Atacama Desert.

“I stayed in a hotel that had seen better days, and I went to the bus station, it was old and crummy. It wasn’t a fancy neighborhood, it was a lively place. I got on the bus and it drove down the (Mapocho) river”.

Kirshner describes that trip in the early seventies; an interminable journey that stopped in an infinite amount of towns, but today takes little more than an hour by plane.

“I was uneasy, I didn’t know what was going on. It was a military government, I was all alone, I didn’t really speak much Spanish, even if I understood most of the food words that were necessary”, he says with a smile. “But for the people there...it seemed like ordinary life. The bus stopped at this place, La Ligua. And a guy gets on with sugary pastries. He went down the aisle of the bus, and I had to buy one, you know, to see what’s going on, so I did. Then we stopped in Los Vilos, the seaside town. And a guy gets on the bus with chickens. A box of chickens wrapped as luggage. We were driving up this road, and, it’s a long ride, it’s about 8 hours, stopping in the towns, with all sorts of interesting stuff. And there was a fork in the road where you either go to La Serena or you go to Ovalle. La Serena was my destination. But the bus went to Ovalle. Dear me! We were so close, you know, 30 kilometers away from La Serena, and suddenly, we went to Ovaalle” (he elongates the word, as the trip kept getting longer). “By this time, after an overnight flight, I was really kind of tired, and thirsty, and I’d eaten that sugar thing, maybe that was not such a good idea Finally, I got to La Serena. And that was the first time I’d been there”.

Kirshner describes the road that many generations of Chileans knew from experience; the old road to La Serena and the Norte Chico (“Little North”) through a landscape that becomes progressively arid as one moves north, the small towns between the bigger cities.

Chile would change dramatically and at an accelerated pace throughout the following years after Kirshner's first visit. The same would happen with the astronomical capacity installed in the country, which has benefited generations of Chilean astronomers and astronomers from many different parts of the world.

"A lot of the work that I've been doing has been building on the work that people have done in Chile," says Kirshner, and he refers immediately to one of the most important astronomical findings in recent years: the acceleration of the universe.

"The business of using supernovae to measure the history of cosmic expansion had a solid start in Chile at the Calan/Tololo Supernova Survey," he adds.

That survey began in 1990, a collaboration between the University of Chile and Cerro Tololo Inter American Observatory or CTIO. This complex of telescopes and instruments is located at Mount Tololo, in Los Andes, 500 km north of Santiago, 90 km east from the seaside city of La Serena.

El Tololo, as Chileans commonly refer to the complex, operates in Chile through an agreement with the University of Chile, as part of the United States' National Optical Astronomy Observatory (NOAO), funded by the National Science Foundation and run by the Association of Universities for Research in Astronomy (AURA), "this kind of group of universities that takes the money from the government, and pays everybody," in Kirshner's words.

The observatory has a fascinating history, which Kirshner touches upon in our conversation. The complex was founded in the 1950s in an isolated mountain and has operated continually, even through the most turbulent decades of Chilean social history.

Kirshner explains that Chile has been the place of origin for "a number of the very basic discoveries that made it possible to see the change in cosmic expansion rates from long ago to now, and to see that the universe is speeding up. Also, our follow-up on initial discoveries and even the initial discoveries themselves were done in large part at Cerro Tololo, using telescopes in Chile. This work, which led to the 2011 Nobel Prize in Physics, really had a very strong set of roots in the country of Chile."

The fundamental discoveries that Kirshner refers to are the work of two prominent Chilean astronomers, José Maza and Mario Hamuy. Both received the National Prize for Exact Sciences in Chile, and both have an asteroid named after each. Maza and Hamuy, along with a group of academics, founded the pioneering Calán/Tololo Supernova Survey research with the objective "to start a photographic search for supernovae in the Southern Hemisphere." They discovered 50 supernovae in three years. That work provided "essential data" for the

2011 Nobel Prize in Physics, and the Royal Swedish Academy of Sciences mentioned the work of Maza and Hamuy expressly, along with Mark Phillips and Nicholas Suntzeff, as the authors of it.

“People in Chile and work done in Chile have been significant,” highlights Kirshner. From the Southern Hemisphere, Chile looks towards the center of the galaxy. In the vast desert area at the foothills of the Andes and at the edge of the Pacific Ocean, the cold Humboldt Current system and the Pacific Anticyclone create unique phenomena of pressure and dryness in the Chilean skies: there are no skies more pristine for observing the universe. “It’s so good, that we want to do there the big thing, the better one, the bigger one,” Kirshner says. The “big thing” he refers to is the Giant Magellan Telescope or GMT, a telescope that “will have 100 times the area of the Hubble Space Telescope. And with the tricks that we use to correct for the atmosphere, it should have ten times sharper images. This is our next thing. It’s our dream, and Chile is the place of our dreams,” says Kirshner, and laughs at his comment.

But Chile was not always the place astronomers dreamt of. In fact, the Atacama was once considered unsuitable for their purposes. On a cold evening, I met Kirshner at the Harvard Smithsonian Center for Astrophysics for the first of a series of interviews. There, Kirshner began our conversation with a story of mountains, mules, scientists, soldiers and a ‘giant’ that is under way.

Looking for mountains

“Here are my credentials.” The professor gestures toward a small astronomical observatory made of combarbalita, a volcanic stone unique to the Atacama Desert. “For astronomical observations, Chile is the best place in the world. Of course, the climate and the physical properties in Chile are excellent: there are many mountains; there are very clear skies, very little moisture. And then there’s a historical part which is interesting.”

Native astronomy has a long tradition in South America. A majestic example is the monument city of Machu Picchu, which was designed facing the starry Andean skies. The accelerated pace of stargazing in Chile – soon the country will collect more than 70% of the astronomical capacity of the world – began in the 19th century. James M. Gilliss, founder of the United States Naval Observatory, was one of the first persons to lead astronomical endeavors within Chile. Lieutenant Gilliss sought to improve calculations of the ‘solar parallax’, used to determine the distance between the Earth and the sun. For his project, he needed simultaneous observations of Mars and Venus from two latitudes as far apart as possible. Chile was one of the selected places.

In 1847, Gilliss proposed an expedition to the Chilean island of Chiloé, the southernmost inhabited place in South America at that time. But the reports of Charles Darwin, who had visited the area a decade earlier as the naturalist of the British vessel HMS Beagle, discouraged him. Chiloé had a rainy climate, unsuitable for astronomical purposes.

A Chilean authority proposed to Gilliss the hill of Santa Lucía, then a secluded spot in the Chilean central valley – today it lies at the heart of the busy capital city of Santiago. Instruments and infrastructure for the observatory arrived in Chile by sea, crossing the perilous Cape Horn.

Gilliss built the observatory next to the ruins of a Spanish fort, at 53 meters of elevation. When the project was completed, with the support of local mathematics teacher, Carlos Moesta, and a few of his best students, Chile bought the facilities and founded its first National Astronomical Observatory in 1852.

At the beginning of the twentieth century, a new expedition set off for Chile seeking “to secure radial-velocity observation of the brightest stars,” as described by William W. Campbell, director of the Lick Observatory and future President of the University of California.

Campbell headed the D. O. Mills Expedition to Chile, which took its name from California tycoon Darius Ogden Mills, who financed it. The mission had the objective of building another observatory in the country. This time the project site was San Cristóbal – the other hill at today’s center of the capital city. Construction began in 1903, and by 1929 the observatory was already in disuse. On this year, the Catholic University of Chile took control of it and continued to use it intermittently until 2012, when it was declared a national monument.

None of these early explorations were directed toward the Chilean desert, although according to Victor Blanco – the astronomer who led Tololo from 1967 to 1981, – “Curtis Schmidt, the astronomer in charge of the D.O. Mill Expedition, when surveying northern Chile very early in the 1900s for possible observatory sites, declared the entire region of the Southern Atacama desert unfit for astronomical observatories.”

Kirshner explains, “in the 1960’s, people already knew that the Southern Hemisphere was very interesting. They knew that the center of our galaxy goes right overhead in Chile, so it’s a great place if you want to study our Milky Way. You also have a good view of the Magellanic Clouds, not available in the north. There are just too many good reasons to explore the Southern Sky. At that time, the big telescopes had been built in the north, mostly in California, with a nice view of Los Angeles. But the city got bigger and brighter, so that wasn’t such a good idea. The idea was to search for sites in the Southern Hemisphere.”

When Kirshner thinks about the people who made astronomical development possible in

Chile, he remembers, among others, former director of the Cerro Tololo Inter American Observatory (CTIO), Victor Blanco. Cerro Tololo's main telescope bears his name, as does the galactic cluster "White 1" (white being the English translation of Blanco's surname).

In a 2001 article for the Annual Review of Astronomy and Astrophysics, Blanco tells his story and that of the CTIO. He was the son of a police officer in Puerto Rico. After serving in World War II, –where, "in addition to predicting how our own and Japanese radar beams were expected to behave, [he] had to brief the pilots... about the weather they were likely to encounter," –Blanco came to Chile.

CTIO originated in 1958, "when Professor Federico Rutland from the University of Chile visited the United States to explore possible collaborations for building and operating an astronomical observatory in Chile", Blanco affirms.

One year earlier, a group of seven American universities, including Harvard University, had united under the Association of Universities for Research in Astronomy, AURA. Only the Yerkes Observatory in Chicago responded to Rutland's approach. One of its astronomers, Gerard Kuiper, "secured support from the US Air Force to acquire a 60-inch reflector for planetary research," to be operated jointly by the University of Chicago, University of Texas and University of Chile.

At that point "the scouting of sites in Chile was being carried out by some people in cooperation with the University de Chile," says Kirshner. "And people went by very simple means, by mule, to some of these mountains where the observatories are now."

"There were some astronomers in Chile, but their efforts were independent, there was no active community. There were explorations of potential astronomical sites; Harvard had a station in South Africa in the 1950's, and there was an observatory in Australia. But Chile in the 1960's was very hospitable, so the National Science Foundation and the Carnegie Institution looked at maps of Chile, and asked, 'How do you choose which mountain to go to?' I don't know how, but they did select some mountains."

At that moment, "the light-gathering power of Southern Hemisphere telescopes was less than 10% of northern ones," writes Blanco, and "there was no observatory located on a site with frequent clear night skies and exceptional viewing."

In 1959, Kuiper sent Jurgen Stock, a German astronomer working in the US, to test some sites around Santiago for the project. On February of 1960, he took the Pan American Highway towards the Atacama Desert. Stock rented mules and tried stargazing in different locations until, as he wrote to his daughter, he saw Cerro Tololo, a mountain "far from the road, right topographically, isolated, with good height."

In a report dated April 16th, 1960, Stock wrote: “In spite of the fact that we felt more like a part of a horse than a human being, we decided that this site was on our program.”

In 1962, AURA made its final decision, and CTIO got its name: Cerro Tololo Inter-American Observatory, located in the foothills of the Chilean Andes, at the 30°10'S latitude.

The optical astronomy observatory was established on behalf of the US National Science Foundation. It served American and Latin American astronomers who sought to observe the southern skies.

An almost separated world

Kirshner: “I was a graduate student at Caltech. In 1974, I went to Kitt Peak in Tucson, our national observatory, as a postdoc. It was a sister observatory with Cerro Tololo, so I found I had to think of some reason to go there, which of course I did. So the first time I went, it wasn't such a good time [to be] in Chile. There had been a change in government, rather violently, in 1973.”

“I arrived at the Santiago airport, and then I stayed at the Sheraton Carrera Hotel, right there by La Moneda – the Chilean presidential palace, bombed by the Military Forces during the coup. It was not exactly still smoking, but it was damaged. And I thought, ‘What am I doing? Is this a good idea?’ Anyway, the people working at Tololo left me a note: ‘Go to the bus station, and there will be a ticket for you.’”

Arriving at the Tololo Observatory, he found a world of its own. “It wasn't a military base, but it was like an expatriate thing; they had their stuff. They had peanut butter from the commissary at the American embassy.”

“And they had houses. Very well insulated ones.” Kirshner tells the story: “When they built the Trans-Alaska Pipeline, there were these prefabricated houses. When the pipeline was done, they sold them all, and the houses from Alaska ended up in Chile. So it was kind of funny. For Chilean weather, kind of excessive,” he laughs.

“The observing was so good, and the people were so nice; the telescope operators and the technical people, everything was nice. They took very good care of you,” he remembers.

He finds a wooden box on a shelf on his Harvard office: “We used to bring photographic plates, magnetic tapes on our trips, and the guys at Tololo would give you these boxes, to take them home.”

It is a simple old box. Sturdy, well made, unadorned except for some stickers, one from 1978. “There are so many things that are typically Chilean, like this box. They think it’s ordinary, but it seemed special. And it is a strong box.”

“There was a very high standard of performance. The local staff, they were very nice. Sometimes we were not; we didn’t know very much, we didn’t know the names of forks and knives. And they also ran an excellent cafeteria.”

At this point, it feels like Kirshner is not in Cambridge anymore, but at the observatory.

“You know, you stayed up on the mountain, and there was this beautiful glass window, sets of windows, and you looked out on the mountains... It was great to go there,” he says.

Kirshner continues, “you see mountains in New England, and of course, they are covered with trees. You see mountains in Arizona; there are shrubs, woody mesquites, there’s vegetation. It all looks like a jungle compared to Chile. In the desert, what you see is not the color of vegetation, but the color of the rocks. That struck me so much the first time. I remember driving up the mountain, that yellow and sometimes a kind of pink, I don’t know, that sense of seeing the bones of the mountains.”

Nights lost

Chilean President Eduardo Frei arrived at the Tololo dedication ceremony by helicopter. He flew directly from Santiago on November 6, 1967. At a ceremony in Uruguay that same year, Frei and US President Lyndon B. Johnson announced the acquisition of a four-meter telescope for the CTIO, financed by the Ford Foundation and the National Science Foundation (NSF). Three years later, when the telescope was still on its way, Salvador Allende, first socialist Chilean president, and first Marxist to come to power through open elections in Latin America, succeed Frei.

The American government, led by Richard Nixon, fiercely opposed Allende. And the telescope could have ended up in the middle of a bitter political dispute. Víctor Blanco, CTIO director, decided to meet with Allende personally.

It was “a memorable occasion,” writes Blanco.

After a long wait, the socialist doctor and politician received the astronomer. “The president-elect cordially repeated the promise of support and also told me he had already been informed about CTIO’s activities by the University of Chile... Before I left, he said I should appeal personally to him if the CTIO ever had any problems with his government.”

Economic conditions in Chile worsened during the following years, “possibly caused by hastiness in the implementation of the government’s agenda, by obstruction from the wealthy and conservative sectors of the population, or both,” says Blanco. But CTIO “functioned normally during the time Salvador Allende remained in power and not a single observing night was lost.”

After several years of waiting, the four-meter telescope components, which had been bought by the former US and Chilean presidents, arrived at the port of Coquimbo, near La Serena and Tololo, in 1973. Three months later, General Augusto Pinochet overthrew Allende’s government. Inside the burning presidential palace, and under the attack of the Chilean Air Force, Allende committed suicide.

“Severe actions were taken against known or suspected Allende partisans or sympathizers,” writes Blanco. “The military carried out what they called an ‘internal war.’” In La Serena, “some executions took place soon after,” he adds. “We were affected by a nationwide curfew, travel restrictions and prohibitions of most private radio broadcasts.”

Radio communications from La Serena were prohibited starting the day of the military takeover, but transmissions were still possible from the observatory, “where the beam of a highly directional antenna was aimed toward Tucson, Arizona. In this manner, observers planning to come to CTIO were informed of how they would be met at Santiago’s airport and taken to Cerro Tololo.”

“Only one or two observing nights were lost during the worst moments of the military crisis,” states Blanco.

The director was ready to meet the leader of the coup, and the military that would rule Chile for the next 17 years. “Unlike Salvador Allende, who promised his support, General Pinochet limited himself to acknowledging the information we provided.”

At one point, the former director remembers, “[we] were told that General Pinochet wanted to visit Cerro Tololo, and I was asked by one of his adjutants to provide a list of our staff members indicating their political affiliations.” Blanco refused, under the basis of a strict policy within the Center of staying out of Chile’s politics.

“General Pinochet visited Cerro Tololo anyway, and we kept those Chilean staff members we knew to have been pro-Allende well away.”

“Universities had been put under military control and remained so for years, and press censorship continued. Nevertheless, CTIO functioned normally.” Pinochet declared foreign observatories as privileged scientific territories, whereas mining was prohibited unless

expressly allowed by Chile's president.

In 1975, the four-meter telescope was finally assembled. Visiting astronomers started using it in January of 1976.

An almost separated world

Kirshner: "The short part is that the observatory was run very well, or pretty well, even during the time of the military government," remembers Kirshner.

"This was the case even though the government-to-government relations with the United States were very bad, especially at the time of Letelier bombing in Washington. People in the US, including all the American 'spooks' in Chile, they were mad at the Chileans."

Among these rather extraordinary circumstances, astronomers like Kirshner forged on with their research. In the early 1980's, the American scientist even flew with his family to the country for a few days.

"We stayed in La Serena, in one of those houses from Alaska. It was February, and I was at the University of Michigan at that time, so it was gray, cold, and snowy, dark. Getting in the airplane, you know, it's a long flight, and it's overnight, and I was with little kids, my kids were four and six. But then there's that moment, when you arrive in Santiago, go outside, and it's springtime! And you can smell flowers. It's pretty special."

"And you can also see the people from Chile, they were coming home, and they were pleased to be there." As if he could see the Santiago airport on that visit, Kirshner describes: "there were families, there were hugs and balloons, because Chile is a very warm and welcoming kind of place," Kirshner pauses, "but, my daughter was sick."

"She had a cough, a terrible cough. We got to the observatory. We got to the place where we were going to stay, but the cough got worse and worse, so we thought: 'this is very bad.' It seemed to be the thing that we call in English the croup, and it turns out there are two kinds of croup: there's the kind that gets better, and there's the kind that can get worse and can be very dangerous. We didn't know which it was."

"It was getting to be evening, so I thought: 'what should I do.' I'd been in La Serena before; I knew there was a clinic in town. I also knew there was a curfew, and that you were not supposed to drive at night. On the other hand, it seemed this could be a life-threatening thing. So I put my daughter in the car, and we started to drive down through the city, to the clinic."

“I had the lights on inside the car, because, you know, the Carabineros (Chilean police) would be there, or whoever was looking, watching.”

“I was anxious. I was anxious for my daughter; I thought: ‘How am I going to explain this to the people at the clinic? What would the facility be like?’ But I was also aware of this threat, this police threat, that you may, that they would tell me to do something, and I wouldn’t know what they were telling me.”

“So, I’m driving down the hill and thinking: ‘Dear God, what happens next?’ and... she stops coughing.”

“I said: ‘Becky’.”

“I feel a little better,’ she said.”

“I thought, first of all, this is not gonna go well if I pull in and cannot describe the symptoms very well in Spanish, and especially if she doesn’t have them. I thought, maybe I’ll just drive very, very slowly, back up the hill. So I did.”

“The short form of the story is, she had the kind of croup that gets better by itself. And one of the things that stops the coughing is cold air.”

To go out in the desert night was a threat, but it was also the cure for the astronomer’s daughter.

“It’s almost a non-story,” Kirshner adds, “but it made me realize that everybody in the city was living under this kind of sense of threat.” Driving to the hospital at night, “ordinary things were not safe. I realized that there was a kind of parallel world to the whole thing.”

“There was a threat that, somehow, people could disappear, those horrible things could happen,” says Kirshner. “So, there was a little undercurrent of unease.”

Working in Chile at that time was a mixed experience. “The science was so great,” Kirshner adds. “And the observatories, even though they were kind of a US government thing – at a moment when government relations between the US and Chile were extremely bad and got worse, – but there was no problem.”

“Although they certainly tried to stay out of politics as much as possible, they still had to deal with the local administration. It was somewhat difficult, so their method was to be as open as possible. Saying you can come here anytime, you can open any door, and see what’s going on. And this apparently worked,” Kirshner pauses and smiles, “whoever the local Colonel in charge was, he left them alone.”

A privileged viewpoint of the galaxy

Throughout the following years, Kirshner kept visiting Chile once or twice a year, “now a lot more for committee meetings than actually for observing, but that’s what happens as you are kind of an old guy. You send other people to do the things you used to do.”

In the mid-nineties, people at the Carnegie Institution for Science – which founded the Las Campanas Observatory in 1969, about three hours north of Tololo – asked Kirshner at Harvard, and other institutions, to join a new telescope project in Chile. They ended up building two 6.5-meter telescopes – the Magellan telescopes, Baade and Clay – at Las Campanas.

In 2013, one of the Magellan telescopes allowed a team from the University of Arizona to produce the ‘clearest visible-light pictures of stars and an exoplanet ever taken.’ “For the first time, we can make long-exposure images that resolve objects just 0.2 arcseconds across, the equivalent of a dime viewed from more than a hundred miles away,” explained Laird Close, the project’s principal scientist.

Chile has become the setting for the great astronomical discoveries of the recent decades. The privileged viewpoint of the galaxy is not only in an excellent location. It also has the most sophisticated lenses on the planet.

At great lengths, the astronomer describes the principal observatories and how they work and announces ‘the giant’ that will rise in the Atacama desert.

“Think about the light that is emitted from astronomical objects in the universe. Light is a much broader term than just what you can see with your eyes: there’s light that has a shorter wavelength than the bluest colors you can see, ultraviolet light. And there’s light that has longer wavelengths than the reddest light that you can see, the infrared,” he explains, starting with the basics.

“And it goes beyond that; there’s emission in the radio, that is composed of longer wavelengths. And there’s the ultraviolet and then x-ray and gamma rays, these other kind of photons in the shorter wavelengths. Your eyes are not sensitive to that, but with the instruments that we can build, we can measure that, and it can tell us fascinating things.”

Kirshner starts his introduction to the Giant Magellan Telescope talking about light and about ALMA (the acronym spells the Spanish word for ‘soul’, but it stands for Atacama Large Millimeter/submillimeter Array). The ALMA Observatory includes an impressive 66-antennae radio telescope located in what Chileans call the Norte Grande (‘Big North’) in

the Atacama Desert, at 5,000 meters of altitude.

“ALMA measures radio waves from distant objects, long waves, and that’s why it’s huge. It covers a big area, because that’s how it gets a sharper view. You combine the signals from these different antennae to get a sharp image. The thing that emits radio waves includes dirt that’s forming into planets around other stars, and debris that may form planets around other stars, so ALMA is and will be a fantastic thing for studying how stars formed, and how planets formed.”

But the Giant Magellan is a different kind of telescope.

“The telescopes I’m talking about are optical telescopes, so they measure light, more or less the light that you can see, a little bit beyond the infrared, a little beyond the ultraviolet, and that comes from much hotter places than these star-forming regions.”

“In some cases, it comes from the surfaces of stars, stars that may be exploding, supernovae, which I’m specialized in, or galaxies, of course, which are assemblies of stars where the light is being emitted.”

“And even though they are very far away, the telescopes have a big collecting area, a big mirror. They gather a lot of light; it goes on to an electronic detector, which is 100 times better than the film we used to use and which measures the light and gives you an image. It sorts of ‘takes a picture’, sort of like the ones you’re used to.”

“These telescopes could be used to study planets, or planets around other stars, or stars, or galaxies, galaxies at the edge of the universe. There’s a whole range of kinds of things that you can measure with an optical telescope.”

Kirshner enumerates the ‘latest generation of telescopes’ in Chile.

There are the Gemini, twin 8.1-meter-diameter telescopes. North Gemini stands on the hill of Mauna Kea, the dormant volcano in Hawaii, South Gemini on the Pachon hill in Chile, close to Tololo, at 2.722-meters above sea level. They are called optical/infrared telescopes, observing the universe from the infrared or heat radiation through the optical light.

Then there are the 6.5-meter Magellan Telescopes, also at Las Campanas hill, followed by the Very Large Telescope, which, besides its self-explanatory name, consists of four telescopes named in the indigenous Chilean Mapuche language: Antu, Kueyen, Melipal and Yepun.

Working together with the help of other four auxiliary movable telescopes, they form the VLT, located on Paranal hill, south of ALMA, at 2.635 meters of elevation. It can “reconstruct images with an angular resolution equivalent to distinguishing the two headlights of a car at the distance of the moon,” according to their webpage.

“Those are the very big telescopes in Chile,” summarizes Kirshner. “But now, we are talking about building the next thing, the better one, the bigger one, which is this Giant Magellan.” Naturally a big enthusiast, Kirshner is eager to describe the Giant Magellan, or GMT, and to state it as ‘the new frontier’ in optical telescopes. He compares it to an eye in the sky or a telescope in the air.

“We’ll make the Giant Magellan big. It’s going to be roughly 25 meters across. It will have 100 times the area of the Hubble Space Telescope. But making the light into a sharp image requires doing more, and with the tricks that we use to correct for the atmosphere, it should have ten times sharper images. So, this would be fantastic. If we can make this work,” he adds jokingly.

The tricks are better known as ‘adaptive optics’, technology “that allows you to measure how the earth’s atmosphere is bending the light, and correct it, and you do that 100 times a second.” Kirshner and his colleagues are already using it at the current Magellan Telescope.

Kirshner shows a small space between his thumb and index finger and explains: “what you have to do is compensate for the wiggling effect of the earth’s atmosphere. If you look across a highway on a hot day, you see that there are images in the back, shimmering around,” -he waves his palms, “and that’s because the hot air is moving, and it bends light differently, at different times.”

“The same thing happens when you look up: there’s air between you and the top of the atmosphere. And the light from a star comes down through that atmosphere, and that wiggling blurs out the light. But...” He pauses here, “if you can measure exactly how the light is affected, by looking at a bright star, and then correct for it, by adjusting some mirrors, which is what we do, you can take out the effects of the atmosphere. You have to do it pretty fast, you have to do it in a hundredth of a second, and you have to do it with many moving parts.” So, thanks to adaptive optics, astronomers can see the sky from the earth “as being in space.” “And it’s a lot cheaper because you don’t have to lift the whole telescope into orbit,” adds Kirshner. Controlled by computers, deformable mirrors correct the distortion caused by the turbulence of the Earth’s atmosphere, in real time.

The seven mirrors that will be part of the Giant Magellan not only need to be deformable, but also have to be made with “exquisite accuracy,” according to Kirshner. And they are being made under a football stadium, the football stadium at the University of Arizona.

Back in 2012, Robert Angel explained to the National Public Radio (NPR) medium the ‘spin-casting’ method used in the making of the mirrors. “In the old days, you made mirrors by ladling molten glass into a mold.” With spin casting, “we just put these chunks of solid glass, lay them over the mold while they’re cold,” said Angel. “Then they heat the furnace

to 2,100 degrees Fahrenheit. At that temperature the glass chunks melt, turning into a clear, syrupy liquid that oozes into the mold. Having the furnace spin while this is happening encourages the glass to flow into the parabolic shape it will eventually become. It will stay in the oven for two-and-a-half months while it slowly cools down to room temperature.”

Once in place, the seven mirrors will collect the light for the GMT. A lot of light.

“This is a technological frontier. The instrumentation for telescopes is getting better and better. The ability to make those measurements, to very quickly figure out what you should do to correct for the earth’s atmosphere, and to go around that loop,” Kirshner traces circles with his hand, “a hundred times a second, is something where you need fast computers. You need good sensors, and you need a very clever design that takes into account how the atmosphere works. So, we are working on all that stuff, and we’re quite confident that that will work on the Giant Magellan Telescope.”

The Giant Magellan is being built near the observatory at Las Campanas.

But besides its impressive technology, the advancements it represents and its size, the key question around the Giant Magellan, as well as around any other great technological advancement, is why a telescope like this is needed.

“To look at the most distant galaxies in the universe, to see those earliest formations and to have some idea where they came from. But also closer to home, in our own Milky Way galaxy, we know that there are many stars, around which there are planets, orbiting. And a big telescope, like the GMT, would be perfect for learning more about what those planets are and even searching for signs of life on those planets. So, from the beginning of the universe, tracing matter all the way through to the formation of stars, and planets, and maybe even living things, the GMT will be a tremendous tool for discovery.”

Worries and hopes

“Chile has always been very hospitable to this scientific enterprise; and the fact that the best place in the world for doing this is Chile is something that people take pride in,” says Kirshner.

“Over the years, politics have been one thing, but the thing you notice as a visitor is the way the economic development of Chile has changed things a lot.”

“Chile is still a country that has a big range of economic levels,” he turns his hand upside down, like pointing to those differences. “But you can see that things have improved for everybody, public things are much better, the roads are better, the buses are better, there’s just much more going on.”

“Now, this is mostly good, but with economic development comes other activities, like lights. The city of La Serena is a lot brighter now than it used to be. These are matters of concern because, of course, astronomers appreciate the dark, and it is changing. So, you know, you have to pay more attention to the process of preserving these beautiful dark skies that make this a unique place in the world.”

“The other part of it is, in Chile, astronomy is very good, but mining is much more important. And one thing we are always concerned about is the development of mines in the neighborhood, and within the neighborhood means, you know, within a hundred kilometers.”

The positive side of mining in Chile, says the professor, is that nothing is too big to be able to transport it inside the country. “The big parts that telescopes need are smaller than the parts of trucks and cranes for the mines, so, there’s a whole world of people who know how to do these almost impossible things, like transporting huge objects up into the mountains.”

“What we worry about is that there would be a commercial mine set up too close to the observatory. They’re dusty; they’re noisy; they work all night and have lots of lights; and they are critical and powerful inside the country. Getting the balance on this issue right is something in which we astronomers need the help of the people of Chile.”

As I interview Professor Kirshner, snow falls over Cambridge.

“We’re very good at learning how to detect the presence of invisible things,” he says when I ask about the giant telescope’s amazing capabilities.

“I’ve been working a lot on the discovery of the acceleration of the universe, this mysterious thing. We thought we would measure the density of the universe by looking at the history of cosmic expansion. But of course, we found something completely surprising, which is that the expansion is speeding up over time, and we attribute this to the properties of dark energy.”

“Dark energy is a good-sounding name, but just because you have a name for something, doesn’t mean you understand what it is,” he adds with a smile.

“For the presence of dark matter, which is stuff that has gravity that we can’t see, we measure its effect. We see that it pulls on, say stars or other galaxies, and from that, we infer how much matter there is.”

“For the dark energy, it’s the other way around: it could be just a quality of space itself,” he shakes his hands as if there was something contained in between them, “or some fluid that’s in there, that’s transparent. But it affects, it makes the universe expand faster over time. It’s a little like looking out the window on a windy day. You see a tree moving, and you know it’s the wind. The presence of dark energy is something that we infer, from the effect that it has, but we don’t see the stuff itself.”

“So, really, we are just at the beginning of trying to figure out what dark energy is. By observing distant objects, you can trace up the history of the universe. The GMT would be very powerful for this sort of work. It will allow us to study what was going on in the early phases, where we don’t know if the supernovae back then are the same as the supernovae now; and where some of the uncertainties in our story for how the cosmic evolution has gone can be reduced. We can figure out better what the properties of the dark energy are, and to see whether it’s the cosmological constant, which is an idea that Albert Einstein had, or whether it’s a more subtle form of springiness about the vacuum itself.”

The mysteries that astronomers want to unravel today are not small. And at least part of their answers will come, once again, from the observations made in the starry skies of the Chilean Andes in Atacama.

CHAPTER 2

CHILE AS A MICROCOSMOS OF GLOBALIZATION



Geoffrey Jones, Isidor Straus Professor of Business History and Faculty Chair of the Business History Initiative at Harvard Business School, thinks that

- unless very, very carefully handled - every process of globalization contains the seeds of its destruction. He also considers that Chile, a country he has explored from various perspectives, clearly illustrates this cyclical process

Geoffrey Jones ~ Chile as a Microcosmos of Globalization

Geoffrey Jones, Isidor Straus Professor of Business History and Faculty Chair of the Business History Initiative at Harvard Business School (HBS), thinks that – unless very, very carefully handled – every process of globalization contains the seeds of its destruction. He also considers Chile, a country he has explored from various perspectives, clearly illustrates this cyclical process.

“I’m not a Chilean specialist, but I think in one way you could see the country is like a microcosms of globalization,” says Jones, sitting at his office in the Baker Library, one of the comfortable and well-maintained buildings among the green gardens of HBS.

Professor Jones has a quite cosmopolitan background: Born in Britain, teaching in the United States, he holds an Honorary Doctorate from the Copenhagen Business School and an honorary Ph.D. from the University of Helsinki, among other achievements. At Harvard, Jones investigates the evolution, impact, and responsibility of global business.

“My view is, during the last 200 years, the world has seen these waves of globalization. During the late 19th century and early 20th century you have the creation of a very global world,” says Jones.

“Globalization encourages wealth creation but also rewards winners. So, what you tend to see, as the globalization cycle persists, is an increasing maldistribution of the gains from globalization that leads to a lot more inequality. And this tends to produce, over time, a reaction which will close down globalization.”

“With the Great Depression beginning in 1929, governments more or less closed down globalization: there’s huge fall in trade, migration, capital flows. That last pretty much 50 years, until the 1980s, when you see the slow liberalization of China, and then Deng Xiaoping and a group of political leaders in the West, particularly Ronald Reagan in the United States and Margaret Thatcher in Britain, who liberalize and deregulate their economies,” continues Jones.

“Chile absolutely fits this model. Among all the Latin American countries before the 1920s, this was the most open to foreign capital, the most laissez-faire, the most liberal. And it partakes in this giant nitrate boom, selling its products to the global economy; it’s a full partaker. But after the Great Depression, and the Great Financial Crisis in 1931, Chile is hugely punished for being global: its markets collapse, its openness becomes a weakness, the country experiences a horrendous fall in incomes. What’s the reaction? It follows this general pattern: the Chilean government starts to close down the economy, put up all sorts of barriers to foreign firms, it becomes extremely inward looking. And that mirrors what’s happening almost everywhere else, actually perhaps to an extreme extent. And the consequences are much slower growth, stagnation, low productivity growth, but not the kind of shocks that

devastated the country in the global era.”

The next globalization wave, continues the professor, starting in the late 1970’s, found Chile under Pinochet and the ‘Chicago Boys,’ a group of Chilean economists trained at the University of Chicago under the influence of Milton Friedman, Nobel Memorial Prize in Economic Sciences and prominent advocate of free-market policies.

“Pinochet and the ‘Chicago Boys’ are all about ‘bye bye regulation state, hello market economy, neoliberalism, and everything else,’ and Chile becomes a pioneer of the new global economy in Latin America, even though other countries were less convinced of its merits,” affirms Jones.

“And Chile does well, as you do in the age of globalization. By 2000, its GDP per capita has passed that of Argentina, and that’s never happened before, Argentina was always been the richer country. But again, in a familiar pattern, what we’ve seen by this century is the identification of all the people who’ve been left behind, and this huge opportunity gap in education and many other things. And we see the same reaction again, one that mirrors wherever you want to look, whether it’s Trump in the United States or the Brexit story in Britain, or whatever. Those who have lost in the globalization process are starting to articulate that they are ‘losers’ and they want to say ‘bye bye globalization’ and ‘let’s go back to a situation where our jobs and incomes are safe,’ so we have equal access to resources.”

Jones has studied the nuances of this process from different perspectives and through different characters, from the ‘king of nitrate,’ John Thomas North to American conservationist Douglas Tompkins. From tycoon Daniel Guggenheim, to the current Chilean business elite. For Geoffrey Jones, not all roads lead to Chile, but at least some of them do.

The Guggenheims in Atacama: “Rich beyond avarice”

In 2012, Professor Jones and Felipe Tamega Fernandes wrote, “The Guggenheim and Chilean nitrates,” an Entrepreneurial Management Case for HBS.

Every year since the joint publication, Jones teaches the case about how the Guggenheim family exploited copper and nitrates in Chile, and the impact of their business decisions in the lives of thousands of miners and the Chilean economy as a whole, ‘eviscerating’ local politics, destabilizing the British bank that financed their operations, and affecting the whole financial system in London.

The Guggenheim case is part of “Entrepreneurship and Global Capitalism,” one of the most popular electives from the Master in Business Administration (MBA) program at HBS.

With this material, Jones confronts their students with questions such as: “What’s better for the world: all the exploited people in Chile, or an art museum in New York?”

Starting in Chile in 1830, the paper describes how “Chile passed with less damage (compared to other states) through the turbulent decades of the emergence of modern states in the nineteenth-century in Latin America.”

When the price of silver and copper, two important Chilean exports, fell sharply, the country’s economy stumbled. But in the mid of 1870’s, “nitrates came to the rescue.”

Nitrates were used as fertilizers and were the basis for dynamite – invented by Alfred Nobel in 1867. After the ‘War of the Pacific’ (1879-1883), fighting against Bolivia and Peru, Chile was in sole possession of the nitrate beds of Atacama, and by 1891, half of the Chilean revenue came from it.

British, French, German, American, and Chilean firms were essential to the transport, insurance, and sale of nitrates in international markets. The ‘colorful’ entrepreneurs of the era included British Colonel John T. North, who used the disruption caused by the War to buy up nitrate firms.

North, so-called ‘king of nitrates,’ led price cartels against the interests of Chile. When President José Manuel Balmaceda called for greater national control over nitrates, North was accused of conspiring with the president’s opponents who staged a violent rebellion. Balmaceda was overthrown in 1891. He later committed suicide.

The Guggenheims, Swiss immigrants to the United States and business celebrities, set their eyes on Chile because of the copper. By 1916, they owned two of the most important Chilean copper mines, Chuquibambilla – still the largest copper mine in the world – and El Teniente. “While in the United States the family was increasingly associated with arts, hospitals, charities,” in Chile they kept a highly segregated operation. At Sewell, the mining town of El Teniente, Chileans were forbidden to enter some buildings.

In 1924, when German manufacturer BASF had already created a synthetic form of Chilean saltpeter, Daniel Guggenheim took a rash decision: to enter into the Chilean nitrates industry, with a plan that would make the family “rich beyond the dreams of avarice.”

Guggenheim calculated he could reduce the costs of nitrate production dramatically, applying new technologies and persuading local authorities to lower his export duties. He raised \$130 million (\$1.6 billion in today’s dollars) from New York capital markets for the venture. The Anglo-South American Bank, one of Britain’s largest overseas banks, also backed the operation.

The plan didn't work as expected.

By 1929, year of the Great Depression, the Guggenheims owned half of Chilean nitrates industry. But the country was 'in the eye of the storm,' and by 1933, the until they reach business collapsed. 52,000 people lost their jobs. The inflow of foreign money into Chile practically halted. Criticism spread that the government was engaging in a scheme to relieve the Guggenheims of their debts at the expense of the nation. Civil unrest and political chaos unfolded.

The Chilean government issued bonds to rescue the nitrate industry. The Guggenheims took most of them. The British Anglo-South American Bank made money advances "on the understanding that the Guggenheims would issue bonds in New York and London to pay off creditors."

But foreign buyers declined to invest, and in 1931, when the Chilean president Carlos Ibañez left for exile in the midst of the crisis, investors ran to recover their deposits. In danger of failing at a time the entire British financial system was stumbling, the Bank of England rescued the Anglo-South Bank to avoid greater panic.

A new Chilean president, Arturo Alessandri, negotiated with American and British diplomats to salvage the investors, "but not to the point of driving Chile into a total collapse," presses the case.

About \$44 million USD in unsecured bonds, mostly in the hands of small private investors in the United States rather than the Guggenheims, according to the case study, were wiped out. In 1934, when nitrate prices began to stabilize, "the foundations of the liberal policies pursued by Chilean governments over many decades had been fundamentally shaken. The combination of relative openness and the sharp fall in the price and volume of exports had proved disastrous, creating the largest fall in incomes of any country in Latin America," the authors state.

Thousands of unemployed workers fled from the Atacama Desert, desperately searching for new employment. Vast piles of caliche, saltpeter layers, were left as testaments of a bygone era. The Guggenheim fortune remained strong, but "the reputation of financial genius surrounding their name lay rusting alongside the rail tracks in the Atacama Desert," the document concludes.

"The MBA course I teach talks a lot about the responsibility of business leaders, and the Guggenheim case is a particularly interesting way to explore that issue," says Jones.

"The Guggenheims are part of a story of how capitalism became discredited in Latin America,

with fateful consequences for the system as a whole. They had zero interest in their workforce or human rights abuses, and foreign companies were shut out of the country because of this bad reputation,” states Jones.

“But there’s another twist in the case, which I like to talk a lot about to my students: the Guggenheims, in simplistic terms, made a huge amount of money in Chile from enjoying low labor costs and exploitative conditions, and they used that money for philanthropy in the United States. In the 1920s, they virtually paid for the creation of the aeronautics industry in the United States. They were also huge art collectors, and their collections eventually went into the Guggenheim Museum in New York City.”

“So, for me the interesting question is what do we think of philanthropy that is paid for by extremely bad practices. What do we think of the trade off? What’s better for the world: all the exploited people in Chile, or an art museum in New York? The United States now has a bunch of philanthropic entities, like the Bill and Melinda Gates Foundation. Much of the funding for their foundation has come from practices that were not the best. They not as bad as the Guggenheims’, but were not the best. Is that a justifiable example of business responsibility? I don’t have clear answers to those questions, but I think those questions should be asked, especially at this moment when foundations are almost replacing governments in many ways, in health and educational efforts.”

An enclosed elite in an open economy

Geoffrey Jones holds the first business historian chair in the world, created in Harvard in 1927.

In that role, in 2007 he supervised ten video interviews conducted by then-fellow Andrea Lluch with some of the most prominent Chilean business leaders, offering rare insight into a traditionally closed from public-eye elite.

Chileans Roberto de Andraca, Roberto Angelini, Ricardo Claro, Rafael Guilisasti, Jorge Marín Correa, Andrónico Luksic, Eliodoro Matte, Horst Paulmann, Reinaldo Solari and Sven Von Appen were interviewed as part of the elite that flourished during the globalization wave that drove the steady Chilean economic growth of the 90’s. Argentinean entrepreneurs were also part of the project.

The testimonies became the base for Creating Emerging Markets (CEM) at HBS, a project led by Jones to explore the evolution of business leadership beyond the United States, including people from Latin America, Asia, and Africa. An average of 1,000 scholars visit the CEM website every month to access this unique collection of testimonies from people whose

public appearances are scarce.

“Chilean entrepreneurs want to deal with some aspects of the past,” says Professor Jones. Some of them are extremely explicitly talking about Pinochet doing good things, or the ‘Chicago boys’ coming to rescue Chile.”

These Chileans describe themselves mainly as Catholic, “certainly much more religious than in other places,” describes Jones. They are all men, “and that’s a huge problem in Latin America. We had more success finding women in India and Turkey,” explains Jones. “There’s a lot of work to be done, and needs to be done in gender balance because if you lose half of your talent, you’re completely handicapping yourself, it’s just a waste of talent.”

The interviews also show hints about the way an enclosed elite works. That enclosing, says Jones, “is a common problem in countries with big diversified business groups, and it tends to make entrepreneurial startups much more difficult.”

“It’s not just a Chilean thing; it’s general, you can see it in India too. These business groups spring a level of expertise and management skills, typically to an emerging market so that they can bring real benefits, but they do shut out new types of entrepreneurial ventures. That’s something people should think about: What can be done about that? The business groups itself could think if they want to encourage incubator funds or something, maybe in their own best interest, no? To encourage people who have new ideas?”

The interview transcripts are available upon request on the CEM website, and full-length video interviews are available to “qualified researchers” by contacting HBS.

“It struck me quite early on that there was remarkably little written about the business history of Chile. In so far as economic history was studied, it was studied regarding broader institutions, or macroeconomic statistics or something. But, because all these companies were so secretive and often family held, there wasn’t any information out there. So I had this idea that if history was going to be more important helping people not to repeat mistakes, we needed to generate the resources that would enable people to write history. So the whole idea with the project was not to pursue a specific research agenda but to generate resources that researchers and educators anywhere in the world, including in Chile, could access, so they could write the kind of history that would enable policymakers and business leaders to learn from the past. Because you can’t learn from nothing.”

Based on these interviews, Jones and Andrea Lluch analyzed the impact of globalization in Chile and Argentina in a collection of essays published in Spanish in 2011, and in English in 2015.

“The interviews with the Chileans and Argentinians show very clearly the importance of context in shaping business behavior and decisions. The Argentinians relate a story of survival against one shock after another in the face of a government that was always hostile to business and highly unpredictable. They talk endlessly about surviving day by day and strategies to deal with hyperinflation. And what to do about the elevated risk and whether to move out of Argentina. It’s a different story with the Chileans,” says Jones.

“Chileans also went through enormous turbulence as the economy moved from a regulated economy to a free market economy, under the dictatorship of Pinochet. So they had plenty of shocks too. But from the 1990s we see an increasing level of stability and confidence that (government and politics) would not change too much. And you can see that in their interviews: they’re more willing to plan, think about the future, they’re not living on the day to day. There are other differences too. In the Argentinean interviews what we see is a kind of dysfunctional business elite. Many of the interviews criticize each other and other members of the business elite; they criticize more or less everybody there. The Chilean interviews contain, I believe, no criticisms of other business leaders at all. In fact, what you see is a closely-knit type of business elite where people are acting in a collaborative fashion, in associations or other interest groups, and they are kind of comfortable about that. There’s very little of the kind of aggression that we see among the Argentinians.”

The interviews with Chilean entrepreneurs were made around 2008, “when Chile was roaring away,” says Jones. “So we caught them at this moment when many good things were happening. They had a huge amount of confidence, and in many ways, they were telling us they were proud of the businesses, of their innovation, and the ‘globalization’ they and Chile had achieved.”

“If we re-run the interviews now, maybe they wouldn’t talk so much, because now there’s this feeling again of business being under a lot of scrutiny, of society becoming very critical, legislation (regulation) coming their way again. So, I think we may have had a window of opportunity to get to these guys, and it may have closed down again because they have the feeling of criticism from the society around them.”

During the second decade of the 2000’s, the price of copper – still the primary source of Chilean income – fell. President Michelle Bachelet responded to social demands with tax reform, among other reforms. The business elite was on guard. “Chile Businesses Think the Good Times Are Over. Why So Glum?” asked Bloomberg Magazine in an article in July 2016.

“It’s the shock, right?” explains Jones. “Because the numbers are still good, low inflation rates, good credit rating, low unemployment, and very good rankings in things like the World Corruption Index. All of that is so much better than Argentina,” compares the academic.

“But the end of the China boom, the copper’s price story, and then the breaks of social protest about the inequality, there are things that had interrupted this period when there was a continuum of good news. And I think these bad news have a greater effect in Chile,” asserts the professor.

“You know, in Argentina, which has of decades of bad news, they wouldn’t be so shocked. Chileans were glowing in what has been achieved. It was an excellent story, the story of ‘the Chicago boys came, they did these reforms, and it all turned out very well,’ ‘our business is crucial.’ There were all these good stories, which have gone away. Remember: it’s relative perception, not absolute perception. Like the British, in absolute terms, they have done very well, but they felt very unhappy, so they get Brexit.”

To be interviewed in the CEM project, people have to be at least sixty years old, or more, because Jones wanted to capture their evolution over time.

“That means these lads all remember Chile before Pinochet. They remember Chile being poor, and they remember a Chile that was a quiet inward-looking economy, from the 1930’s to the 1970’s, so I think that’s probably something that’s crossing their minds. Just like in their deepest memories Argentinians remember when Buenos Aires was a world capital and they were the richest country in the world, Chileans remember being Argentina’s poor relative. It’s not just an imagined past, it’s a past that they understand, and they don’t want to come back to.”

“Chile grew at 5-6% for two decades maybe, something absolutely transformational, you know, that fast highway to the airport, all those others infrastructural type of things, all amazing. So then it’s a real shock, and for these people who remember the past, it’s a big shock.”

How are Chilean traumas from the past affecting their present and future?

“In an ideal world, people learn from history, and one of those clear lessons for business people is that they need to be part of society, engage in society, share their wealth. It’s obvious. Some of these people talk about the responsibility of businesses, some of them have set up foundations. That would be the real thing to take away from the past. With globalization, we seem to be doomed to repeat mistakes. So, philosophically, I think my function is to collect and share information. I think a place like HBS, can have some social responsibility to collect and share that information and that’s how I conceive this project. There’s no attempt to portray these people as heroes or not, that has to be left to the people who read these interviews. Those who read them can see their silences; can see what they are saying and what they are not. I think my contribution is to provide some materials to let people have that discussion.”

Tompkins, the Chilean path of a globalized conservationist

In 1968, Douglas Tompkins, founder of North Face, and Yvon Chouinard, founder of Patagonia, drove together from San Francisco to South America. From that point, they would take alternative pathways to a shared goal: a more sustainable world.

Tompkins would start there a much broader trip, determined to conserve one million acres of natural landscapes in Patagonia, even against the wishes of some of the local population and Chilean authorities. He would not live to see the end of his project, when almost half a century later, his widow Kristine McDivitt would make the most significant private donation to a government, offering these million acres of land to become part of the Chilean national park system.

In 2016, Geoffrey Jones decided to compare the alternative roads of Tompkins and Chouinard to conservation efforts. He included his findings in his book *Profits and Sustainability*, which he describes as “an unusual book of history,” one that focuses on the historical role of business in our environmental crisis, “not on causing it, but on trying to mitigate it.”

Tompkins and Chouinard are moguls that represent two different systems of what a ‘green’ entrepreneur should do. “Chouinard stayed with her company, Patagonia, and is going for incremental improvements to try and make the business more and more sustainable. Tompkins went from The North Face to Esprit, and then in 1999 sold his businesses and started buying out forest. He argued that our economic systems are so convoluted, that even if you are a sustainable company, you are still taking part in an unsustainable system,” he summarizes.

The Deep Ecology movement influenced Tompkins’s provocative ideas. “He thought the best he could do was to try and save a lot of trees. And he went downright to southern Chile and then into Argentina to do it,” continues Professor Jones.

In March 2017, National Geographic described the harsh landing of Tompkins in Chile: “Initially, locals bristled at what they considered a foreign land grab and at the couple’s successful opposition to a massive hydropower scheme. Some castigated the Tompkins for taking land out of production—logging and sheep and cattle ranching—and eliminating the jobs those industries produced in favor of restoring what the Tompkins considered degraded grasslands and forests. As puma populations in the region have crept upward, so have complaints from ranchers who have lost sheep. Over the years, relations between locals and the Tompkins improved as their foundation involved the community in planning and created more jobs.”

Tompkins purchased at least 1.5 million hectares of land in Chile and Argentina, which he

converted to protected areas and national parks.

“He received a lot of criticism, right, that he was this like ‘weird guy’ with this particular view,” describes Jones. “But we’ve already done some rough calculations about how much carbon dioxide he took out of the atmosphere, doing that, and it’s quite a proxy thing, but it’s a lot. Our experiment was to compare these two strategies and saying which one is better for the world. Of course, it’s a kind of strange question because the Tompkins history is not replicable. You can’t have rich people buying millions of acres, and then plant trees, while there are thousands of companies, which, if they started doing things more sustainably, could probably amount to a much more scalable thing. But Tompkins publicly say, ‘you got to move a lot quicker.’”

The book, written by Jones in collaboration with Ben Gettinger, concludes, “the Chouinard strategy represented a better practice of green entrepreneurship, which, if widely adopted, might markedly reduce the environmental impact of businesses. The Tompkins dual strategy of exit from business and application of entrepreneurial skills to conservation resulted in large environmental gains, including sequestering and storing an estimated 80 million tons of carbon.”

Jones warns that Tompkins “has been criticized as a typical American imperialist who turns up, buys all this land and aggressively removes villages to make them look good and everything else. But it’s worth pointing out that from the beginning, he and his wife said they want to give the land back. And it’s worth pointing out that in 2017 his widow did give back all of the lands they had bought and reforested and repopulated in the largest ever gift of territory to a government. And it has prompted the Chilean government to make a lot more of their federal lands into conservation areas. So this entrepreneur effectively created a giant conservation area, which saved numerous species and did a good contribution to fighting global warming.”

Why Chile?

“Because he could,” answers Jones. “Because in a lot of places foreigners cannot buy land, so that was quite important. He was this outdoors guy; he went to southern Chile and it fitted with his lifestyle. He didn’t want to go to Thailand and do this, he liked this sort of landscape, and everything, so I think he fell in love.”

Tompkins passed away in 2015, in a hospital in Coyhaique following a kayak accident at General Carrera Lake, part of the same landscape he was ferociously committed to protect. “One strong thing I take from that is that entrepreneurial skills are critical in making the world more sustainable. It could be that our entrepreneurial skills are best employed, not in business, but in figuring out other solutions to sustainability issues, whether it’s this kind of direct conservation story, or in education, or some other areas,” proposes Jones.

Winners, losers and lessons

“It’s strange, right?” sums up Jones in our final conversation. “I wasn’t looking for Chile in particular,” says the researcher. But he ended up finding a generalized pattern in Chile. And from that, some challenges and risks.

“One of the troubles of the globalized world is that if you’re a relatively small political entity, you’re very vulnerable. Chile was totally dependable on the world wanting a bunch of nitrates, and then a substitute was made, and the whole world economy went down, So nobody wanted any nitrate anyway, and Chile was stormed out.”

“To deal with this vulnerability is to test how strong your institutions and society are. Some kind of small countries, some of the Scandinavians or Switzerland have survived in turbulent worlds, primarily because they have powerful institutions and strong social capital and human capital. They’ve been able to find out a role for a small place in a global world, and they’ve been able to survive when that global world goes down. The question is if Chile is in that group, if it has got that level of institutional and social capital, and human capital development to survive.”

How do we better prepare for turbulent times?

“One of the few things that history can demonstrate is that human capital development is related to economic development,” says Jones. And he tells a little story about Sweden.

“In the 19th century, Sweden was one of the poorest countries in Europe, or indeed in the world, but invested very heavily in education. They came to be called ‘the impoverished sophisticated’ because by the end of the nineteenth century they were still poor, but highly educated. But then, they developed industries depending on technical skills. Because with a highly educated labor force, you can upgrade your industries.”

“In a global economy, if it lasts, there’s absolutely no future in the kind of low skill type of labor force,” cautions the academic.

“The future is in a much more educated, highly sophisticated type of force. In a small country like Chile, that’s the obvious place to go, because commodities always have booms and busts, and commodity-dependent economies are always highly vulnerable ones. The country that has that kind of informed type of industries, a kind of diversified base, has a lot more of potential. So yes, education for school kids, secondary schools, high schools. That’s the level where you need people to receive good education skills, and that’s probably where Chile is stumbling”.

Chile should also worry about its social imbalances, just as the whole world should, thinks Jones.

“Globalization inevitably leads to growing inequality. The end of the first global economy was not caused by bad luck; it was because there had been a great deal more losers than winners. A new round of globalization started in the ninety nineties, and now we have exceptional levels of inequality across systems, in Chile or China or the United States. You have these massive levels of inequality within countries, but you also have massive inequality between successful and unsuccessful countries. That’s why you’ve got millions of Africans trying to get into Europe, or millions of Central Americans trying to get into the United States. So I think we have a trend very similar now to the 1900’s and these huge numbers of ‘losers’ are very angry. Whether it’s ISIS, or Putin, or Brexit or Trump for that matter: people are getting more sort of hostile to the existing system and demanding de-globalization.”

Frustrations will not produce a shock by themselves, Jones specifies, but they can feed extreme political ideologies and social fragmentation. Then, all you need is a big shock – a financial crisis, a terrorist attack – and the global system could be “shut down again.”

“So, the trick to going forward in this second globalization – and it may already be too late – is for businesses to make sure there are more winners than losers. That’s part of my big message about learning from history. Because you could say that history is dead and gone, but it’s not. It’s alive.” The good thing is we never stop learning from it, and from every corner of the world.

CHAPTER 3

REAL LIFE TEACHINGS



Katherine Merseth, Senior Lecturer in Education, founder of the Harvard Children's Initiative, the School Leadership and the Teacher Education Programs at the Harvard Graduate School of Education, collected in Chile the experiences of schools principals working in a diversity of communities. Their experiences, she found, apply in similar ways as much to a school in Santiago, to one in Detroit.

It was a weekday in October of 2011, in the Chilean capital, Santiago. Katherine Merseth was in her hotel room, possibly on the 8th floor. At that altitude, most of building windows are permanently shut. The smell of the pepper spray abundant at street level probably did not reach that floor. The cries of the students demanding public, free and quality education for all and a solution to the millionaire debts that drag on their educational expenses may have been but drowned, unintelligible noise.

As in many other similar protests in Chile that year and before, some of the protesters were wearing their school uniforms: blue dresses for the girls, gray trousers and a tie for the boys, all with white shirts. From a distance, they resembled penguins. For this reason, they are called Pinguinos ('Penguins'); and the social movement they started in 2006, "the penguin's revolution." In 2011, they came back to the public sphere with full force.

That specific day, Professor Merseth remembers, the 'Penguins' were confronting police authorities, as had happened in previous demonstrations. Katherine Mercer, Harvard PhD in education and Master of Arts in secondary mathematics teaching, looked down on the street below. In her many years serving as a curriculum developer, teacher, and administrator in K-12 schools in the United States, she had never seen something like this before.

"I could see the demonstrators blocking an intersection ahead, and what looked to me like an army tank was moving down the street," she remembers a few years after the incidents. "All of the sudden, the tank or the police vehicle started blasting a water cannon and sprayed the protesters. I had been told that the students were protesting, but I had never seen that kind of student-organized civil disobedience before."

The Harvard academic was taken aback and surprised at first. "Then I thought this was something good."

"I'm not a big proponent of blocking traffic or in any way harming others," she warns, "but I think that students need to have agency in their learning. Some people may not agree with me, but I think they should have a voice, among many voices, in determining what they learn and how they learn. I know it's a contentious issue, and I'm not supporting any violence, but it was quite affirming seeing students who cared so much about what they're learning to take to the streets and demand more."

That day in Santiago "left a mark in my memory," Merseth says.

Different schools, same dilemmas

It was not the Chilean student movement that brought Merseith to Chile. Yet, she had the chance to witness the force of the student's protests wave. These nationwide protests began in 2006 and resurfaced in 2011 in the country, igniting an ongoing public debate about Chilean education. Some of the most prominent voices in those protests later became Congress representatives, and an educational reform was approved in 2017, under Michelle Bachelet's second government, though it was only partially supported by university and high school student leaders.

What did bring Merseith to South America were the experiences of school principals, which she wanted to compile in a writing project. People like Iván, director of a vocational – technical – school in conflict for trying to convince his board that at least some students should have the chance to enter university level education. Or Eugenia, a principal in a public school where parents worried that the presence of kids with special needs in the class would take too much attention from the teachers, which would lead them to neglect other children. Or María, working in a disadvantaged neighborhood with high rates of drug trafficking, who needed to support the school teachers, but still demand good results from them. Or Juan, who was trying to forge a bond between students from Chile and Peru in a technical school. As the kids barely interacted with each other, the director had to negotiate events like national holiday celebrations.

Ivan, Eugenia, Maria and Juan are not their real names, nor those of the other directors whose cases were selected for Katherine Merseith book. But all of them represent the actual experiences of people who deal with great challenges on a daily basis that many societies in different parts of the world have yet to resolve: What is the role of education? How can we turn it into an effective tool for the well-being of all?

The decisions taken by these persons directly affect students and their families, and they also impact us as communities. Education brings forth cultural forces that help us define ourselves. Nonetheless, many important questions around this essential process are not always addressed, like: What is the impact of poverty on learning. Should excellence be sacrificed in favor of equity. To what degree should schools reflect the culture or ethnicities of their students. What is realistic to expect from a teacher with 30 students in a classroom.

The idea to collect case studies in Chile came up in a conversation between Merseith and Violeta Arancibia, then Director of the Chilean Center for Training, Experiment, and Research in Pedagogy at the Ministry of Education (CPEIP). The proposal was to assemble teams of school principals and universities to develop a book of real-life case studies to be distributed among education faculties. Casebooks are commonly used in business schools,

and not as much in education. As an expert on school leadership and teacher development, Merseth got the funding to for the project through one of the first grants of the Harvard-Chile Innovation Initiative (HCII) program.

As “Confronting Challenges: Case Studies for School Principals,” the publication that came out from this project highlights, “school directors, principals and teachers from across Chile came together and donated their time and energy over the course of nearly two years to produce the cases.” Working with CPEIP and assisted by James Honan, Senior Lecturer at HGSE, thirty narratives were developed between the principals and the Chilean-Harvard team of experts. Fifteen were selected.

The trick for the project’s success, for Merseth, is that these are real stories about real Chilean schools. Schools “both suburban and rural; upper class, middle class, lower class; from the north of the country to the south,” as she describes, which can resemble the daily life experiences of teachers and school directors working in different places, under different circumstances, in different parts of the world.

“The organizing principle of these cases was a tough, difficult decisions that a principal needed to make as the leader of the school; struggles that they face every day. The cases were originally written in Spanish; they needed to be translated into English for me to edit them. What was fascinating to me is that I was traveling to Michigan, in the middle of our country, and I was able to use one of those cases with school principals in Detroit. I didn’t tell them where the case was from, or who wrote it, but after a few minutes of discussion, one of the school principals raised her hand, and she said: ‘This happened to me yesterday.’ So, yes, they are Chilean, and there are important aspects of the specific culture on them, but there are other general issues that a school principal in Detroit can say: ‘Yes, I understand that.’”

In times in which traditional educational models are being challenged, and new answers are sought for education to adapt to a changing world, school directors have a crucial role to play. Their potential impact on teachers and students is enormous; and so is the pressure they face.

“The cases tell us that a school principal is what I would call a manager in the middle,” describes Merseth. “They must manage up from the government, the owner, to the board, and they have to be to the same degree differential, differ to them. They have to manage down, to teachers, to students, to people under their direction. And then they need to manage across, to other school principals, to their communities, to the community’s elders, to the families. So they are doing all three directions of management, and it’s hard because if one of the governments has a policy that you don’t agree with, you have to do it regardless. And what if the community thinks you’re not doing the right thing for the children? Or what if the teachers revolt and say, we don’t think you’re good a manager. School principals are really in a pressure cooker; it’s a very hard job.”

There is a broad diversity in Chile that interests Katherine Merseeth, and that is expressed in the cases: “We have, first of all, diversity of regions, so people were from the North, and the South and Santiago. And then there’s a diversity of rich, well-resourced schools and very poor and impoverished schools. And then there’s a diversity of location, rural versus urban schools; some are private, some are public, some are all-girls, all-boys. They vary enormously across all of those characteristics. Those are the schools of Chile.”

Within this wide variety, school principals are facing some common issues: managing multiples stakeholders, competing interests, different education values, cultural values, social values, economic values, class differences. “All of those elements are present in the cases, and probably present in the schools,” Merseeth thinks.

In a globalized world, cultural integration is one of the challenges that the school community must address. In one of the cases, Merseeth describes, “there’s a secondary school in Santiago where about 30% of the students are from Peru and 70% from Chile. The students, they don’t like each other; they don’t trust each other; they don’t get along. And the school principal is faced with a challenge from the Peruvian students: they want to celebrate their Independence Day, they want to sing their national anthem.”

It is a contentious issue in a school in Santiago. Chile and Peru clashed in the Pacific War (1879-1883) and, for decades, schoolchildren on both sides of the border have learned their distinct versions of that conflict.

“There’s an issue of national pride here, because, as I understand, there’s a deep history, and sometimes animosity, between the two countries,” describes Merseeth. “And so the school principal is faced with this decision, which is a classic dilemma: he can’t win. He can’t ignore the Peruvians; he can’t completely embrace the Chileans.”

“We face similar issues here in the United States with recent immigrants coming into our country. And it’s a very divisive question: Are schools responsible for educating them? I think the answer is yes. But then the more difficult question is: Do we honor their culture, the Peruvian culture in this case? Or do we want to make them more like Chilean students? It is challenging because, I believe personally, that we do want to honor the culture and the diversity of the students who come and sit in our classrooms. But there are difficult moral dilemmas that school principals face as a product of our global world, where people are moving across the artificial national borders and coming together.”

There are no clear answers in this one or any of the other collected cases, which are meant to be support material for teachers and principals. “This is not a research study, so there are no results or findings,” says Merseeth. But there is something equally valuable: “It is the people

who do the work speaking about their work. And I think that's important."

Considered as individuals with a fundamental role in improving educational outcomes and climate in school, principals, in Chile as in many other parts, feel at least some time questioned in their role.

"Working with them I felt them feeling attacked, and not supported, and criticized, in part because there is a lack of clarity about what their role is. Are principals meant to be instructional leaders helping teachers teach? Are they meant to be financial managers, worried about where the money goes? Are they meant to be the public face of the school to the community? A lot of times it's not clear what they should be doing, or what they ought to do, and so they feel they're expected to do everything, and can also feel they're not doing anything well."

As a teacher herself, Merseith has a clear view about the role of a school principal: "Instructional leadership. To make sure that children are taught well and appropriately. Because if we don't get the instruction correct, if we don't get it right, what's the use? What you're asking me is what I think the purpose of school is, and it's instructing young people in how to think, how to collaborate and how to solve problems to become participating members of society."

For Merseith, it is all about the teaching. Teaching is her way.

Teacher; daughter, granddaughter of teachers

Katherine Merseith grew up in a tiny town "of five hundred people. We were 23 in my high school class, so there were under 100 students in the whole high school". She then studied Math at Cornell University, and "for probably the first 30 years of my life I believed it was all concrete: I needed to teach you how to get the answer, not why the answer. It was the way it was. And when students said why is that the answer, I would reply, 'Don't worry, just do it.'"

From her undergraduate education in mathematics at Cornell, she continued her education as a Master's student in mathematics in Boston College; and then earned a Master of Arts in teaching secondary math, and a Doctorate Degree in education from Harvard.

On that path, she understood the power of the 'why' in mathematics, as in other areas: "when I began to work with teachers I realized that the students' retention of that knowledge, of direct, frontal instruction, is brief. They didn't remember it six months later. But if you understand why something works, then you'll never forget it."

She is not only passionate about mathematics. Merseith was the principal investigator of the Mathematics Case Development Project funded by the National Science Foundation (NSF)

and served as co-principal investigator of the Teacher Education Addressing Mathematics and Science in Boston and Cambridge Project, among other related initiatives. In 2003, she edited another book based on case studies, “Windows on Teaching Mathematics: Cases of Secondary Mathematics Classrooms.”

In fact, real-life cases on the teaching of mathematics brought the Harvard Ph.D. for the first time to southern South America, more than a decade ago.

“My first visit to Chile was quite exciting. It was in the context of being a math teacher, and writing cases about math teaching. I worked with a professor of the University of Chile who wanted to use case studies to learn with his teaching fellows different moves and techniques in teaching. It was inspiring to see that issues that I had seen in the United States about teaching mathematics were the same issues and the same dilemmas that teachers faced in Chile.”

Those cases were “grounded in mathematics, but also on pedagogy about how we teach, how we assess, how we determine where the learner is and what to do. I think growing from that experience, having been a math teacher and now working with school principals, the common aspect that I see is that a teacher is a leader. The learning of students moves forward because of the planning, the directions, and the interactions, the efforts that a teacher makes. And this I believe is identical to the role of the school principals. It is on a different scale, it is a different context, but school principals need to convince, to conjoint, to push, to pull, and that’s what teachers do. So the roles are quite similar, but in a different context.”

As an expert in math teaching, Katherine Merseith is a leading figure in a field where women are still underrepresented. Despite the extraordinary contribution of some women to the discipline, mathematics, both in the academic and labor areas, is still widely dominated by males.

“I think it’s cultural. Women are expected to say ‘I’m not good at math,’ so it’s transmitted to our daughters. Culturally, it’s okay to say ‘I’m not good in mathematics,’ but you would never say ‘I’m not good at reading.’ It’s just culturally accepted. And the teachers, women teachers, and many teachers are women, they don’t like math or think they are not good at it, so they tell their students ‘Oh, I’m not good at this.’”

Merseith did not get that memo. “My grandmother was a teacher. She taught in the late eighteen hundreds. I have her teaching certificate in my house, framed. My mother was a math teacher. I don’t know why, but she was. My mother died when I was 15 years old. And 15-year-olds don’t talk to their mothers... But from a very young age, I received a different message, which was women could do math, it’s fun, it’s exciting. Math was fun! I used to play with numbers; numbers were my friends.”

Finland, United States, Chile

In Chile, as in other countries, there is not a more contentious debate than the one about quality education and its purpose, financing and outcome measures. The role of the school and teachers is always in discussion, as families renew in each first-grade student their hopes for a better future. And although many believe in education as the great engine of social progress and its role in striving towards a more egalitarian society, teachers are still underpaid and undervalued. For Merseith, this is a paradox.

“I talk to my students about it. Let’s imagine it’s the first day of school. Across countries there are parents like you, taking their four or five-year-olds up the steps to the school. And you’re giving your child to that teacher. There’s nothing more important to you than that child and your child’s well being, and you’re saying: ‘here, take my child.’ Then you turn around, and you walk away. And you have put your trust in the school in that teacher. You trust that, right now, your children are well taken cared of.”

Those same teachers in which the community places such high expectations are the ones who feel – as in the cases gathered by Merseith – challenged and over-criticized.

“I gave a talk to the parents of Harvard students,” remembers Merseith. “We were in the Sanders Theater, and I asked them all ‘I like you to take a card and write down a name of an important teacher.’ Because everybody can name one person that was important in their education. And then I said, ‘alright, you know how important that person was to you. Now imagine if in 15 years, I have the auditorium in Sanders Theater full of Harvard students, and I ask them to write down the name of an important teacher. Imagine if they write down your son or your daughter’s name.’”

“I think we tend to think of that special teacher as an exceptional person, someone unique. People say about those teachers that they hold them in great esteem because they were so good, but the teaching profession is not held in the same level of esteem. Everyone, anyone you ask in the street does remember that special teacher. And maybe even if we don’t have one, we start looking for one in our memories, and we find the person.”

As is common when discussing education policies, Merseith refers to the Finish case. Warning that Finland is a “smaller, more homogeneous country, with a story of a socialist government that managed education directly,” she praises the role teachers have in the country. “In Finland teachers are considered very, very high in the hierarchy of society. And that’s in part because of their government. They have a system where they train as many teachers as they need. So if they’re looking for one thousand teachers, they only admit one thousand students to be teachers. It’s competitive, it’s fully paid for, and it’s like winning a competition. It has prestige.

It's like 'I'm a teacher because I was selected to be one.' It changes the paradigm entirely."

Another pivotal change in education, Merseth elucidates, is the way educational outcomes are evaluated.

"Schools are typically evaluated in concrete, discrete pieces of information. What is eight times four, for example. They're not evaluated on the children's thinking about solving problems. And this comes from the fact that our testing system is not robust. It's very hard to test problem solving or collaboration skills. Do you collaborate well or not? That's harder to say. We are all over tested," she says, and refers to countries like the United States and Chile, "and we are tested on the wrong things."

Standardized tests, of which Chilean education heavily relies on, "are the problem," according to the expert. "We need to assess, we need to know how we're doing, but we have the wrong tools. It's like using a hammer to screw. We need a screwdriver to be able to tell whether or not it's working. But the mechanics of designing non-standardized tests are very expensive; they're very hard to design. The Programme for International Student Assessment (PISA) moves in that direction. And the United States does very poorly on it because we're not teaching students how to think."

Merseth believes in finding a place in the education system to make an impact. And she chose principals. "If we get the school principals right, then the teachers will teach more effectively. Because it's a very hard job."

"We ask so much from teachers and school principals, and we give them so little support," she concludes.

Education before and after Google

Schools not only need to teach students to think. They should also prepare the young for a changing, complex society. Another reason why "teaching concrete facts now makes no sense," according to Merseth.

"Because we have no idea what you will be confronting even 20 years from now. Who would have thought that Google would transform how we find knowledge. You know I'm old enough to know that there was a time b.g. – 'before Google,' – and to know that how we think and act has been completely transformed by it."

"Instead of learning a fact, we need to learn skills that enable us to look at what Google says and evaluate it. If we don't train students to do that, they will take everything on Google or the internet as a fact."

Merseth is part of a generation trained to find knowledge and sometimes create it themselves. “But I never had to assess the knowledge; I didn’t need to assess if that was good knowledge or not so good knowledge.”

Still, the fundamental question, the one rarely examined based on Merseth’s experience is why do we have schools. What do we want them to do? What is their purpose?

“When you begin to explore that question you realize that different, very reasonable, thoughtful, intellectual supportive people have different ideas. For one person the baseline purpose of schooling is economic: ‘we need to give you a job, we need to make you able to support your family.’ Another person may think that purpose of education is to simply gain more knowledge because learning is wonderful and fun and life is beautiful if you can read books. Someone else may say – certainly a perspective more present in the present time – that education’s purpose is the assimilation of groups coming into a country or region. Yet others say that the ultimate purpose is the individual student, making them feel good about themselves, feeling agency, feeling empowered, and so.

“All of these purposes that I’ve talked about exist in the minds of teachers, school principals, school leaders, parents, and students. And it’s really important for those different views to surface if you’re leading a school. Because if half of your faculty wants to go this way, and the other half of the faculty wants to go this other way, you have a problem.”

“This is why I believe in school principals who are leaders in the school and should be instructional leaders as well: the need to bring to surface this idea about the purpose of schooling in each school community.”

Thinking about the purpose, says Merseth, addressing that fundamental question is the way to move towards more effective schools.

The experiences of Chilean principals are a contribution to that conversation.

“I think there are some generalities that all school principals, whether I’m in southern South America or Northern Europe, face. But the South Cone is, to my understanding, a region that’s rich with cultural heritage. A region that has traditionally had different groups that have come together through artificial, geographic boundaries. And I think we could learn a lot from the region, even though the United States is a much larger country, I think we could learn a lot about how to manage those differences, how to mold a country and its education, how to bring people together for a common cause.”

CHAPTER 4

LESSONS FROM A COUNTRY IN THE RING OF FIRE



Doug Ahlers, Senior Fellow at Harvard Kennedy School Ash Center has seen disaster and recovery in places like New Orleans and Tibet. He is an expert who believes in the strengths of communities like the ones he has worked with as co-founder of Recupera Chile, an initiative dedicated to offering support for the Chilean towns affected in 2010 by an 8.8 earthquake and a tsunami.

Strawberries.

An anecdote about strawberries could illustrate part of Doug Ahlers' work and the lessons he has learned in Chile. It's the story of the funding he obtained for a mother to buy some strawberry plants, and her firm decision not to do that. The woman bought a pig instead.

It happened in Perales, a fishing and farming village with about five hundred inhabitants on the southern coast of Chile. In 2010, an 8.8 earthquake struck the country. The epicenter was located in the Pacific Ocean, a few kilometers from the town, and it triggered devastating tsunami. In some areas, a few standing walls marked the places where the houses of Perales once stood. In others, nothing but rubbish was left.

Ahlers, Senior Fellow at the Harvard Kennedy School's (HKS) Program on Crisis Leadership and former Senior Fellow at the Belfer Center, got to know Perales as co-founder of Recupera Chile, a Harvard-led collaborative, multidisciplinary program to support some of the communities affected by the earthquake and the tsunami. The program focuses on three towns with populations between 500 and 3,000 inhabitants: Perales, Dichato and Cobquecura.

Ahlers knows about natural disasters – about tsunamis and earthquakes, but also hurricanes and floods. He has been teaching, consulting, and working on disaster preparation and recovery in several countries, including Haiti, Indonesia and Japan; and in cities under threats of future natural catastrophes such as Christchurch in New Zealand and Los Angeles in the United States.

A few years before visiting Chile, in 2006, Ahlers had the opportunity to become directly involved in the disaster recovery process of New Orleans with the Broadmoor Project, a Harvard initiative to “support, observe and learn” from the community of the historic district of Broadmoor, flooded during Hurricane Katrina. After the flood, part of the area was ‘green dotted’ by city officials, indicating it would be razed and made into a public park if 51% of its population didn't return to their homes. The residents, who had a long tradition of activism and community participation, were determined to stay and revitalize their district. Within that context, Ahlers worked on the design and implementation of a strategy for community-based recovery. Dozens of Harvard students volunteered for the program. He documented the successful process, building a best practices model for recovery and pre-disaster planning. This particular model was then tested in Chile.

In 2011, one year after the earthquake, Harvard President Drew Faust visited the city of Santiago, where the David Rockefeller Center for Latin American Studies Regional Office resides. That same year, Recupera Chile was created. Ned Strong, then Executive Director of that office, and Program Officer Marcela Rentería – who would succeed Ned – assumed the leadership of the multidisciplinary effort. In January 2012, Ahlers landed in Chile for

a two-week consultative project including three Harvard teams and faculty members from the Harvard Graduate School of Design and the Harvard Medical School. It was the first of many visits. Working with Chilean public and private entities, Recupera Chile became an “umbrella” for an integrated disaster recovery strategy based on the strengths of local communities and focused on the three aforementioned towns.

Ahlers describes it as “a huge area of devastation. The earthquake in Chile was the sixth largest earthquake in recorded history. Regarding the percentage of damage, in regards to the percentage of GDP invested, it was one of the most massive levels of destruction and reconstruction for a country, considering its ability to absorb and handle it.”

“In the coastal communities, a tsunami wave inundated dozens of towns; it wiped them out. Dichato and Perales were virtually destroyed,” he details. “Cobquecura was spared from the tsunami because it was closer to the epicenter, but it had a lot of adobe – clay made from sun-dried earth and straw – buildings, and adobe tends to perform very poorly in earthquake shakings, so the majority of the town collapsed. Fortunately, people were able to get out and survive, and no lives were lost in any of those three towns, but what the evacuated locals came back to was complete devastation.”

Part of the Ring of Fire, the most seismically vulnerable ground on earth, based on a three-plate junction – the Nazca, the South American and the Antarctic plates, – Chile is well known for its disaster preparedness. But the 8.8 quake recovery was difficult.

“A tsunami wave takes everything,” explains Ahlers, providing a better understanding of the challenges faced by the Chilean coastal towns. “So if you’re a farmer, it takes all your crops. If you have cattle, or cows or chickens, they are all swept out, and your farming tools, your household items, et cetera. So you’re starting with nothing. Communities have to rebuild from new fishing boats and fishing nets to new cooking stoves, to new strawberry plants or potato plants, whatever the farmers are raising.”

“When we first went to work with the communities, the government was doing a very good job on rebuilding the physical infrastructure: roads, bridges, water systems, schools, as well as rebuilding permanent houses,” Ahlers says. Then he stressed that: “Chile is very progressive in the world in feeling that governments have a responsibility to put a roof over everyone’s heads. Under other governments, including the US government, it’s more the individual who is responsible for the roofs over their heads, except at the time of crisis.”

Despite the government’s efforts, “there were still people displaced in camps, people living in temporary housing, the mediaguas, which are essentially sort of wooden shacks that are either put on the side of your property or in camps, and the largest displaced camp in the country was in Dichato, with about five hundred families living in pretty much horrendous conditions,

with security issues, sanitation issues.” To recover, people needed to start from scratch.

The power within communities

Recupera Chile implemented a “community-based approach to disaster recovery.” The idea behind this type of recovery is that, even under the most challenging circumstances, the power to recover lies within the same people directly affected by the catastrophe.

“It’s very similar to recovering from the loss of a loved one, the death of a spouse, or a child. You have to go through the grief, process the loss, and then rebuild yourself. You could never say that a counselor or someone from the outside could ever ‘make someone recover.’ People have to come through and recover and rebuild their lives and come through the grief and the trauma themselves. A family or an entire community goes through a very similar process after a disaster. A community has to rebuild, truly rebuild itself.”

“The community itself has many strengths,” says Ahlers. “Sometimes they just need a little help over a technical issue to build on their internal capacities and capabilities, and solve the problem by themselves.”

Ahlers describes one of his experiences working on the recovery of Chilean fishermen.

“When we got to Chile, a lot of NGOs had come through and had given the fishermen fishing boats. But they failed to give them fishing nets, or to deal with any of the other issues. In one of the towns, Perales, we found that the tsunami changed the schooling patterns of fish because earthquakes and tsunamis change the subsea environment. So, despite having new fishing boats and new fishing nets, the fishermen couldn’t earn a living off fishing. So we realized they needed fish finders, sonar devices. And just giving a single fish finder to the community was enough to help them restore their fishing patterns and restore their livelihoods.”

The point is, Ahlers says, “you can’t just go in and solve a problem in isolation, you have to work with the community and understand all of their problems and all of their needs and work with them on the development of their recovery.”

Of course, there’s a lot of space for expertise and technical assistance after a disaster, he explains. But one of the things he has learned from working with communities is “that it’s very easy for experts to think that they have all the answers and know exactly what a community should do. But when you get in and start working with the community,” Ahlers adds, “it’s a very humbling experience because you learn that the community knows better about itself and its needs and capabilities and strengths than we, as outsiders, do.”

You never rely solely on your expertise, Ahlers clarifies, because if you want to boost the recovery process, you have to engage with the community, listen to them and understand, “truly understand,” their needs, their strengths, and capabilities. “Then try to plunge your expertise into that, to help them further those strengths and pre existing expertise.”

Prior to Recupera Chile’s founding, it is important to go back to Hurricane Katrina (2005) and the Broadmoor community, where Ahlers and his team at HKS learned about recovery from the neighbors of New Orleans. And then, the strawberry anecdote in detail.

The power of Social Aid and Pleasure Clubs

In 2008, Doug Ahlers was part of the research team of Action in Time, a project within the Harvard Kennedy School of Government, working on “trying to be prepared to respond to a large-scale disaster or to recover after it,” in the words of professor Hermann ‘Dutch’ Leonard.

For Ahlers, the diagnostic was clear. In the face of disaster aftermath, there was a massive disconnect between the community on the ground and the government planners. “No one ever asks them. No one ever sits down with the folks and says: ‘Alright, What do you need? How can we help you? How can we work together to do this?’” he explains.

New theories on disaster recovery proposed a more decentralized approach, based on community: “and I said,” Ahlers recalls, “this is a wonderful theory, but let’s try and implement this.”

When Katrina happened, a local leadership group from the Broadmoor community in New Orleans contacted the Harvard Kennedy School. Ahlers, with other HKS fellows and volunteers, became part of the project.

He describes it as a perfect partnership, as they were looking for a place with a shared sense of identity, a place where people identified with the site and neighbors. And that’s precisely how the people of Broadmoor felt about their community.

Ahlers explains “the project there was to prove that recovery after a disaster takes place at the community level. It takes place at the individual level, at the household level, at the individual business level. Each family and each member has to recover from trauma and grief personally. Each family is in it together, having to recover both emotionally, in trauma and psychologically, but also economically form livelihoods regarding jobs and house, belongings, in terms of everything.”

“And I am at the Harvard Kennedy School of Government, so we look at the role of

government in this,” he describes. “And there are certain things that government does very well, like infrastructure, because a family and a community can’t build a water treatment system or a street. But the government can’t restart a restaurant. It might be able to give you a loan, or a grant, or something like that, but it can’t put customers in chairs. They can give you access to counselors and therapists, but they can’t make you heal from grief and loss. They can potentially give you money to buy a new tables and chairs, and beds for your kids, but they can’t put the photo albums back on your shelf or replace the dining room table that was your grandmother’s that was cherished and lost. Ultimately, recovery happens at a much smaller level than the government. But we always look to government for solution to the problem.”

In Broadmoor, there was about a 32% poverty rate and more than 50% of kids living below the poverty line. By US standards, it was a somewhat extreme situation, Ahlers details. 25% of the population was making less than \$10,000 a year, and around 15% was earning less than \$5,000 a year.

“The way that one survives in poverty, or with very limited resources, is through social networks: An aunt or a sister look after the kids; families do things; there’s a pooling of resources, sharing of the houses, transportation. You use social networks as a way to maximize your resources when you don’t have many,” Ahlers noted. Soon he realized that social capital was critical to the recovery process.

“There’s been research done where social scientists show the more social capital in a community, the better that community does in its recovery.” In New Orleans, researchers looked at different groups and their recovery rates. “We used sets of metrics and things for recovery, both self-reported and objective measures. And found that the group that had the highest recovery rate was part of a unique institution, the Social Aid and Pleasure Club.” A characteristic institution for the African American community in New Orleans, the Social Aid and Pleasure Club survives from the period of American segregation. People did not have access to medical support or retirement plans, so they formed clubs or associations that would work together to support each other. “So if you were elderly and didn’t have housing, they would find housing somewhere,” Ahlers points out. “They would bring meals to you, or arrange for medical care; it became a mutual aid society. It was social because it also indeed involved recreation and play, arranging things for kids and fairs and celebrations.”

“Most folks in the Social Aid and Pleasure Clubs in New Orleans, if you look at it demographically, they are the poorest of the communities. And yet they ended up having the highest recovery rates because they would help each other with things!” he explains. “So if you needed someone to help fix your roof, all of a sudden ten people came and helped. But you might then be cooking for someone, or watching after someone’s kids. So, they were sharing and maximizing their resources.”

Ahlers noted that the second most-recovered community in New Orleans was the Vietnamese community, composed of immigrants who settled in the area after the Vietnam War. “When Hanoi fell, about 20,000 Vietnamese settled in New Orleans, mostly because of the climate; you could grow rice and go shrimp fishing. Again, that’s a very tight-knit community, with a lot of great social capital and social network. There was a great sense of identity and commonality among them, and they knew they needed to work together actually to help each other.”

The third most-recovered community was the Jewish community. “It was spread out, and there was no geographical pattern to it, but as a community, they worshipped together, did things together. And they stood together,” says Ahlers, and he continues: “Sometimes it was just about asking people: ‘Is there anything you need?’ It was about making sure people didn’t fall through the cracks.”

Ahlers juxtaposes the experiences of those communities to the group with the least amount of recovery in New Orleans, “the ones that were put in “FEMA-villas,” hundreds of thousands of FEMA (the Federal Emergency Management Agency) trailers all lined out in camps. “People were randomly put together. They weren’t with their neighbors, their friends, their social support systems. They were isolated from their places of employment, from the schools they’d gone to, from anything familiar. They were completely severed from their past lives and all of the support systems that were there. It turns out not only did they have the lowest recovery rate; it’s almost impossible for people to recovery under those conditions. How do you go and work? How do you get back to reemployment if you were completely cut off from any form of getting back to normalcy in any way?”

For the HKS Senior Fellow, Broadmoor became an excellent model to understand how communities recover.

“What usually happens is that we get into this mode, that the communities are the victims, and therefore we have to go in and help them, and that’s it; as opposed to understanding that communities themselves are incredible engines of recovery and that our job as experts should be figuring out how to help them stoke those engines of recovery. I maintain that all communities have tremendous strengths and resiliency. They can, and should, and must be drawn upon for the recovery. The biggest waste in recovery is not the money that gets misspent on this or that project, but that the resources and the strengths within a community get ignored, underutilized, or disempowered.”

Dichato, Cobquecura, Perales

Since late 2011, Recupera Chile has invested, worked and supported initiatives within four greater projects: 'Entrepreneurial Sparks,' 'Sea Farmers,' 'Healthy Bodies, Learning Minds' and 'Ground Up Buildings.' Within this network of initiatives, it built a massage center in Cobquecura and worked with local authorities on the reconstruction of a water treatment project in Perales. It has invested in a local microbrewery and has helped and supported restaurant owners in Dichato to navigate the new tsunami mitigation rules. Recupera Chile organized an entrepreneurial competition in which a surf school/tourism center won. The organization also became a partner of the University of Concepción for a coastal development program to support artisanal fishermen and women. It has sponsored hearing, dental and eye screenings, and has provided eyeglasses for dozens of kids.

And although a few years have passed since the 2010 earthquake, it remains committed to supporting recovery in the three Chilean towns it works in.

Ahlers remembers one of his initial projects in Chile. "It was a fantastic example of private-public collaboration." Chilean public officials from FOSIS (Solidarity and Social Initiative Fund for Social Integration), SERCOTEC (Technical Cooperation Services for Small Businesses) and CORFO (the executing agency of government policy for entrepreneurship and innovation) spent two days briefing a group of Harvard students on their respective programs. Then, the Harvard group met with the communities, "and we set up the time to do these little counseling sessions with individuals because we knew the programs, and we could help them to calculate their eligibility and to get through all the materials so they could fill out their applications."

Ahlers had already seen in New Orleans how people struggled to apply for funds to repair their houses, through forms created "in an remote office in Washington, by people who have gone to advanced university degrees and did not understand the realities of the hurricane impacted areas."

"One of the things we learned in Broadmoor was to use trained volunteers to help people fill out forms or to hold their hands through the process. We found in New Orleans, and in Perales too, that often, even if people knew about the program, the application process was overwhelming, not because they were an 85-year-old widow, or they had never filled out an application before, but because they were traumatized. Everything is overwhelming after disaster; life is overwhelming!" Ahlers exclaims, "and often what happens when you're overwhelmed by a crisis is you freeze, you paralyze. So, just having someone to hold your hand through the process is often all that's needed. And it's perfect if they are trained volunteers, but they don't have to be extensively trained, they can be college students or retired people, or

others community members.”

Filling out a form can also be a way to restore the sense of self-control lost during catastrophes. Ahlers explains why.

“Usually, and especially with natural disasters, but even from human-made disasters, something has happened, and families are no longer in control of their lives. There’s a great sense of unease, a feeling that bad things can happen at any moment. So one of the most important pieces of recovery is re-establishing that sense of self-control, of being able to control one’s destiny and one’s own life again. And when outsiders come in and just do things, it does nothing to help the community to rebuild that sense of control. In fact, if anything, it only reinforces that trauma.”

This not only refers to including people in decision-making progresses. It is telling them: “this is your decision-making process, you are in control of your recovery, you have to be, there’s no substitute for that,” Ahlers asserts.

External resources are essential, and the community-based approach is resource intensive one because it requires providing technical expertise as well as counsel to communities in order to help them through possibly the most challenging and adverse situations that they will go through. Through Ahlers’ work, a resource-rich institution like Harvard entered such a context of recovery directly influencing the framework of the Chilean towns’ rehabilitation.

“To me, universities are perfect partners in providing the resources for community-based recovery to communities after a disaster. When you think of all of the different needs regarding expertise that a community has to deal with, all the problems that it has to solve: there are things from economics, from business recovery to agricultural issues to environmental damages; there are challenges in architectural and urban planning, public policy issues and government issues. There are health issues, psychological issues. And when you think about who sort of has all of the expertise under one roof, it’s a university.”

Under different Recupera Chile projects, Harvard University has collaborated with the Massachusetts Institute of Technology (MIT) and at least five Chilean universities.

“For example, in Dichato and Perales, the salinization of the soil from the salt water intrusion meant that either you have to remediate the soil to be able to grow crops again, or you have to find crops that could tolerate a higher salinity in the soil. And experts in agricultural and biology were necessary for that.”

“But in that same community, you needed people who could work on mental health counseling. And then you needed people from the Harvard School of Education to come in, to rebuild

schools and get education restarted in the community, and people from the Business School to come in and work with business restoration and livelihood restoration. So, universities are a great way to bring resources into a community. We make a mistake in the disaster recovery world thinking that is all about the built environment, and that it is just to write a check and disaster recovery is done. The greatest contribution we can make to a community after a disaster is to bring the technical expertise to work with communities to solve each of the myriad problems that they have.”

No matter the extent and diversity of the work of Recupera Chile, Ahlers emphasizes: “We’re there merely to support the community in its recovery. We only try to facilitate them in their process.” And the communities know it. They are fiercely independent and prideful, “and we’re just outsiders coming into their towns, they don’t want to be told what to do.” For Ahlers, the tale about strawberries serves as a sobering example.

“We were working in the community of Perales, of five hundred families or so, a very rural, fairly isolated community with some mix of fishing and agriculture. And we were doing some livelihood restoration grants, where people would come to us with, you know, their needs, and we would give them grants to restore their livelihood. So one woman needed strawberry plants to replace the ones that she lost in the tsunami. And we gave her a grant, a few hundred dollars to go out and buy new strawberry plants, but she used the money to buy pigs instead.” “Then,” Ahlers continues, “she raised the pigs, fattened them up and sold the pigs at the market, and used that money to send her daughter to school.”

“An argument could be made either way as to whether she was right or wrong in her decision,” Ahlers reflects. “But she’s the one who has to live with the consequences of her decision, and she’s the only one who can say whether she made the right choice or the wrong one: no one from the outside can ever say it.”

“Other NGOs or experts might come in and say that it was a horrible thing she did,” Ahlers explains. “But, in terms of Community Based Recovery, you have to understand that she knew more about what was important to her family and her needs, understand that she had to make, and did make, the priority decisions of what was important for her family.”

“It may have been more sustainable if she bought strawberries or had just raised the pigs and kept the pigs. But instead, she sold the pigs and got the money for school. Because to her, the long-term welfare of her daughter was far more important than the short-term or even long-term sustainability based on strawberry farming,” Ahlers states.

“Just like the people in New Orleans, who knew what risks were, or the people who know what a tsunami is, she knows the tradeoffs of her decision making because these are the things that she lives with every day. She knows the consequences of her decisions, but she also knows

what her priorities are, and what sacrifices she's willing to make for these priorities. And feeding her daughter and herself was one, but continuing to have her daughter be another generation of strawberry farmers was not the priority. She decided she would find another way to survive and feed herself."

"So, instead of going back to that paternalistic way of thinking 'I know what's better for you more than you know what's best for you and your family,' my attitude is, 'Who is a better expert on her family and what the priorities for her and her family are than she?' She's the one who is not sure how to feed herself in the future, because she doesn't have sustainable strawberry plants, but she thinks her daughter is going to school and will have a better future because of that."

"I think, what a noble thing for her to do: she's sacrificing her own future for her daughter's; but it's the same, even if someone goes out and spends money on a TV. Who am I to say that that television isn't bringing that family more enjoyment or quality of life? If you're going to talk about empowering individuals in communities about their decisions, it includes the ability to make mistakes. And a television... Who knows? Maybe it's the right thing, maybe it's a mistake, but these shouldn't be my decisions to make for people, or government's decisions to make for people or UNDP or USAID's decisions to make for people. These are decisions that either a family or community should make on personal and community issues. And part of it is trusting that communities and individuals and families will make the right decisions. What's fascinating is that there's been a lot of research about how, in the end, the decisions that folks make at the family or community level are very close to what the experts would make. And the differences tend to be less about a community that makes less effective decisions, and more about that their priorities are different because experts didn't actually know enough about the community to know what was important for them."

There is, however, a secret in this process that Ahlers shared to the end of our conversation. "A community is going to recover whether the government is involved or not. They're going to recover. The question is if they can recover better or faster. And it will always be an excruciating process. Because often what communities want is to go back to the night before, or the day before the disaster. And sometimes that is completely impossible. And you're never going to have the house you grew up in again, or that photo album that was washed away, or that dining table that belonged to your grandmother; those things may be gone forever. And certainly, there's no way that someone who's lost their husband or wife or child or parent will ever, ever be able to go back to what their life was before. So, some of the recovery processes can be about restoration to what things were before, but a lot of recovery is about that healing process of moving on to what the new future is, whatever that is. It's about helping a community find its new future. And trying to make that as easy or as less painful as possible."

CHAPTER 5 FOR THE KIDS



Judith Palfrey, T. Berry Brazelton Professor of Pediatrics at Harvard, had been working for 40 years on child health before visiting Chile. She found a country eager to debate about some of the issues she cared more about, like early childhood and social inequality. Her unexpected bond with the country narrowed after the earthquake, which inspired her to become part of the multidisciplinary project Recupera Chile.

For Judith Palfrey, it all started with shells.

“Here in Massachusetts one of my favorite things to do is to go clamming. I grew up going every summer to the New Jersey coast. I think E.B. White said “there are two kinds of people: those who like fresh water and those who like salt water” and I’m definitely a salt- water person. So, in fact, the first reason I ever went to Chile was to see the seashore and to go to Chiloé to see some clams and see the shell fishers. I did not originally come here for any other reason.”

It was a vacation trip – Chiloé is a unique Island in the Pacific, off the southern coast of Chile – and the first connection between Judith and the country. But an uncommon series of events, interests and a natural catastrophe forged a tight bond that would bring the pediatrician back to South America for years to come. Part of her work in Chile is deeply connected to early childhood in the country and part is linked to a small community of Chilean farmers and fishers.

By the time of that first visit, Palfrey, T. Berry Brazelton Professor of Pediatrics at Harvard, had dedicated 40 years to working on child health. As she said, “I was in a moment of: ‘Ok, What’s the next chapter?’”

Judith is a mature woman, with a soft smile and a lot of determination. Faculty Dean, with her husband Sean, of the Adams House residential dormitory at Harvard College, she had no apparent reason to connect herself to a place eight thousand kilometers away from her home. But in 2006, Chileans elected a woman pediatrician as President, the first time in the history of this South American nation. Just starting her term, Michelle Bachelet announced she would look forward the creation of a child welfare system. As it was expressed in her government program, in a country of economic prosperity and high levels of inequality, Chile needed to even out opportunities for kids from early childhood.

“There was a lot, lot of discussion about early childhood education in the country. Bachelet being a pediatrician and also very interested into nutrition, was saying: I want a family to be secured, I want them to have day child care, good healthcare, a good future.”

Palfrey followed the debate with attention. She had just written about that in her book. “I had a vision of the birth moment being the time when society would say: ‘You have good daycare, you have good healthcare, you have a bank account that you’re making for the child for their education and you have some commitment that you make to your community.’ If a community did that with every family as the family was growing, we would have a strong society.”

It did not take too much time for Palfrey, who had never worked on international health

before, to engage in a private-public initiative designed in Harvard and implemented in Chile to improve the quality of early-childhood education, the Un Buen Comienzo (“A good start”) program. She was not aware there would be other challenges ahead. In February 2010, a tsunami hit the Chilean coast after a large 8.8 earthquake. South of the country, a train of waves wiped out some seaside towns, taking boats, houses and farms, impacting the lives of thousands.

Judith was not in Chile at that moment, but when she received a phone call asking for help, she came back. “Do you know anything about early childhood?”

By 2006, Palfrey had a long career in pediatrics, both as an academic at Harvard and as a physician at the Boston Children’s Hospital, where she had been Chief of General Pediatrics for more than two decades.

“I’ve been really active as a doctor for 40 years. For the first 30 or 35 years, all of my energy was focused domestically, in the U.S., and I worked very much in community health. I would often be asked, ‘Why don’t you do international health?’ And I would say there are so many problems in the United States, I’m not going to be a person who wonders on, I’m going to work as much as I can in the United States.”

Her perspective changed in 2004, as she wrote the book “Child Health in America: Making a Difference through Advocacy.”

“Part of the big thing that I try to teach people is advocacy, how to fight for what you think is right. In writing that book, I did a lot of comparing the U.S. to other places, and it was just stunning how much bigger children healthcare problems are in the rest of the world. I began to think: ‘Some of the things I’ve learned domestically, are there applications internationally?’ Also, it was a time in my life when I was stepping down from running a lot of programs in my hospital.”

That was the moment when Palfrey asked herself about what her next phase would be.

During her trip to Chile, “just as a courtesy,” as she says, Palfrey met Steve Reifenberg, who established and directed the Harvard office in the country for seven years, starting in 2002.

“I had never met him before. At that time, Bachelet was just coming out,” remembers Palfrey about Michelle Bachelet, first female president in Chile and later first Executive Director of UN Women, the United Nations Entity for Gender Equality and the Empowerment of Women.

In March 2006, just starting her first term, the Head of State convened a Presidential Advisory

Council for the Reform of Policies on Children. It was the first step towards the creation of Chile Crece Contigo” (“Chile grows with you”), an intersectional policy-based government program focused on children below the age of four years in Chile, a first of a kind project in Latin America.

“So here’s this country, that is not maybe as developed as others, but in early childhood it’s ahead, certainly conceptually and maybe even practically, of the U.S. in its child development efforts. On the other hand, to have the president of a country caring about early childhood... The only president in our country who ever did that was Lyndon Johnson in the 1960’s with Head Start programs and so forth.”

In the United States, ‘Head Start’ was launched in 1965 as part of the ‘War on Poverty’ of U.S. President Johnson’s administration. It started as a summer camp where preschool kids from low-income families could “catch up” before entering the education system. Though “grossly underfunded” and “serving half of the kids it was meant to service” – as described in 2009 by Jack P. Shonkoff, founding director of the Center on the Developing Child at Harvard, – it is still the oldest and largest federal program for young children in the United States. It is designed to offer services on education, health and support for family wellbeing.

What Professor Palfrey found in Chile in 2006 was a political will around early childhood care and support. The situation prompted her to remember her mentor, “the person who trained me,” Julius B. Richmond.

Richmond was a pioneer in studying young children growing up in conditions of poverty. The late Harvard Medical School professor and U.S. Surgeon General under Jimmy Carter was also a fighter against big tobacco companies and the first director for the national Head Start program.

“So, at that time, I’m beginning to think about international health, I’ve never done it, and Steve Reifenberg says to me, It’s nice to meet you and, Do you know anything about early childhood?” Palfrey laughs as she remembers the question. They started organizing a conference on early childhood, “in order to fit in with the policymakers in Chile.”

“We just did it. We expected maybe 200, 300 people, but 600 people came. We filled two auditoriums. There was extraordinary interest. We brought the Dean of the Graduate School of Education at Harvard; we brought some people from ‘Sesame Street,’ so, it was a fun group. Because the Ministry of Education and Ministry of Health in Chile were so interested, it was a very, very high-level meeting. And out of that meeting came the idea that we would create a project and it was called Un Buen Comienzo. You could say I am sort of the ‘grandmother’ of the project.”

Initially focused on more impoverished neighborhoods, the Un Buen Comienzo (UBC)

program addresses very concrete goals: “enlarging students’ vocabulary, reducing respiratory infections, increasing school attendance, and getting all children to have annual physicals.”

In Palfrey’s words, the program targeted some “relatively diverse, low-income families, with the idea that the expansion of early childhood schooling really benefits people in poverty. And one of the major points about early childhood interventions is that we believe, and many people believe, that one of the ways to break the cycle of poverty is to help families early on with the education of their children.”

Designed at the Harvard Graduate School of Education by Catherine Snow, expert on language and literacy development in children (Patricia Albjerg Graham Professor of Education), run and supported today through a local philanthropic foundation, the UBC program was started right before the creation of the Center of the Developing Child at Harvard University. Snow worked with Chileans Ernesto Treviño and Andrea Rolla among other academics. The project was directly related to one of the center’s mission: “to take the findings of Harvard faculty and students out into the world.”

With UBC, Palfrey started visiting Chile on a regular basis. “Through this program, the predominant place that I’ve been working is Santiago, working in the small comunas” – the Chilean basic administrative units.

“Some of these comunas are really plagued by the effects of poverty. I remember being at one school, going in one day to the daycare center of the school, and the Superintendent was very upset because the night before there had been a robbery. And the thing that had been robbed was the electrical box on the outside of the school. And just thinking about that... What kind of poverty would drive you to steal an electrical box? Is that the level of deep need? Some of the communities are really racked with those kinds of problems.”

“On the other hand, the comunas have a lot of strengths, and one of the things in Chile that is so spectacular is that schooling is considered a very, very important thing. And so the community schools, the community day care centers and so forth, are really built beautifully and supported beautifully. So you have this kind of contrast to the housing and life structure for some of the families in these inner cities.”

“The wonderful thing, though, is that many people in Cambridge and Harvard are interested in South America. But there are also people trained at Harvard who are from South America who are here, so we were able to staff almost the entire program with Chilean people.”

“We had our directors and partners from Chile. So this wasn’t so crazy, we weren’t directing things from so far. We were the cheerleaders.”

Working in the Southern Cone of the Americas, Palfrey found “a unique opportunity to reach

children at a young age” for the project. She remembers meeting the Chilean president “a couple of times,” and becoming close friends with some of her state ministers.

“I have huge respect for her. I think when you come from the position that we do, people who do advocacy for children, we recognize that there are horrible problems for adults, for elderly, but it’s very hard to get children on the political agenda. People say children don’t vote. So, to be in a place where public policy is run by someone who says, you know, ‘children do matter, and childhood is where economic disparities begin...’ To have somebody who understood that was just amazing”.

“What Dr. Richmond always taught us was if you have a public policy that you want to change, you have to have three things. One of them is knowledge. The second one is political will. And the third is the social strategy. You always have to have all three, and they have to work together. We don’t have the political will around children in the U.S., not yet. But in Chile there was a woman who was saying: “You know, we’re going to invent this for people.” That was extraordinary.”

Phone call after a disaster

For Chileans, it is emotionally hard to go back to February 27th, 2010.

That day brings memories of anguish, fear and despair. Almost everyone in the country knows someone who lost something or was severely hit by the disaster that day. The whole nation mourned the loss of more than five hundred lives. Judith Palfrey, who was not in Chile at that time, also remembers the date well: “The earthquake occurred on February 27, I came in April,” she says.

It was an 8.8 earthquake, one of the strongest ever recorded by a seismograph. Its epicenter was in the sea, just 70 miles (115 kilometers) from Concepción, second largest city in the country. The quake woke up Chileans at 3:34 a.m. local time, in the middle of the night. It was still dark, and the ground was shaking under the feet of millions of half-asleep, terrorized people.

On the coastal areas, following traditional wisdom, some ran to the hills, but not all. Undetected by the government and navy authorities – a NOAA warning was ignored –, a tsunami traveled across the Pacific and impacted the southern Chilean coast. An “ugly, dirty wave,” as witnesses recalled days after, struck the fishing villages and the beach towns around the area.

“So I’d been working there since 2006, had many friends. And a few weeks after the earthquake,

I got a call from one of my friends, Martin Zilic (former Education Minister), saying: Can you come to Chile now? Because we know that you've been working with the American Academy of Pediatrics on disaster recovery. And we would like you to come down and help us think about the children, think about what families ought to be doing, what schools ought to be doing. 'And it was just an honor to be asked to do that.'

"It was very much the way it is in Chile," she adds. "You come, and they say, 'Well, we want you to give one talk.' But then they say 'we want you to talk this afternoon, and then tomorrow.'" "To be honest, I had seen this before in Indonesia, Haiti, and all these other places: to go down on the beaches and see the boats destroyed and the livelihoods of people torn apart; but there was something just profoundly personal about this one," says Palfrey.

"The sea had become a monster. The tsunami is a monster. The boats were up on the shore, overturned, even a town away from where they were before, maybe in a cow pasture. All of the tranquility and all the beauty of a seaside town was gone."

Palfrey recalls visiting places like the tiny Coliumo bay, a beautiful spot profoundly affected by the tsunami, around six weeks after the disaster.

"I was just a visitor, but what it must have been like for the people to be sitting next to a little chimney fire, not having heat, not having their homes, not having their schools. What was lost was the preciousness of life, the things that people did for their work, the things they did day in and day out, that we all take for granted."

Initially, the pediatrician spent ten days in the country, "going from town to town, being there, in the middle of really horrible situations, seeing what people were going through. I sat with groups of people and talked about the children and the ways families could support them through this very, very difficult time."

Palfrey remembered and detailed her work in Chile in different interviews for this book through the following years.

As part of a small group of people from the David Rockefeller Center Regional Office in Santiago, including its former director Ned Strong, current director Marcela Rentería and Harvard Professor Doug Ahlers – she became part of Recupera Chile, a project to help and support some of the communities affected. She became one of the directors of the Mental Health area along with Chilean doctor Mario Valdivia.

Every January after the tsunami, Judith Palfrey has kept visiting to work with the southern towns of Cobquecura, Dichato and Perales, located in a unique area of Chile, where farmer and fisher cultures mix, surrounded by forestry plantations. The villages can only be reached

after a one-hour flight from Santiago, and another two hours in car.

“In Chile, because of the good understanding of earthquake protection, in many of the big cities the recovery came along pretty well,” says Palfrey, but in some of the small towns, even if the housing was recovered, there was still much to do.

Judith has endless stories of her work along the Chilean coast of the Biobío – the region takes its name from a local river. She has met with fishermen, fisherwomen, school teachers, farmers, volunteers, local doctors and students, Harvard and Chilean faculty professors, navy officers, families and kids.

She talks about Chilean Professor Eduardo Tarifeño and his students from Universidad de Concepción helping people to go back to the sea and work on aquaculture projects. She mentions Julio Salazar, who lost his home in Dichato and was building surfboards on a shelter, helping kids to reconnect with their coastal identity. She also remarks the brewery in Old Cobquecura town, where Matías Picerós, whose ancestors were the original inhabitants of that land, saw himself reconstructing not only his town after the earthquake, but also reconnecting with his heritage.

In Palfrey’s words, Recupera Chile’s work is “like lighting a fire, giving people a basic support so they can do on their own work.”

Palfrey’s team on mental health issues, which includes psychologist Pilar del Canto, started working on issues like identifying kids with mental or physical health problems and helping them to get physician appointments or to reconnect with social services and local health centers. The team has developed different initiatives within the Recupera Chile umbrella, from helping children with tools for self-control and emotion management, with the help of a group of kinesiology students from the University of Concepcion, to organizing the ear and eye screenings that are commonly offered throughout Chile, but were disrupted by the catastrophe.

They worked on “increasing the physical fitness and activities of the children, increasing their literacy and reading abilities and introducing the children to the environment, which is the sea, and make them more aware of the physical world around them,” summarizes Judith. Harvard students come every year to learn and contribute.

“It makes sense for the Chilean kids, but it also makes sense to the volunteers from Harvard and Chilean universities. They’ve heard the theory of how to teach readings, or they’ve heard the theory of children’s mental health problems, but they’ve never seen that.”

While some people were still in shelters, their houses wrecked by the waves, Palfrey and her

team organized the first Recupera Chile Summer School in Dichato. In the gloomy days after the disaster, “we had music; we had food; and we had some books; and they came from everywhere. We had little fellows; as little as six or seven, and they went up to eleven, twelve years old. They were as cute as can be.”

One year, the Summer School brought a Navy band for a ‘Zumba’ class, and an education group from the University of Chile worked with the kids in computing classes. Local foundations like Mar de Chile or Tierra de Esperanza contributed in different initiatives, from painting workshops to marine biology lessons. For Professor Palfrey, in every one of these activities, there was a stake in the identity of the community.

“This is a complicated situation, you can imagine that. This is where you live; this is where your home is; this is where your grandparents, even your great-grandparents lived. But the sea came, and it was very, very frightening, and did awful things. So what’s that balance? So, you’ve got to learn to swim, learn tsunami protection, and learn where to go up the hill, and how to handle those situations, but at the same time, you have to value and love the sea. So the questions are: What was really important and precious about this place? When we lost much of it, what did we lose? What were the values that we wanted, to be sure that we, as people, we preserve them in our community?”

It is hard to keep track of all the projects Judith Palfrey has been part of in these tsunami-impacted areas. Some have involved just a few number of people; some have reached dozens, people from the United States and Chile. Some of them were part of the mental health unit she directs in Recupera Chile; some belong to other areas of the same project. Nonetheless, for the Harvard Professor, all of this stuff, large or small, “just demonstrates the capacity, the strengths in these communities. They’ve been through a lot, but they have the internal capacity to grow.”

There is, of course, also a lot of effort and dedication from behalf of professionals like her. The work of Judith on these villages also fits into who she is and what she believes in, for example, concerning health.

“I have an extremely broad view of health. That’s just who I am. The question about what does it mean to be ill is very easy. But if you think about what does it mean to be healthy, that’s a very, very hard question. And the more you look at it, the more you realize that, as humans, to be healthy we need to be challenged; we need to be stretched; we need to be valued; we need to have a sense of purpose; and we need to feel involved”.

“So many teenagers and young people do not feel valued,” she continues, “so many do not feel that they’re contributing to anything. And their self-esteem falls, and they turn to things like drugs, alcohol, etc. So, in this broad definition of health, we need our young people to have a

sense of hope. If there's no sense of hope, we have a dead community.”

“The more that you study teenage health, the more you learn that employment and a sense of ‘Where do I belong in Society,’ are critical. Whether it’s a Harvard student or it’s a boy in Dichato, these are really critical moments in our development as human beings.”

Through its institutional initiatives in Chile, the Harvard name has a significant presence. The David Rockefeller Center also offers a politically neutral space where policymakers and intellectuals from different perspectives can come together to collaborate. This is an important feat in a country like Chile, where mutual trust is still affected by the wounds of its turbulent political past, but also by the persistent levels of socioeconomic inequality – a phenomenon “you can not only see, but you can also feel,” says Palfrey.

Beyond this privileged standpoint across Chilean society, it is the hard and thoughtful work of Harvard affiliates that has helped Chile the most. “The Harvard name helps with some of the higher level policy stuff, I think. But quite frankly, what makes a difference on the ground is having these relationships with consistency, with real people. Now that we’ve been consistently coming and we know the people in the towns, there’s trust. I’m not sure the Harvard name can do those things. I do think it helps. At least they’re curious about why Harvard would do this,” she smiles.

For Judith and the volunteers that have worked with her, the experiences in Chile have also broadened their perspectives on community-based work, recovery and sustainability.

“I’m also a clinician. I’m a doctor. I see patients, and I like to see something happen, you know, tomorrow. And so to answer why is in small towns like these in Chile? What is the academic exercise we’re doing? It really is learning from the local experience and strengthening their capacities to address all of the problems that come forth. I mean... With this issue of recovery, we’re dealing with economic development. The problem is the policies, right? The policies are that you have to wait ten years to get your acreage in the sea to set up your mussel farm... ‘Well excuse me, I want to put some food on the table for my family today.’ Not ten years from now. Not all these hoops and so forth.”

“One of the things that I know personally, is that our team in Chile, is beginning to ask questions about the whole ‘locavore’ movement. We’re seeing it around the world; we’re seeing the local production of foods, local production of crafts and others as something that’s been dying, as something that’s been kind of moving out of places. People are moving to the city, forgetting their roots, and forgetting the basics of the natural world. And so a major part of what we’re doing in Recupera Chile is exactly tied into the question of ‘where are these places?’ These places are important, and place-based work has now become a major area of interest among academics.”

“So, we’re just sitting on this wonderful, if you will, gold mine, of places where we can think about the physical structures, we can think about the human needs, we can think about the productivity, and we can work with some future-kind questions about our world. And that’s what makes this work so interesting and creative, and hopefully meaningful.”

A place to fell in love with

Judith Palfrey has visited Chile more than 20 times. “Two to three times a year since 2006,” she says. It is a surprising number, considering that before that year, and after an outstanding and long career focused in the United States, she did not have any academic or professional connection to Chile.

Given this reality it seemed logical to me, as a journalist, to ask her what has she taken away from all her experiences.

“What I have done most of my life is to build programs in the health sector that integrate health and other groups, health in schools, or health in daycare. I’m very proud of the programs that I’ve made. Most of my writing is about community health. When you write things, you say this would be good, that would be good, but the opportunity that Recupera Chile has presented to a number of us, is like... Oh my gosh! This is the moment that this is actually all happening. And perhaps there’s a little room for that little something in the background that we could add to it, so I do see there’s a lot of very personal aspects to it.”

Maybe there is something more. All the different challenges and opportunities that Judith Palfrey found in Chile align with who she is and what she believes in. Chile became a part of her work through her ideas about early child education and equality, about health and public policies, and about what communities are, and how they grow and evolve and recover.

“I think we’re all drawn in our work, in our passions and so forth to things that have some personal meaning. And so for me, the opportunity to be working on something that I think is very important, but also to use some of the areas of avocation, has been wonderful.”

“So Chile is, you know, a gorgeous country. It has provided me with these wonderful opportunities.”

She reflects and adds, “Life is funny. There are little turns and so forth, but, why Chile? Well, I guess I kind of fell in love with the country,” she says with a smile.

Chile was, for Palfrey, the right place at the right time.

CHAPTER 6

A PLACE IN ANTARCTICA



Since 1947, Chile has had a polar base. There, it has collected substantial and valuable data about an area that is changing rapidly. James McCarthy, Harvard Alexander Agassiz Professor of Biological Oceanography wants to bring people and students to this territory to learn there more about how climate change is affecting our environment and how we can – and will – face it.

James McCarthy ~ A place in Antarctica

James McCarthy has a dream.

Alexander Agassiz Professor of Biological Oceanography, McCarthy dreams of bringing Harvard and Chilean students to one of the most mysterious place on earth: Antarctica.

“I had been on the Antarctic Peninsula maybe five times, the first time some 30 years before and now when we began discussions about the possibility of a public opportunity for students who would want to come to see what Chileans are doing at the Antarctic base Arturo Prat.” The idea was born at the Harvard Rockefeller Center in Santiago, inspired by the uniqueness of Chile’s proximity to the continent. Less than 1,000 kilometers, around 642 miles, separate Cape Horn – the southernmost tip of South America – from the icy, mountainous land that stretches west from the South Pole, known as the Antarctic Peninsula.

Around the peninsula, facing the Drake Pass – which takes its name from English navigator Francis Drake, – lays in the South Shetland archipelago. It was in 1947, seven years after Chile incorporated this area as part of its territory, when the first national Antarctic expedition arrived there. The Chileans renamed Discovery Bay as Chile Bay (Bahía Chile) and chose the Greenwich Island to build their first polar base. They named it Arturo Prat, honoring the Chilean commander and navy hero.

Constructed from galvanized iron, its interior made of wood, the base served during 55 years, until it was closed in 2004. This closure did not go for long: four years later, the station was reopened in 2008 and declared National Historical Monument in 2010, as recognition “for its contribution to environmental conservation and support for science.”

To this day, under the coordination of the Chilean Antarctic Institute, the naval base offers space and logistical support for scientific research. Prat is just one of the nine Chilean stations in the Antarctic territory. The country has ample resources and experience to move between the two continents.

“Of course many Chilean scientists have the opportunity to work at the base, increasingly after they built new research facilities there. What occurred to me, and colleagues in Chile, was that an enormously interesting thing to do would be to figure out how to bring a group of students there for a course on Antarctica. We would team with Chileans, and the students of the course would come both from Chile and from Harvard. We would team up with Chilean academic and scientific counterparts, and as a group we would put together a curriculum that would allow students to understand what is interesting, new and important in Antarctica... What is changing regarding the science, and what science can tell us from Antarctica.”

To advance his plans, McCarthy traveled to Arturo Prat.

James McCarthy ~ A place in Antarctica

“I’ve visited some bases in Antarctica, both in the Peninsula and around the Ross Sea, and each of them has many things in common and yet a lot of very individual characteristics. One of the interesting things about Arturo Prat is how long it been there. So, historically, it’s exciting to be at a place that has been committed for such a long period to observing the Antarctic Ocean.”

This was not the only thing he noticed.

“The other thing one notices at different bases, and I say this very genuinely, is a different receptivity to people like myself, scientists. Many of these bases are maintained by career people who look upon their period there as part of their work: they have duties, everyone there has something that they are in charge of, whether it’s the cooking, or the building, or the cleaning or clearing the ice. Some bases are more welcoming to visitors or, in this case, visiting scientists, who are exploring, and inquiring whether there may be some opportunity to work there. And our reception at Arturo Prat base was remarkable.”

McCarthy mentions a curriculum around Antarctica, including “fundamentals of physics, chemistry, and biology. And when you talk about coexisting in a confined quarter of the base, some sociology as well,” he says with a smile.

“You can’t study the biology of the ocean without studying its chemistry. You can’t study the biology and chemistry of the ocean without studying its physics. And of course, to understand it, you also need to know what happened there in the past, so you need to study geology, the records, you need to know whether something unusual is happening today or if it has been a common occurrence for maybe thousands of years.”

Of course, all of this could be taught, and is taught, in classrooms in Cambridge or in Santiago, “but taking students to Antarctica, not only to see things for themselves, but to be active participants in research projects, would be something different,” says McCarthy.

“ It means we would have laboratory exercises. We could collect samples of water and we could study the lichens or the plankton. We could study the penguins, and also a wide range of less charismatic, if you wish, interesting organisms in Antarctica.”

Penguins, being the most popular inhabitants of the area, are only part of a cold, dry, hostile, but still very biologically active area.

“To contrast: you could take a group of students out into the... say, the center of the Pacific Ocean, somewhere in the middle of the Northern or the Southern Hemisphere. You could spend a month there, making observations every day, and see hardly any change. I’ve done that. It’s an interesting thing to do, I’ve spent years of my life doing that,” McCarthy describes.

James McCarthy ~ A place in Antarctica

“But when you’re in the Antarctic, it’s changing every day. Penguins are a good example: you see them first arriving when there’s still snow on the ground. They begin their courtship behavior, and male penguins begin selecting stones to make the area where the female will lay eggs. Then, the male goes out to feed, and the female sits on the eggs. Then they take turns, taking care of the chick after the egg hatches to feed the chick. Then, they both leave, and make food runs, simultaneously, because the chick needs so much food now.”

Penguins, krill, crabs, seals, big whales are part of “this dramatic pulse of activity,” as McCarthy describes, that students could witness and explore. Others could see it too since he also talks about plans to create an Antarctic museum. A different one from those that already exists in the area.

“We could use all this information to feed into this, broadly speaking, museum concept that would allow people to actually not just to see some artifacts as relics about Antarctica, but to see what we are learning today.”

McCarthy has visited the museums around the South Pole.

“Probably the best developed in the whole region is on the island of South Georgia. It is an interesting place that has earlier artifacts and relics of past work there, but it doesn’t have anything contemporary, it doesn’t tell you what is interesting and exciting about Antarctica today, and therefore only celebrates the human presence of the last decades.”

As tourism in Antarctica slowly increases, there may be an opportunity for that sort of facility. Vessels already offer learning experiences for travelers. The professor has been on board on some of these trips.

“People are not going there because of the nightclubs and certainly not to hang out at the bars,” McCarthy laughs. “They want to go on shore; they want to see things. So that is why you would have a quite ready audience.”

McCarthy tells that, as he and others pushed this idea forward, local authorities were very receptive. “But then everything came to a holding pattern,” Chilean authorities began to think about new projects for Arturo Prat.

But even if his dreams are on a halt, McCarthy is convinced that this place where Chileans arrived at the end of the 1940’s is a perfect location to study Antarctica.

“We haven’t encountered anyone who thought that it was a bad idea,” he assures.

Unimagined things

McCarthy knows every ocean in the world. What attracts him to Antarctica?

“I have a fascination with Antarctic science,” he emphasizes the word ‘science.’

“People are motivated in a variety of ways. I know people who get together at different places around the world just to talk about Antarctic pioneers. For some people, the notion of explorers, of a particularly important person, at some point in history, of someone who is especially brave or venturesome or maybe creative, can be inspiring.”

“But for some people who maybe aren’t so interested in the history or don’t find those individuals so attractive, it may be different things. I don’t know anyone who’s ever seen a penguin and wasn’t just fascinated by penguins’ behavior. Living in this unusual environment, covered of ice and snow and freezing water: it’s impressive to watch them protecting, feeding and nursing their chicks. It’s almost beyond description to imagine something as intriguing as penguins’ behavior,” says McCarthy.

“It’s a similar process with the great whales. I don’t know anyone who’s ever seen a whale in the wild who would forget what that experience was like. So, different things motivate different people, but Antarctica is one of those places that just seem to have so much of that... It’s mysterious; it’s a place that a lot of people know about, but not quite what to think about. And when you begin to learn about its biology, it’s fascinating”.

It could be the birds, or maybe the fish. “There are so many unusual things to be discovered about Antarctica. The fact that there are fish swimming in water that should freeze them solid, but it doesn’t because they have special proteins in their blood that work like antifreeze is unusual! Or the fact that you can have organisms living inside the ice that are such an important part of the whole food chain, or the way a tiny animal, like a shrimp, can nurse the biggest mammal in the planet, the blue whale. Those are things that you don’t find anywhere else. There’s something special about the Antarctic science.”

One example about the special and mysterious aspects of Antarctica is that science still cannot explain why the blue whales have not recovered after they were hunted so intensely up until the early part of the 20th century.

“Since the mid-nineties, the eighties, there’s been no hunting for blue whales, yet they haven’t recovered,” says the oceanographer. “That’s a mystery: why is that? And how can we understand how different that ecosystem is today than it was when it had those great whales? Because they are not only the largest animals on the planet but also the food that they

consume is a huge portion of what is produced there.”

Those kinds of questions keep scientists, marine scientists and polar scientists, returning to the area.

“One of the exciting things about studying science is you always have to be prepared to be surprised. I would say honestly that every time I’ve gone out to the open ocean for a month, two months at a time, we’re on a ship away from land; I’ve seen things that I could never have imagined. I’ve seen either unusual organisms, or an abundance of unusual organisms, organisms of maybe unusual size, behaving in unusual ways, things I could never have imagined, never read about it, never been described to me by anyone who’s had that experience. So, I think in the sort of field of ocean science and the same mystery of Antarctic science, we still have a lot to learn about what’s happening there.”

When you see different things, you formulate your questions differently, explains McCarthy. “Once you discover something, you start looking at everything a little differently. And I think that kind of experience is formative for a young person, who is undecided about what they want to do with their lives. Am I interested in science? Am I not? Am I interested in history or am I not? Where are my passions? And when you have the option to experience something like this, it can start your fervor for pursuing that particular area of interest.”

Impact on the poles

“The fact that Chile has one of the oldest facilities on the Peninsula and some of the longest records means it’s crucial in terms of observing how climate has changed,” says McCarthy, who was co-chair of the Intergovernmental Panel on Climate Change (IPCC) that won the Nobel Peace Prize in 2007.

He assures that, for the most enlightened scientists, climate change has been evident since the late eighties. But it has become clear to the public only during the last 20 years. Today, the facts are there “for anyone who wants to check; anyone sufficiently curious and not paralyzed by some particular worldview, or constrained by some ideology. We have compelling evidence of climate change. It’s just what the evidence shows.”

Climate change unfolds in very particular ways in the Poles. “It is a very, very interesting puzzle,” explains the academic.

“The top of the globe is an ocean, and it is covered in ice. It has more ice in the winter and less ice in the summer, and what is shrinking is the thickness of the ice and its area. And it is shrinking in the winter as well as in the summer, but most dramatically in the summer. That’s what you usually see in the news, how the Arctic is losing ice in the summer.”

James McCarthy ~ A place in Antarctica

Unlike the Arctic, Antarctica is a continent covered by a massive thick layer of ice. And as it loses ices, more of the ocean freezes.

From the perspective of a scientist, it's a simple process: "Salt lowers the freezing point of water. That's why seawater freezes at almost -2 Celsius. If you melt more ice, more water flows under the ocean; the ocean gets fresher. And if there's less salt on it, more of it would freeze."

"People sometimes look at this and think that it is a contradiction. But again, you have to think about how different the North and the South Poles are."

The North Pole is at sea level, and the South Pole is about 3000 meters high, because of this block of ice, explains the academic: "The South Pole will always be cooler than the North Pole because of this elevation. So Antarctica is the coldest and also the highest continent." As a matter of fact, without the ice, much of the land of the Antarctic mountains would be close to sea level: "think about the center of Greenland, which is below sea level because the weight of the ice pushes it down," McCarthy illustrates.

"But Antarctica is also the driest continent; it has less precipitation than the other continents because of the winds that swirl around it spill down at the center. To have precipitations, you need to get moisture from the ocean and move it over land. In Antarctica you don't have air masses moving over; they are moving around. You have a circulation that moves clockwise around Antarctica and this cold, dense center area."

Atmospheric phenomena in Antarctica can be very counterintuitive.

"Yes," concedes McCarthy, "and part of the reasons earth, ocean, and atmospheric sciences are very exciting to study is to understand how these different areas might seem to work. So the North Pole should be cooler than the Southern, no? But it isn't."

As an oceanographer, McCarthy has navigated in all kinds of water. "For many years of my life, I've seen different locations. But the polar regions, the Arctic and Antarctica, are different and unique from the oceans and climate perspective for many reasons. And the first one today is because they are changing rapidly."

He details further: "In Antarctica, that current that switches around the Antarctic corner, comes across the southern tip of Chile and swipes around through the Drake Passage, is speeding up. It is faster today than it was 20, 40, and 50 years ago. We believe that is related to the changes that are occurring in the atmosphere and is consistent with climate change." He continues: "The Peninsula, which is the part that first comes closer to Chile, is warming more rapidly than anywhere else in the Antarctic cone, which is what you would have expected

James McCarthy ~ A place in Antarctica

because it sticks out farther into the water and it moves further away from the pole. But it is warming up at the fastest rate.”

Climate changes affect the poles more dramatically because water is susceptible to small changes in temperature: it can be liquid, solid, ice. That is the downside.

“But you can turn that around,” proposes McCarthy, “If we begin to make substantive progress in reducing the rate of warming, the poles should also be a place where this becomes evident early on.”

Again, McCarthy bets on Antarctica.

“The Arctic, in many regards, is more difficult to study because again, it’s an ocean covered by ice. We don’t have stations out in the ocean, and very few ships can get into the middle of the Arctic sea ice. Satellites certainly help, but you can’t see the biology from satellites. You can see some of it, but you can’t follow it closely.”

“But in the Antarctic, you can put your hands in the water, and see what’s there. You can enumerate it, count it, take it into the laboratory, and study it. Antarctica is one of the earliest indicator regions: it’s like the canary in the mine. When you see the canary starts to look ill, you better get out of the mine. Well, similarly, if the canary starts to wake up, you’ll know that things are getting better.”

And McCarthy expects things to be better.

“I have granddaughters of about ten years of age, so when they are my age, 60 years from now, I wonder what the planet will be like. But I know that, if someone has faith in the sensibility of humanity, which I do, you might see one day how the worst outcomes were avoided. We’ll do the right thing.”

If that’s the case, it will be cold, dry, high Antarctica the first place where future generations will know that, at least, we fought back.

CHAPTER 7

INVISIBLE LIVES IN THE DUSKY FOREST



Donald Pfister, Harvard Asa Gray Professor of Systematic Botany and Curator of the Farlow Herbarium, followed the path of a scientific expedition that 100 years ago arrived at the windy doors of the Strait of Magellan, and recognized there the microscopic diversity of a unique place, once connected to a lost land.

Our conversation takes place at the Farlow Library and Herbarium, surrounded by an international collection of more than a million specimens of fungi, algae, bryophytes and diatoms. The frail imprint of these specimens, descendants of some of the oldest organisms on the planet, is trapped here in samples, slides, drawings, manuscripts and field documents.

“My introduction into Chile, I guess, as a place to begin, and it was in a kind of odd way, I began reading the diary that had been given to us by the family of Roland Thaxter. He was a mycologist; he studied fungi. In fact, we’re sitting here in this library, and this library is here because of his work establishing this institution.”

The academic I am speaking to is Donald Pfister, Harvard Asa Gray Professor of Systematic Botany and Curator of the Farlow. He goes back to 1905 to begin the story that led him to Chile.

“I am a mycologist, I study fungi, and this collection here in Harvard specializes in literature and specimens of fungi, lichens, mosses and algae. I handle the specimens and study them, and I’m responsible for them as a steward of the collections. But when I first came here, to Harvard, I became very interested in one of the botanists who had been here, Roland Thaxter.”

Born in Massachusetts, son of a lawyer and a poet, Thaxter was a distinguished botanist, mycologist and entomologist who “spent over forty faithful years in building up his beloved science of mycology,” quoting the words written in his Biographical Memoir for the National Academy of Science. He was named full professor at Harvard in 1901 and, “for a man of a retiring nature, he received as many honors as usually come to famous botanists,” the document continues. And so it was. At different points of his life, Thaxter was named President of the American Mycological Society, elected to the American Academy of Arts and Sciences and appointed foreign member of the Russian Mycological Society, among many other designations. Several fungi and lichens are named after him, as well as the genus Thaxteria.

Described as “an extensive traveler,” Thaxter began one of his most audacious field works in 1905: a trip to Chile. He was inspired by the extraordinary scientific expedition of Charles Darwin, who visited Patagonia, Tierra del Fuego, and other parts of the South American country during his five years as the naturalist on board the British vessel “Beagle.”

Pfister says that when Thaxter left for South America, “he was pretty much prepared for a year in the field. One of his specialties was to look at a particular group of fungi that occur on insects (laboulbeniales), and part of what he was doing was collecting these insects, looking for the fungi. He really started that whole field of investigation of these insect parasites. He was also kind of sent on a mission by William Gilson Farlow, founder of this institution, to collect seaweeds. So, he was ready.”

He took the maritime route from North America to England and then across the Atlantic, “with stops in the Azores and so forth,” details Pfister. He could have crossed Panama by rail, but he was afraid of smallpox. “He ended up in Buenos Aires, where he had contact with mycologist Carlos Spegazzini, who was kind of the reigning botanist of South America. Thaxter spent time there, mostly collecting insects and working with Spegazzini. He left on a steamship and went down the Atlantic coast to Punta Arenas.”

Located on the northern edge of the Strait of Magellan, just 76 miles north of Cape Horn, Punta Arenas (roughly translated to “Sandy Point” in English) is one of the southernmost cities in Chile, South America and the world.

“He writes very wonderfully about the time he spent there,” recalls Pfister, “He fell in love with Punta Arenas, in a way. He said it was the most productive time and the best place that he had been to in South America.”

In his “Notes on Chilean fungi,” published in 1910 in the *Botanical Gazette*, Thaxter writes: “During the months of February and March 1906, it was my good fortune to pass six weeks of the Antarctic summer and early autumn in the town of Punta Arenas, on the Straits of Magellan.”

“These months being in many respects the most favorable for botanizing in this cold and wind-swept region,” continues Thaxter, “I had an excellent opportunity to become acquainted with its fungus flora, which was much richer and more varied than might have been expected, in view of the comparatively scanty phanerogamic flora and the general severity of the climate.”

“Freezing temperatures were not uncommon and it was not unusual in the morning to see the green beech forest on the hills to the west of the town loaded with snow. The small pools, in the localities where I collected, were often frozen over as late as the middle of the forenoon, while icicles might be seen hanging from flowers and grass growing on the dripping south slopes of the ravine which led to my usual collecting ground,” Thaxter narrates.

It is the diversity of fungi blossoming under this harsh weather conditions what impressed the botanist at the beginning of the 20th century. “That a heavy forest of often very large trees should develop under such climatic conditions as having been described, is surprising; but that beneath its shade a considerable flora of the more fragile and perishable forms of fungi should develop, is even more difficult to understand.”

It was reading these notes, more than a hundred years later, that Professor Pfister realized “this was a wonderful part of the world,” as he describes. “I’d done fieldwork in other parts of South America, but not southern South America, and never Chile. But also, having reviewed and looked at this diary that is very, very highly detailed, I realized that there were fungi that

Thaxter collected that are right here in this collection here and that had never been fully studied. I began to dig those out and work through them, and realized that many of them were not even described.”

Thaxter ended his trip abruptly in 1906 when he was called home. His oldest son was seriously ill. During his following years at Harvard, the professor focused back on his founding work on laboulbeniales, the order of fungi that grows on insects. His Chilean trip was the subject of a talk at the Botanical Society of America, which he presided in 1909, and the subject of his somewhat brief “Notes of Chilean fungi.” At the time of his death in 1932, it was clear that “much of the material he collected” – notes Pfister – on South America, was still not thoroughly studied, as it is mentioned in his biographical memoir.

“Thaxter travelled to South America studying the fungi that he was particularly interested in, which were insect parasites,” explains Donald Pfister. This also explains the time he spent in Buenos Aires, since; at that time the Italian born botanist Spegazzini was “the only other person in the whole world who was studying these specific fungi. “He kind of wanted to know what was going on,” adds the professor.

During that same period, Harvard was also building up its fungi collection, so Thaxter also collected fungi in general. More than a century after later, Pfister noted with surprise that some of those still undescribed species were very rare. “I hadn’t seen anything quite like them before: they were unique kinds of fungi for me to look at and experience.”

Like Thaxter, Pfister headed south.

Beauty, mystery, discovery

“When we talk about fungi, we’re talking about a kingdom, in the same way, that we talk about green plants on land, or animals running through the forest. This is a kingdom,” asserts Professor Pfister.

The fungi kingdom is still a mostly unknown scientific territory in which scientists enter hoping to find a tiny unexplored part of our world. And their options for finding something new are, indeed, very high.

“We haven’t even done 10 percent of the work of describing fungal diversity,” assures the professor. “We’ve described just about 85 to 90 thousand of these organisms, but the estimates about the number of fungi in the planet are derived from the number of plants and animals. We know more or less how many plants there are, and we have some estimates about how many animals there are. We have some idea about how many fungi there would be associated

with any one plant, and it's about a ratio of three fungi to one plant. So, if there are 350,000 vascular plants or plants, then three times that would give us some estimates of the total number of fungi”.

“But we also know that there are more fungi associated with insects, fungi that are living on dead organic material...If you take these factors and put them together, the estimates are well over a million, a million and a half species of fungi in the world. So it means that there's the possibility to find something new everywhere, practically. And along our lives, even in an area like this, where there've been mycologists collecting in the field for a hundred and fifty years, or two hundred years, I can go out and begin to look carefully, and I can find things that nobody has identified or characterized.”

Pfister remembers his earliest days as an undergraduate and the thrill of discovery when he collected his first specimen: “a beautiful bright red fungus, one of these cup fungi.” He also remembers his disappointment when he saw it described in detail on a field guide. Pfister persisted, starting a 40-year career in mycology.

“Part of this intrigue is to know that you can go and study and look and that you, unlike me as an undergraduate, are going to go out and find something new and different. We are still in this really infant stage of development of the topic.”

Discovery is one of the most attractive aspects of mycology. Beauty is another one. “I'm fascinated by these little organisms. I was always taken by how beautiful they are. Just the idea that you got these perfect productions in nature,” he says.

By the late eighteenth century the first books dedicated exclusively to fungi began to appear. They were generally quite descriptive. “Many of them were beautifully illustrated because that was what you had: a picture of a mushroom and its color and its size and so forth,” Pfister describes.

“By early in the eighteenth century we began to get lists and catalogs of fungi, and those were all kinds of studies of diversity, based on morphology and how would they look like. Very little was understood in many ways about the reproduction of fungi and how they developed. But by the mid-eighteenth century, people were beginning to gain understanding about spores and some things about reproduction. All of this, of course, was discovered without knowing about genetics or modern biology.”

When Louis Pasteur ruled out the theory of spontaneous generation, the study of fungus moved into the laboratory, from growing fungus on plates to sequencing their genomes. “These days we continue those two lines: doing biodiversity studies and going out in the field. Collecting the organisms themselves and bringing them into the lab where we manipulate

them, extract their DNA and make sequence comparisons”. There is discovery and beauty in the world of fungi. There is also, “a little bit of mystery,” Pfister says. “One of the amazing things for me about fungi,” he says, “is that one can go out into the forest and look and collect and develop a whole new set of eyes for the natural world. Sometimes you feel like one day the fungus is there and the next day it is gone. Or you thought you didn’t see it yesterday and it’s there today. And this makes them seem like they are almost mystical: they come, and they go. So, when you are in the field looking for fungi, it’s almost like a treasure hunt. As you’re out, looking, you’re developing a way to see and perceive the world. And you don’t know what to expect. When we go back to an area where someone has collected a fungus previously, you may say, ‘well, what are the chances of finding it?’ But when you do find something new, it’s just a fantastic sense that you’re connecting yourself with the history of a place.”

In their sudden, sometimes unexpected appearance, it seems as if fungi, and life, came out of nowhere. “Spores are everywhere; even in the most unlikely spots you can find or isolate fungi. When I teach about plants, sometimes I reflect about when we were ancients, five hundred years ago or more, what a miracle a seed would be. This thing that you plant and get the whole plant. It’s a miracle. All that’s packaged in it, it’s all there. We can describe it very technically now, but if you put yourself in this ancient mind of not knowing any biology in the technical sense, here it is, this little thing: it’s going to be a plant. It’s amazing. It’s the same idea with fungi. We know that they produce spores, we know that we can take the spores, germinate them, we can grow them up in the lab, but think about these observations from the perspective of an untrained mind. This room is full of spores. If I put out a piece of bread on the table, it will grow fungi. We can explain how now, but if you let yourself go, it appears to be miraculous.”

The importance of an earth tooth

Unlike Thaxter, who sailed weeks to get to Punta Arenas, professor Pfister traveled from Massachusetts to the southern Chilean city in just a couple of days. Still, he had the feeling of being in a remote, unique place.

“I tend to approach things in a kind of historical context as well as a biological one. The historical part of it is that you can’t go there without thinking about those early ship passages and what it was like in those days. These days you can fly into Punta Arenas, and it’s windy, or raining, or whatever it is, but it’s not like coming in a ship. Back then, that was the only way you could get there, knowing that you were separated from the rest of the world by months. These days you’re in contact, and you’re able to do emails and phone calls, but, for me, the landscape is still so special.”

Pfister describes the landscape around Punta Arenas. “Because of the geology, you got these

very dramatic peaks and valleys. You got glaciers, ice, and snow and the windswept trees that are so characteristic of that part of the world. There's a kind of immediacy about the place. You feel the weather; you see the effects of climate on the landscape; you are connected to it in a certain way."

Charles Darwin wrote about "the dusky forest" around Punta Arenas. Elizabeth Agassiz, naturalist, educator and founder of Radcliffe College, traveled with her husband – geologist Louis Agassiz – from the Caribbean to the end tip of South America. In 1872, she wrote about leaving Punta Arenas, after staying several days: "It is the only settlement in the Strait of Magellan, and lies midway between the Atlantic and Pacific Oceans. Its position marks a sudden and decided change in the general aspect of the region, the shores in the eastern portion of the straits being open and low, and the passages between them wide as compared with those of the western portion. I like to remember that afternoon. To me it was full of vague anticipation, for we were on the threshold of the region where we had been taught to believe, mountains rise sharply up from narrow ocean channels, and glaciers dip into the sea; where the scenery at once delights and stimulates the imagination, suggesting more than it reveals. The weather was beautiful, a mellow autumn day with a reminiscence of summer in its genial warmth. The cleft summit of Mount Sarmiento was clear against the sky, and its snowfields swept over by alternate light and shadow, seemed full of soft undulations. Cloven peaks are, by the way, a common feature of mountains in the Strait of Magellan, as we afterward found."

Thaxter writes a lot about the environmental degradation that had been going on in the area, a century ago, a consequence of ranching and sheep raising. "Many of the forests were cut and burnt. The landscape was quite desolate. The forests were gone. Today around Punta Arenas, there is a lot of open pasture land where you can see the trunks of trees. And I think many of those tree trunks were probably there when Thaxter was here, a hundred years before," says Pfister.

Pfister arrived in Punta Arenas as leader of a trip organized by the Harvard Alumni Association and the Museum of Natural History. The trajectory of the trip was a lake crossing, from the Chilean city of Puerto Montt to Bariloche, in Argentina, and also included a visit to Punta Arenas. In the same year, Pfister got funding to make several trips to some of the localities where Thaxter had collected specimens. He worked in collaboration with Matthew Smith, a postdoctoral fellow at Harvard at that time. The primary areas for collecting were southern and central Chile. Pfister and Smith determined the locations, seasonality and plant associates of some of the species gathered by Thaxter.

"The primary locations where we recollected were Punta Arenas, the lakes region of Chile and around the Osorno town and the volcano. We were able to go back and look at some of these areas where Thaxter had collected fungi and, much to my surprise, we were able to, a hundred years later, go back to some of these locations and find some of these undescribed,

elusive fungi that he had collected. That was unusual for us because many of these areas have been highly disturbed, the trees cut and so forth, but we were back to areas that have been more or less restored or that were coming back after a lot of land use changes.”

Smith – now curator of the Fungal Herbarium at the University of Florida – accompanied Pfister on two trips to Chile. “Matt was very interested in looking at the fungi that grow on the roots of trees, and there, the southern beech also known as the *Nothofagus* tree.”

In 1850, the name *Nothofagus* was coined from two Greek terms: *nothus*, meaning ‘false,’ and *fagus*, meaning ‘edible,’ referred to the beech of the tree. More than 30 species of trees and shrubs are part of the *Nothofagus* group, including Chilean coihues, lengas, ñirres and raulías, which cover the hills toward the snow lines in the Andes Mountains. They were a natural resource in the early days of settlement in Chile and were used for building and fuel.

“The *Nothofagus* forest can be large and impressive as you walk through it, very park-like. The trees give a wonderful appearance to the landscape, and Darwin, when he was on the voyage of the *Beagle*, described it as the dusky forest, because they are kind of a gray-green,” Pfister details.

There is something more about *Nothofagus*. In 1873, the English Naturalist Joseph Dalton Hooker, who sailed from Tasmania to Tierra del Fuego on board of one of the last great scientific expeditions of the nineteenth century, raised the idea that the similarity between the flora of the different continents in the Southern Hemisphere was proof of their common origin.

“There is this idea that there was a big continent, Gondwana, a land that broke apart. South America, Australia and Antarctica were part of the southern part of that land,” explains Pfister. “Today, *Nothofagus* only occur in South America, Australia, New Zealand and New Guinea. But if we go back and look at fossil records, we can find fossil pollen of *Nothofagus* in Antarctica, and this has to do with the geological history of the Southern Hemisphere.”

Fungi like the ones Thaxter collected in Chile could tell part of the history of this gigantic, ancient mass of land.

“In his three months in Punta Arenas, Thaxter went out into the field almost every day. He collected fungi and insects with their parasites, algae. But in the *Nothofagus* forest, he saw something that looked like a tooth coming from the ground. He had no idea what it was, but he gave it the nickname of *Geodon*, or ‘earth tooth.’”

The *Geodon*, described in 1979 as *underwoodia singeri*, is a mycorrhizal fungus, which means it lives in a symbiotic relationship with the tree.

“As many woody plants, *Nothofagus* has this biological feature that is mycorrhizal. But the fungi that are with the *Nothofagus* also have a similar Southern Hemisphere distribution. So, about this *Geodon*, there are two species in southern South America, and there are at least two, I think, in Australia of the same genus of fungus and in the same association with *Nothofagus*. In doing these studies, part of what you’re thinking about is what is the bigger implication. The bigger implication here is that we are looking now at this southern breech broad distribution in the Southern Hemisphere and thinking about what it is, how did this get established, how are they perpetuated. What can it tell us about the evolution of the organisms over time in these distinctive habitats and what can it tell us about this distribution of these? Did they ride the continents or did they get distributed through the air or the sea? We are still working on the similarities of the flora and then asking these questions about it.”

“Chile is so long and so narrow, it’s pushed against the sea and the mountains. This causes a tremendous variation in climate and vegetation patterns, and so, when one began to look at this and think about the organisms that are there, it’s a tremendous range of different kinds of habitat that the fungi can inhabit.”

“When I talk about the *Nothofagus*, they’re mostly found in central and south Chile, and that’s primarily where we worked. The big similarities that we found in southern Chile with fungi are that their closest relatives are likely to be in Australia and New Zealand. And it has to do with the geology of the earth. These continents we look at now were once connected, and the vegetation, the animals, the plants have an origin in the supercontinent of Gondwana, which later began to break apart. Pangea was the big continent, the southern part of that was Gondwana, which included South America, Australia, South Africa and Antarctica. When we look at the distribution of some of the plants, we can reconstruct those distributions by looking, in the case of *Nothofagus*, at the pollen record. And we can see distinctive types of pollen throughout the deposits across these continents. We know that Antarctica at one point had *Nothofagus* growing on its lands. In different positions, different areas, but certainly *Nothofagus* species existed. And this connection that we see is an ancient connection that existed because of the proximity of these continents at one time.”

Pfister found new, undescribed species in his trips to Chile, which he recognizes as a unique spot, not only because of its natural conditions. “Chile is the only country in the world that has legislation that includes fungi in looking at and trying to evaluate a site for development or construction. So, in many parts of the world, plants are considered, but fungi have never been considered along with these environmental parameters for development.” He mentions the work of Chilean Giuliana Furci, from the Fungi Foundation, as the spirit behind this legislation. “It’s a very special thing so far as conservation of fungi goes. And Chile is way far ahead of any other part of the world in doing this.”

“Chileans connect to fungi in a particular way,” says Pfister. “They have stories with them.”

“Whether it’s at a park or a restaurant or in the street when I tell people that I’m interested in studying fungi, they’ll have a story about some fungus they ate, or they’ll have a question about what’s that fungus on the tree over there. My impression has been that Chileans are very much connected with the natural world around them, and that they have a curiosity about that world and fungi specifically. There is also a culture in southern Chile of using the fungal products. If I mention a *Cyttaria darwinii*, fungi that forms a golf ball-like structure on the trees, the fruiting bodies are eaten and traditionally they’re used in a fermented beverage. But also the wood from the tree which is deformed by the fungi is used to make furniture or bowls or other items.”

This close relation to fungi is not always a constructive one. A cup fungi species, morels, are not only eaten, but also exported from Chile. “Morels are a good example of some issues in Chile about fungi and fungal harvest. These are important fungi for commerce. They’re collected many times dried and sent overseas, and so forth. But the morels are thought to fruit much more frequently when there’s been a burn, and one of the things that are problematic is that, because of their economic importance, there’s a motivation to find the places where this occurred or to make the place more fruitful by burning the forest. This is one of the big conservation issues in southern Chile, and particularly the damage done to forests through mushroom collecting.”

Fungi are vulnerable. Mycorrhizal fungi can only live if a *Nothofagus* tree is present. If forests are destroyed, and lands are converted to grassland, these fungi lose their environment.

“In this case, there were obviously fragments and pieces of the forest that survived and in some cases, increased after a period, so they hang on in habitats that were left and presumably extended into other habitats. But many fungi are very vulnerable to environmental change. If we think about good environmental indicators that involve fungi, it’s all in the lichen. Lichen is a combination of algae and fungi, and many have been used in environmental studies to judge air quality. If you want to preserve something, you have to see them.”

“Fungi fit into ecosystem balance in a couple of different ways. One way is that they are critical to nutrient cycling, because saprophytes break down organic material in ecosystems, releasing nutrients that support new growth. Another way is this idea of mycorrhizal fungi and the connection they have with plants that enhances the roots of the plant. And for good primary production, you need to have this fungus present, and you need the fungi in the nutrient cycle. It would be an odd ecosystem if you don’t to have fungi.”

At the southern end of the American continent, facing Antarctica, fungi grow. Pfister thinks about Chile’s next steps, like building a scientific infrastructure that goes along with this legislation that protects and conserves the unique fungi on its territory. His trips and experiences in Chile give him hope.

Donald Pfister ~ Tiny Species And A Big Lost World

“We think about this changing world and changing environment and so forth, but the fact that we could go back a hundred years later, to some of the same places and see what Thaxter saw a century ago, it’s something quite remarkable. You know that a lot of things have happened in this part of the world, but one can still go and see things as they once were.”

CHAPTER 8

WITNESS OF A POLITICAL TRAGEDY



Thomas John Bossert, current Director of the International Health Systems Program and Senior Lecturer in Policy at Harvard T.H. Chan School of Public Health, was an international student in Chile in 1973. The Military Coup in Santiago changed his perspectives on politics and life. And the experience still holds value for those who care about democracy at any time, in any place.

In November 1970, Doctor Salvador Allende became President of Chile. The first democratically elected Marxist leader in the world, he promised a peaceful road to socialism.

Allende's coming to power in the midst of the Cold War attracted international attention. It seemed at that time as if the fate of the revolutionary movements in Latin America would be sealed within the narrow borders of the southern nation. If Allende could impose socialism without using force, he could become an example for other countries to follow.

Both Fidel Castro and Richard Nixon tried to exert their influence over the Chilean transition process, in opposite directions. Intellectuals, political leaders, activists and students from different parts of the world visited the country. Some wanted to be part of the historical experience; others just wanted to see it through their own eyes. Allende proposed a new model for the state, the economy, and society -- "a revolution, Chilean style," one that would taste "like red wine," Allende had said.

Thomas J. Bossert, current Director of the International Health Systems Program and Senior Lecturer in Policy at Harvard T.H. Chan School of Public Health, was one of the international students that arrived in Chile during that time. The experience would influence him profoundly and would change the path of his ideas and career.

"I was then a doctoral student in the Political Science Department at the University of Wisconsin-Madison," starts Bossert. "At that time, a lot of us were interested in unusual and different kinds of philosophies. And as a doctoral student, I found anarchism very attractive. I had been very interested in political philosophy, anarchism, socialism and I had worked on and studied a variety of different political philosophies."

Bossert became interested in Chile as he was preparing a doctoral thesis about the international copper industry. The country is one of the largest producers of copper in the world, and in 1971 Allende had nationalized two American copper companies, Anaconda and Kennecott. Soon Bossert decided that a thesis about the democratic road to socialism would be way more interesting "than a dull thesis on copper," he says.

"I was interested in looking at the democratic road to socialism, the Allende government and its proposal to try and make a new society through a democratic process rather than revolution," he explains. "So I decided to focus my thesis on how the different parts of the political spectrum that supported Allende argued for their different policies."

Bossert arrived in Chile in January 1973, the beginning of the end of the socialist government. He landed in an unequal, polarized and volatile country. The flags of the Unidad Popular (Popular Unity, the left-wing government coalition) fluttered in street marches while Allende's political opponents sounded their pans in protest at night.

“I went to Chile, and I spent time reading and talking to people. I was trying to criticize the Allende government from an anarchist perspective, which was not in the coalition that was in support of him. I looked at the spectrum of different perspectives, the Socialist Party, the Radical Party, the Christian Democrats. There were far leftists who thought Allende wasn’t moving fast enough. And there was the Communist Party, which, ironically, was the most moderate and the one that wanted him to do things in a much slower manner.”

The experience changed Bossert’s political ideas. “When I watched what was happening there, I decided that it was tough enough to try to do the reforms the way Allende was trying to do it. I decided that anarchism was not the way to go. In Chile, I became much more of a Marxist, and I supported the general perspective and the basic arguments that the Allende government had.”

Throughout nine months, Bossert saw people, students and workers marching on the streets; he talked to them, and read and studied about the political debate in Chile. During this same period, the tensions within the government – and the fierce opposition of its various enemies, inside and outside the country – were about to explode, costing the lives of thousands of people. The growing political polarization in Chile, the one that Bossert had seen in his fieldwork, was reaching a point of no return. “[It was] a nation of enemies,” as authors Arturo Valenzuela and Pamela Constable would describe Chile decades after.

Bossert also faced a very delicate situation on a personal level. Back in the United States, his mother was dying of cancer. “My family called me. They said to me: ‘If you want to see your mother, you have to come back now.’” He left Chile only three days before the tragic, bloody end of the ‘Chilean way to socialism.’

On September 11, 1973, and under heavy fire from the Chilean army forces, Allende shot himself inside the government palace La Moneda as it rose up in flames. The military seized power of the country and initiated a 17-year-long dictatorship, led by General Augusto Pinochet.

A somber return

Bossert returned to Wisconsin. “I was very depressed during that whole period,” he remembers. “My mother had just died. I had lots of friends in Chile, and I wanted to help them, but I couldn’t go back. And I still needed to finish my thesis.”

He wrote a new proposal. “At that time there was a lot of theory about the political importance of building institutions. I figured out that the Chilean military government would dismantle the socialist institutions. So I wrote a proposal centered on this concept, and I chose to study

the Chilean National Health System. But nobody in their right mind would have let me go back to Chile to study anything in 1974, so they didn't support it."

However, the director of the Center for Midwestern Universities responsible for developing healthcare projects and programs saw the proposal and asked Bossert to be his deputy. "We agreed that I would work in the mornings on my thesis on Chile, and in the afternoons I would manage part of the projects."

One of those projects was based on the east coast of Nicaragua. He took over it. "I would go back and forth to the country. At that time, the only way we could communicate was calling a ham radio operator in Texas or somewhere, and that person would call Wisconsin collect. I watched my director talk to a resident doctor doing a complicated surgery. He would say: 'Look there, see if you see something that's a little orange.' Then he'd say: 'Over,' and the guy would say something back. It was incredible."

Bossert finished his thesis in 1976. He got married and started teaching political science and philosophy at Wisconsin-Madison, McGill University, then later at Swarthmore and Dartmouth College. "And over that period I found that I really couldn't believe the things that I once believed. I started to become much more a kind of egalitarian liberal, somebody who believes in things that are more practical, more understandable to most of the population. If you believe in something that is too far away from practical applications, you can't really have much communication with the people that are making decisions. I decided that I wanted to be more involved in having some influence on actual policies."

It was at Harvard where he developed his interest in health policies. After Nicaragua, Bossert got a postdoctoral fellowship at the Harvard School of Public Health, now the Harvard T.H. Chan School of Public Health, for a research project on primary health programs in Central America. "And that's how I got started working as an academic in health."

After teaching political science for 10 years, Bossert quit academia to work as an independent consultant on healthcare projects. "Mostly in developing countries. I started to work in francophone Africa and Indonesia. And quickly I became more successful than I had expected, and became a top manager of health projects."

He received a call from USAID, the US agency for international development, to manage health projects in Washington for Latin America. "I visited probably 18 countries in Latin America during a four years period."

In 1990 and through a peaceful process, Chileans recovered democracy, and Christian Democrat Patricio Aylwin became the first president elected after Pinochet. He was supported by a left-center coalition that included radical and socialist parties.

Bossert recalls that USAID gave USD\$10M to the Chilean government “because Ted Kennedy was interested in supporting the new democracy, and in doing it through healthcare. Because I had been to Chile, they sent me down, to see what they were doing.”

Bossert returned to the South American country for the first time since 1973.

“I tried to see what Chileans were doing in healthcare, how they were doing it and why. They were doing a good job.”

In 1994, he went back to Harvard. Now, he could study the Chilean National Health System and how it had been drastically reformed under Pinochet. It was an attractive subject for him, for historical and political reasons.

“Towards the end of the Second World War, in 1950, both Britain and Chile started to develop a state-run national health system. In both of those systems, a large part of the funding came through the regular budget tax-revenue, similar to Medicare in the United States. But it also then – the same institution, the Ministry of Health – provided all the services to most of the population through a whole network of hospitals and clinics. It was a very state-run, monolithic system, with a fairly weak private sector. Some of the population could choose to go to the private sector, even though they were covered by the public sector. But that tended to be fairly limited, just going to your private physician in the afternoon, for example.”

“The system continued to provide and improve, and Chileans were rightly very proud of the positive effects that they had on population health,” Bossert continues. “They really significantly reduced infant mortality, maternal mortality, communicable diseases, and Chile moved from a country that had been very poor, to one that was a model for many others.”

“When the military government came in, a group of economists that called themselves the ‘Chicago boys,’ working under the concepts of economist Milton Friedman at the University of Chicago, took over Chile. They wanted to privatize and to encourage more private services and private insurance. They radically changed the system so that a portion of the population, usually the wealthier part, could take the separate tax on their income that was used to support the public system, and use it to buy private health insurance,” explains the academic. “That was a lot of money. They were wealthier; they could buy a quite elaborated insurance program that would allow them to have private rooms, very good services, and pick the best doctors that they wanted. Wealthy people like to have more choices, as they do in most other countries, and Chile became a model for that kind of reform.”

The ‘Chicago boys’ reformed the health system “in a kind of brutally shortsighted way,” says Bossert. The military government restricted the public health budgets, such that even if

democratic governments tried to put a lot more money into them, “they still did not come near the kind of quality that the private sector had.”

But even if the Chilean health system became a model that people referenced, “there was still a lot of concern about the inequality that was being generated. Only about 25% of the population was able to buy private health insurance,” details Bossert.

The healthcare system designed under Pinochet remained in Chile beyond his rule, with some significant reforms, such as AUGE (Universal Access for Integral Services and Explicit Guarantees), a public system to ensure access to medical care for specific critical illnesses, which is one of the program’s best features.

“In most of the health systems that we know, prioritizing doesn’t happen by design; it happens by waiting lists. What this reform said was: here there are 56 health problems, we’re gonna prioritize them, and if they’re not attended to in a certain period, the patient can get those health services from the private sector.”

With its ups and downs – there has been a massive increase in lawsuits against private health insurers in Chile – Bossert assures that there is no country that has the ‘best health policy’ in the world. “There are always trade-offs. But when people ask me around the world, what country you can ‘use for,’ as the best health system, Chile is one of the better ones.”

A warm January course

By the beginning of the 2000’s, Bossert had built a three-decade-long relationship with Chile. When one of his students proposed a Harvard Winter Session course on health during January in the South American country, he mostly welcomed the idea. A course in Chile, with its dramatic and successive reforms in the area of healthcare, was perfect for Harvard.

Harvard Chilean alumni Jaime Sapag and Miguel Navarro offered their help, and so did the David Rockefeller Center Regional Office in Santiago.

The first course took place in 2003. “It’s designed to introduce students to both health reform, and family medicine and primary health care in Chile. It’s been widely successful, one of the best courses in the summer in our winter terms.”

In the hot and dry Chilean summer, the students meet with the highest health authorities and with people in Congress. They learn about physicians who work on a daily basis in rural areas and the initiatives to include native Mapuche healers in the healthcare system. They visit institutions on both sides of the Chilean health system: the austere public system and the often-luxurious private one.

“What is interesting is that they learn that some of the differences between public and private are just ideological. Although public services are often not as good as the private ones, some of that is just because they haven’t been renovated and haven’t gotten new funding. But the idea that public and private have a different management model, or that you can’t motivate people in the public sector, is not as clear. This is again part of my idea of not pushing people into the mindset of ‘Oh, I’m a market-type’ or ‘I’m a socialist,’ but to make them understand that you can try to solve different problems in different systems and come up with similar results.”

This diagnostic leads to a broader reflection from Bossert: “Many of us who were on the far left always thought the only way to do things and to equalize things was to have public services. And people on the market side are just realizing that their market orientation needs to be modified to get a more equal option. So we’re moving together trying to figure out how we can make a mixed system. There are different contexts in which something may work better than another. We’re trying to develop more evidence that will support one method or another, but so far, the jury is out.”

Chile is one of the more unequal countries in the Organization for Economic Cooperation and Development (OECD), according to the Gini coefficient, and healthcare provision is a theme on permanent debate. “I try to understand people’s positions,” says Bossert. “I’m morally sympathetic to those who can cross the lines and talk to people on the other side. This is part of the lessons that I think many have learned in Chile.”

The risks of polarization

In September 1973, the Chilean socialist revolution ended in tragedy. More than 30,000 people were detained, tortured, killed or disappeared under Pinochet’s regime. Two American journalists were killed in the coup’s aftermath, Frank Teruggi from Chicago and Charles Horman from New York. The story of Horman’s father, looking for his disappeared son in Santiago, was narrated in the Oscar-winning movie “Missing” in 1982.

“When I was in Chile, my parents and people back in New York were reading the New York Times, and they were more worried than I was. For me, it had all become normal: the crisis, the feeling of crisis. I joined the JAP [referring to the “Committees of Supply and Prices” for rationing the shortages of food and basic supplies]. I had my Chilean ID, and there I was, with long hair and a beard, looking like a foreign leftist, which I very much was at that time.”

Bossert left Santiago to see his mother before she died. He was living in an apartment downtown in the Chilean capital. The days after the coup and in his absence, the military raided the place. “There I had all of my books and my notes, everything. They took about half

of the books out and burned them in the street.”

“The notes for my thesis were written in English, so the raiders did not know if they were seditious,” he points with a half-smile, “but they knew that most of the books were not seditious. And there were so many people from Allende’s government in my building that they just went through it systematically.”

His roommate in Chile, a student from Switzerland, was expelled from the country. “It might have been dangerous for me to be there, but I wasn’t there, so…” he says.

Sitting at a coffee shop in Santiago, the academic reflects about the impact of those nine months under Allende.

“In the longer run, Chile caused me to change some of my political arguments and beliefs. I focused on the health area; I became someone who really wanted to make changes. Today, I’ve worked for the World Bank, for USAID; I do all kinds of projects all around the world to try to improve the lives of people by changing policies in health. I do a lot of work that is practical, that goes along the lines of pushing the world closer to what I used to believe in, but it is much more restricted regarding what I expect to come out of it.”

“Probably the experience of living through Chile made me more cautious about making sure not to alienate people on the other side, to try to find more moderate solutions. I accepted the fact that you can’t move as fast as you would like. And I guess, although I still keep the dream of a kind of society that’s way different from ours, I’ve been working too long in this society, and I realize that that’s a dream. But I hope that some of my students continue that dream and try to do more.”

During one of his winter courses in Chile, Bossert had a long session with then Minister of Health Pedro García, one of the healthcare authorities who led the health reforms made by the democratic governments that followed Pinochet.

“He told our Harvard students to be careful with democracy. He told us how Chileans thought they were going to be a democratic country forever and never imagined that they would end up living under a dictatorship.”

“That makes me worry about the United States to some extent,” he adds. “When you are in a political system that moves to a more polarized situation where some people believe they are the only ones who know the truth and that the others are evil, you undermine the consensus that could lead to some positive changes.”

“We are polarizing in ways that are not as extreme as what was happening in Chile in the 70’s,

but still threaten the underlying need to work towards consensus and towards compromise among different positions... I worry about that in the United States, and I worry about many other countries that I've seen, where the conflicts within societies can undermine the democratic processes and lead to authoritarian regimes. And they are not pretty. They are pretty awful places to live in."

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