Centro de Investigaciones Científicas de las Huastecas "Aguazarca", A.C.

Five-Year Strategic Plan

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Table of Contents

Executive Summary

The Centro de Investigaciones Científicas de las Huastecas “Aguazarca”, A.C. (CICHAZ) is poised to be the premier center of scientific research in the biogeographically distinctive Sierra y Huasteca region of central Mexico.

Fig 1. Map showing Mexico and highlighting the municipality of Calnali

Since 2005, CICHAZ, A.C. has established itself as a resource for the Mexican, U.S., and international research community. The station has attracted over 200 researchers and visitors, fostered 70 publications, and CICHAZ-based research has attracted over US$2,000,000 in funding.

CICHAZ is based in the small town of Calnali, Hidalgo (Fig. 1), and has cultivated relationships with local K-12 schools, nonprofits, governing bodies, and the broader community to establish itself as an ally and resource for learning and scientific advancement.

Thanks to a 2017 infrastructure grant from the National Science Foundation’s Field Stations and Marine Laboratories (FSML) program, CICHAZ, A.C. has been able to make a wide variety of structural improvements to better meet its mission. Activities include the addition of solar panels for energy efficiency, upgraded laboratories and

The Río Calnali (*Photo by Gaston Jofre Rodriguez*)

fish rooms, an expanded collection of outdoor mesocosms, the acquisition of cutting-edge data collecting and analysis equipment, and an increased capacity to host overnight visitors. This plan will elaborate on how the station will continue such improvements and further enhance its offerings.

Visiting scientists present their research to the Calnali community in the town *Zócalo* (main square).

The CICHAZ Mission

The CICHAZ mission is to bring science and service together by promoting science, education, and community outreach in the Sierra y Huasteca region of Mexico. CICHAZ is a non-profit organization committed to bringing together scientists from around the world, encouraging collaboration with groups usually underrepresented in the sciences, and creating learning opportunities for the region's population.

The CICHAZ Vision

The vision of the CICHAZ field station is to establish a state-of-the-art, leading international center for research, learning, and service in the heart of the Sierra y Huasteca region of Mexico.

The research supported at the field station is diverse – from social science to genomics to ecology – and the education prioritizes both formal and informal learning. The strategic vision is to have CICHAZ serve as a nucleus for hands-on, place-based, STEM training of a diverse group of students from the U. S., Mexico, and elsewhere.

Station History, Resources, and Activities

CICHAZ A.C. (Asociación Civil, Donataria Autorizada) is a recognized tax-exempt non-profit in Mexico, and CICHAZ USA is a sister non-profit (501(c) 3 corporation) based in the U. S. We are a scientific research station registered with CONACyT, the Mexican federal research agency (RENIECyT # 1901319) and a member of the Organization of Biological Field Stations (OBFS). The station is located at 1000 m elevation in the Aguazarca neighborhood of Calnali, Hidalgo, Mexico, on a small remnant of mesic tropical forest in a mosaic of agricultural and residential-use land (latitude: 20.8985°N, longitude: -98.6014°W).

La Aguja. The mountain in the background, la aguja (the needle), is visible throughout the Calnali municipality.

The co-directors of CICHAZ, Gil Rosenthal and Rhonda Struminger, founded the station in 2005 and lead the underlying NGOs in the United States and Mexico. The facility is supervised by the CICHAZ Executive Coordinator, Ing. Gabriela María Vázquez Adame, the facilities manager, Clemente Hernandez Cisneros, and economic support is anticipated through 2025 thanks to Rosenthal's NSF-LTREB grant. Mr. Hernandez and family maintain the physical plant of CICHAZ, provide daily animal care, and work to accommodate visitors and respond to immediate needs. Additional support is provided by the personnel of the Asesoría Social Productiva, A.C. (ASPAC), an NGO based 200 m down the street from CICHAZ. ASPAC, A.C. provides English-Spanish translation and technical supervision of construction and major maintenance projects, including those already completed for the LTREB and those described in this proposal. Over the past five years, CICHAZ has consistently had an on-site bilingual scientific coordinator at least during the peak dry season between March and May.

Buildings, research areas, and equipment

The front of the CICHAZ field station. In 2018 CICHAZ, along with ASPac and Fundación Siquieros Sin fronteras, A.C., sponsored muralists from South America and Mexico to paint homes and establishments along the main road of the Aguazarca neighborhood. This Corredor Muralistico honors the culture and natural history of the area. The CICHAZ murals were painted by Argentine muralist Sergio Herrera and Mexican muralist Jesús Rodrígue and highlights the rivers and endemic fish that have been central to research at the field station.

The main building of CICHAZ is a two-story former family home on the main highway connecting Calnali to Pachuca and Mexico City. The station is equipped to comfortably host up to 20 people, with five bedrooms (each with a bunkbed and either a double bed or two single beds), three full bathrooms, a fully equipped kitchen, a comfortable reception/entertainment area, a porch, a dining area, and a washing machine. There is also an office space on the second level.

The remainder of the property is approximately 2 acres (.81 hectares) of mature mesic rainforest with shade-grown coffee in the understory, astride a 150-m stretch of the Río Calnali. The outdoor space provides ample opportunities to conduct experimental biology including an outdoor concrete patio and a wired, well-drained sheltered space to conduct high-throughput behavioral experiments.

For safety during the COVID-19 pandemic, CICHAZ management established guidelines for all visitors to follow upon initial arrival and throughout their stay; we are not allowing more than 9 people to be in residence at any one time. We require masks of visitors when inside CICHAZ buildings, and visitors are assigned bedrooms and bathrooms so that no more than 3 people are

sharing a bathroom at any one time. We have made cleaning supplies available for visitors to wipe down all commonly used counters, appliances and handles and ask everyone to follow social distancing and hygiene protocols.

Power Sources

An array of **26 solar panels** sustainably produces electricity on the roof of the field station and enables CICHAZ to send power back to Calnali's grid and save money. Thanks to a line conditioner, critical CICHAZ equipment operates free of 'dirty power'. In case the power does go out, CICHAZ has a natural gas **generator** available so we can continue running the science refrigerator, the -80C freezer, and the critical air and filtration system necessary for live specimens in the wet lab. A 300-L **solar water heater** provides enough hot water for three bathrooms, as well as the kitchen sink and laboratory during peak demand.

Vivaria

There are two recently upgraded inside "wet" rooms that provide some 500 sq ft of space and hold 84 aquaria (14 large, 28 medium, and 42 small). The tanks are fitted with pumps, filters, aerators and other equipment for the maintenance of fish and other aquatic species while

Indoor aquaria as well as in ground and above ground mesocosms are available for visiting researchers to store their specimens.

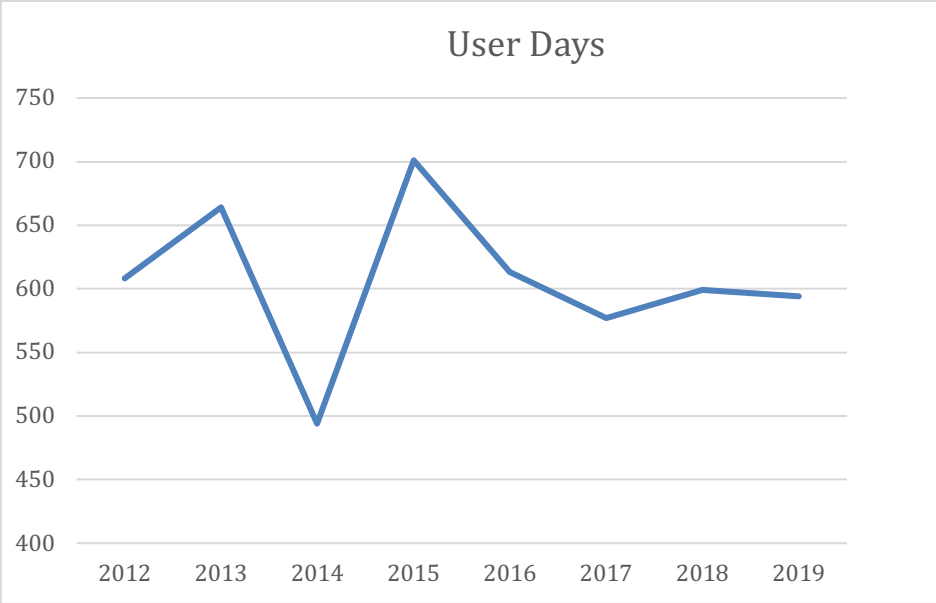
researchers are at the station. An outdoor array of 64 mesocosms (24 above ground and 40 in the ground) are used for a variety of studies, including the LTREB project that provides core support for CICHAZ.

Cyberinfrastructure
Thanks to recent improvements in regional access to the Internet, the field station is taking advantage of a booster system that amplifies signals and makes high-speed Internet available and more reliable. CICHAZ continuously seeks ways to improve its Internet connectivity and speeds to assure fast communication with collaborators, as well as the ability to upload and download large amounts of data.

Laboratories and Research Equipment
The CICHAZ molecular laboratory is climate controlled with a well-filtered air conditioner and a sink, and features 10 linear meters of benches. The molecular lab is set up for basic chemistry and nucleic acid library preparation. A standard laboratory is available for "dirtier" tasks like dissections, parasitology, and specimen imaging. Current equipment in the laboratory includes: compound and dissecting microscopes, digital balance, desiccator, centrifuge, incubating shaker, lighting for digital photography, a refrigerator, and a dedicated microwave.

Newly renovated clean and dirty laboratories provide ample workbench space and equipment for on-site research.

Research and Training Activities
In the last fifteen years, CICHAZ has hosted over 200 researchers from over 25 institutions worldwide. Research has resulted in 70 publications with several more in preparation or in review. Seventeen Ph.D. dissertations, ten master's theses, and four postdoctoral researchers have been completed from work done all or in part at CICHAZ. Researchers have represented a wide range of disciplines ranging from wildlife conservation to evolutionary genomics to political science. The field station has supported research projects in behavioral ecology, physiology, life history, and evolutionary biology of livebearing fishes, impacts of invasive species on native cichlid fish, effects of federal education policy at the local level, political aspects of the efficiency of local public works programs, parasitology, and behavioral genomics of social wasps. User days have remained consistently around 600, primarily because of CICHAZ renovations underway between 2017 and 2020.



We reached our peak in 2015 with our major second Day of Science event, which featured scientists from around Mexico, the U.S., and the world. The Day of Science was founded in part by our FSML Planning Grant and sought to bring together academic experts and local stakeholders to guide us in developing a five-year strategic plan for field station development. This event was invaluable in terms of putting the station on the map, and has resulted in researchers from three major Mexican universities – the state universities of Michoacán and Veracruz, as well as UNAM – working with the station on a variety of programs.

Outreach Activities
Our relationship with ASPAC, a local NGO focused on conservation and sustainable development, has played a critical role in our outreach activities. ASPAC was a major partner in the 2015 Day of Science and Sustainable Development conference, and runs our science summer

camp program that started in 2016. The STEM-focused summer camp hosts approximately 60 students and 15 volunteers over the course of a week, at a cost of about US$500. Students who participate learn about the environment, pollution, and other issues through game play and hands on activities. Participant enthusiasm throughout the program has been high and confirmed a demand for structured but informal outreach activities targeting K-12 students.

Annually we run a guided nature hike to educate the community on the work of scientists visiting CICHAZ, as well as to highlight the areas' biodiversity and ecological attributes. Over the years we have invited expert guests to be a part of these hikes including a myrmecologist, riparian ecologist, and animal behaviorist. In 2020, due to COVID, instead of the nature hike we developed nature trails featuring educational markers to encourage community members to safely distance while learning about and engaging with nature.

Upon request our affiliated researchers also visit schools and Indigenous communities to do outreach presentations.

Sustainability, Research, and Education Goals

Based on feedback from the Days of Science, community conversations, and visiting scientists we have established the following 15 sustainability, research, and education goals.

1. Sustainability Goals
    1.1. Maintain a net zero-level energy use carbon footprint
    1.2. Install a recirculating water system
    1.3. Establish and maintain recycling and reuse systems
    1.4. Decrease reliance on imported equipment, supplies, and personnel
    1.5. Establish a long-term financial plan

2. Research Goals
    2.1. Maintain and expand station cyberinfrastructure
    2.2. Support and facilitate more long-term research projects and researchers
    2.3. Diversify research projects across the natural and social sciences
    2.4. Maintain laboratories and identify additional equipment needs
    2.5. Implement the mobile laboratory

3. Education Goals
    3.1. Hire a full-time science educator
    3.2. Host faculty-led field courses at CICHAZ
    3.3. Attract and host undergraduate service projects at CICHAZ
    3.4. Implement an informal STEM outreach curriculum in Spanish and Náhuatl
    3.5. Expand virtual collections and highlight natural history and processes on site
    3.6. Connect art, science, and sustainability initiatives in partnership with the community

The recommendations for meeting these goals are outlined below.

Sustainability Goals

Goal 1.1. Maintain a net zero-level energy use carbon footprint

Solar panels cover the roof of CICHAZ

Thanks to the installation of 26 solar panels and a solar heater in 2018, CICHAZ's energy use leaves a net zero carbon footprint. While we use propane for the field station's stove, generator, and back-up water heater, the solar panels are creating enough energy to provide for the electrical and water heating needs of visitors, and regularly returns power to the public grid.

To maintain and decrease our energy use carbon footprint, all electronics and light bulbs will be replaced as needed with more energy efficient ones, and we will continue to encourage short showers and less hot water usage.

Goal 1.2. Install a recirculating water system

To minimize water use we are installing a recirculating water system for the 40 outdoor mesocosms. Water will flow into a common biological filter and a pump will then return it through a UV sterilizer and an ozonotar to the tanks.

Goal 1.3. Establish and maintain recycling and reuse systems

In 2018 the municipality of Calnali banned the use of plastic bags and for well over a decade 5-gallon reuse water bottles have been available (once the water is empty, these bottles are returned and refilled). As well, glass beer bottles are to be returned to the stores where purchased or there is a fine. All CICHAZ visitors are strongly encouraged to use their own reuse water bottles and reusable plates, glasses, and cutlery or biodegradable products are used at all CICHAZ events.

However, plastic and tin containers are still readily available in stores. To minimize these items ending up in landfills, CICHAZ has set up labeled recycling bins throughout the back patio and kitchen areas. Moreover, we encourage reuse by providing reusable shopping bags on market day for all CICHAZ shoppers and reusing glass containers for long-term storage.

The collected PET and paper products as well as metals and aluminum cans are sold to local recyclers. Bottle caps are collected to be donated for fundraising purposes at a nearby children's

cancer center. CICHAZ is committed to supporting local efforts to create a waste separation center.

Goal 1.4. Decrease reliance on imported equipment, supplies, and personnel

CICHAZ prides itself on its international collaborations and initiatives but is a Mexican institution focused on place-based research in Mexico. While continuing to nurture international partnerships, CICHAZ will pursue financial backing, supply systems, and personnel development that allow it to perform vital functions in the absence of support from abroad, if needed.

Goal 1.5. Establish a long-term financial plan

Fee Structure

The CICHAZ field station asks users to pay their own share of overhead expenses (electricity, propane, etc.) and funded researchers living and/or working at the field station are asked to pay $60 USD/day for accommodations and bench and office access. Students and researchers without dedicated funds receive discounts in order to accommodate those without financial means. Fees for maintaining animal colonies, frozen tissue, or long-term experiments are assessed on an as needed basis.

Instructor-led student groups from regional universities are encouraged to use the facilities at CICHAZ for educational class field trips that are typically short stays of 2-3 days. The cost of room and bench fees for groups of up to 5 people is $250 MXN per person per day, and each additional group member is $50 MXN per person per day, the maximum group size is 20 people (including group members who decide to camp in the backyard). We can arrange for a meal starting for up to 5 people $300 MXN and each addition person is $60 MX. This fee structure is modest and fees are comparable to or better than rates at local hotels in Mexico when considering the research space and resources, fully equipped kitchen, and wireless Internet access. Fees were determined based on overhead expense calculations and maintenance costs of the station and resources.

CICHAZ USA

CICHAZ USA was established in 2016 and is a non-profit organization committed to bringing science and service together through outreach activities designed to promote teaching and learning in underserved communities in the United States. CICHAZ USA also supports the activities of CICHAZ, A.C., its sister non-profit organization incorporated in Mexico. CICHAZ USA is committed to bringing together scientists and educators from around the world to encourage their collaboration with groups usually underrepresented in the sciences.

The 501(c)(3) status creates a tax-deductible opportunity for U.S. donors interested in supporting our activities in Mexico.

Endowment Plans

While CICHAZ seeks to cover all operating costs through room, board, and bench fees and partnerships as discussed above, there is a need to establish an endowment of approximately US$1,000,000 that would earn 2-3% interest annually. The endowment would cover property maintenance, employees, and activity expansion in years where the fees and other funding runs short.

Research Goals

Goal 2.1. Maintain and expand station cyberinfrastructure

CICHAZ has generally reliable Internet and we will continue to improve its available bandwidth to allow for smooth videoconferencing and large amounts of data transference (uploading and downloading). We aim to provide high quality Internet access that can support up to 30 users simultaneously.

Goal 2.2. Support and facilitate more long-term projects

Over the last five years the Schumer Lab based at Stanford University has planned long-term research projects at CICHAZ. In the next five years we plan to work with additional Principal Investigators from Mexico, the U.S., and elsewhere to base at least two more long-term research programs at CICHAZ.

Goal 2.3. Diversify research projects across the natural and social sciences

Located in Calnali, Hidalgo, the unique Sierra y Huasteca region of central Mexico, CICHAZ boasts access to an area high in biological and cultural diversity. This region is a recognized hybrid zone for *Xiphophorus* fishes and is on its way to also becoming recognized as the *Xiphosphorus* Biological Corridor which should make conservation of critical areas possible. CICHAZ has primarily attracted biologists but CICHAZ has also served as a base for botanists, ecologists, and parasitologists, among many others, and we hope to continue attracting a diverse array of scientists and research projects. Accordingly, in 2019 CICHAZ began expanding its research initiatives by collaborating with Mexican and U.S. investigators interested in riparian ecosystems and habitats as well as sustainable ranching and agrarian methodologies. We also have a collaboration with ASPAC which gives us access to 45 hectares of land (La Tejería) that can be used for additional research projects.

In addition to the natural environment, the Calnali municipality is home to 16,960 people (2010 census) and is made up of 15 localities (13 rural and 2 urban centers: Papatlatla has 2,580 residents and Calnali, the main locality, has 3,416 residents). Social scientists have studied Mexican education policies and its impact on schooling decisions, especially for young women, in this rural area (Struminger 2013), as well as municipality services such as electricity and trash (Ross 2010), and has compared water services between two localities (Hurst 2013). We would like to further diversify the topics investigated and are actively recruiting social scientists with a special interest in rural studies, environment education, eco-tourism, and the role of women in agricultural economies.

Goal 2.4. Maintain laboratories and identify additional equipment needs

We now have the components in place for basic nucleic acid extraction and library preparation, and will have a Qubit fluorometer as well as storage down to -80 ◦C with the installation of a -80 freezer. Beyond standard gel electrophoresis, we have not found it yet cost-effective to set up sequencing or other genotyping on-site at CICHAZ. The ability to make cDNA and sequencing libraries, and to quantify and visualize PCR products, means that samples can be prepared and evaluated to send out for sequencing.

Goal 2.5. Implement the mobile laboratory

Current and likely researchers have requested core equipment that cannot readily be transported in and out of the region, or to difficult-to-reach locations. A mobile laboratory will transport large research equipment to normally inaccessible sites. A YSI system for water chemistry and a backpack electroshocker for aquatic vertebrate sampling are among the resources scientists have asked CICHAZ to provide. The mobile laboratory will be outfitted with secure storage compartments for such equipment as well as animal transport containers for captured specimens. The mobile laboratory will also be invaluable for outreach efforts to surrounding schools and Indigenous communities – bringing materials for informal STEM activities to underserved populations (See Education Goal 3.4). To accommodate the laboratory needs, CICHAZ is purchasing a vehicle in Fall 2020 that will be equipped with electrical outlets, refrigeration, and sink(s).

Education Goals

Goal 3.1. Hire a science educator

The field station needs a permanent science educator in residence who can serve as an ambassador to the community. This educator should be fluent in Spanish, Náhuatl (the local Indigenous language), and English, and have scientific training. The primary responsibility of the coordinator would be to support visiting researchers in their scientific endeavors –identify

sampling locations appropriate for research purposes, accommodate laboratory and animal storage needs as possible, and help promote citizen science activities. If more long-term post doctorate fellows or interns come to CICHAZ, the coordinator should also support them in their work. The educator should also meet with local community members on a regular basis to organize STEM teaching and learning activities to fulfill Goal 3.2.

School visit. ASPAC and CICHAZ volunteers prepare to present research and basic science information to local middle school students.

Goal 3.2. Host faculty-led field courses at CICHAZ

CICHAZ welcomes professors who want to lead field courses in the Sierra y Huasteca region. During the COVID-19 pandemic in 2020, when undergraduates could not visit stations in person, CICHAZ became a coalition member of the NSF RAPID grant, The Virtual Field: An Opportunity to Mitigate for the COVID Pandemic. For this project, CICHAZ created a virtual habitat explorations video featuring the rivers and mesic tropical forest of the area. This video was selected, along with 8 others from other parts of North America, to be used in the inaugural launch of the project's web site. The Virtual Field project targets faculty who would normally have taught an undergraduate field course, and creates an opportunity for CICHAZ to introduce the region and lay the groundwork for inspiring future trips to the station and surrounding area.

Goal 3.3. Attract and host undergraduate service projects at CICHAZ

To increase the number of students and young researchers who visit CICHAZ and the community, we are committed to supporting those who need to fulfill service requirements for completing their undergraduate degrees. Projects at CICHAZ will include developing and maintaining an orchid garden, composting system, and restoration initiatives.

Goal 3.4. Implement an informal STEM outreach curriculum in Spanish and Náhuatl

The annual nature hike. Hike participants learn about water quality and soil erosion from a CICHAZ researcher.

CICHAZ should continue to promote informal science learning for all demographic and age groups and help identify embedded community knowledge through outreach events and community-oriented initiatives. Accordingly, CICHAZ will continue to host its Days of Science events – guided/instructional nature hikes, presentations, and projects with the local community where scientists can learn from and engage with the Indigenous population as well as visitors drawn to the event. To keep costs down, every other year CICHAZ plans to host an expert who can bring a new perspective to topics of interest to the community.

In addition, CICHAZ, with its partner ASPAC, will continue offering STEM-based summer camps for youth, continue to establish itself as a resource to local schools, and will develop after school and weekend programs that target all ages and demographic groups. To support these efforts, once the mobile laboratory has been purchased and prepared for research purposes, CICHAZ will add microscopes, water sampling equipment, digital cameras, a smartboard that pivots to face externally for data, video, photo, and other educational sharing, and is exploring the possibility of a satellite for Internet access. The curriculum discussed below could be implemented with a full-time scientist educator in residence (see Goal 3.1) committed to co-created citizen science projects initiated by the community and facilitated with CICHAZ resources.

The after-school curriculum should be available in Spanish and Náhuatl and will focus on community, conservation, and biodiversity, and support the following four educational goals: 1) help increase knowledge in the community on the area's biodiversity and water quality; 2) provide a resource for the community to initiate their own projects of inquiry; 3) show how biodiversity and water quality impact agricultural endeavors – the economic foundation of the community; and 4) foster citizen science so participants can create and share knowledge for science and policy purposes.

Leveraging the Informal Stem Learning Framework (Struminger et al 2018) and the six Strands of Science Learning developed by the National Research Council (2009), the CICHAZ

curriculum and associated activities (e.g., Days of Science, summer camps, community and service activities, counselor trainings, school visits, and workshops) will address the priorities outlined in Table 1.

Table 1. Proposed science and community knowledge targets

Age/Level	Science Learning/Community Learning
All; Especially elementary (prima)	Science Learning (Strand 1): **Experience excitement, interest, and motivation to learn about phenomena in the natural and physical world.** Community Learning: Generate excitement, interest, and motivation to be a part of a particular place with special natural and physical features
All; Especially middle school (secundaria)	Science Learning (Strand 2): **Come to generate, understand, remember, and use concepts, explanations, arguments, models, and facts related to science.** Community Learning: Support the development of place-based and observation skills to recognize aspects of science within the community context (local knowledge)
All; Especially high school (prepa)	Science Learning (Strand 3): **Manipulate, test, explore, predict, question, observe, and make sense of the natural and physical world.** Community Learning: Incorporate the scientific method into community-driven inquiries about the natural and physical world.
All; Especially Universidad	Science Learning (Strand 4) **Reflect on science as a way of knowing; on processes, concepts, and institutions of science; and on their own process of learning about phenomena.** Community Learning: Share and incorporate peer-reviewed resources and materials as well as methodologies in projects.
All; Especially adults (adultos)	Science Learning (Strand 5): **Participate in scientific activities and learning practices with others, using scientific language and tools.** Community Learning: Encourage contributory, collaborative, and co-created citizen science activities that brings the public into the scientific process.

Age/Level	Science Learning/Community Learning
All; Especially families (Familias)	Science Learning (Strand 6): **Think about themselves as science learners and develop an identity as someone who knows about, uses, and sometimes contributes to science.** Community Learning: Encourage contributory, collaborative, and co-created citizen science activities that brings the public into the scientific process.

Goal 3.4. Expand virtual collections and highlight natural history and processes on site

Visitors and users of CICHAZ are encouraged to contribute to pertinent databases in their academic disciplines and/or as citizen scientists. Data collected by visitors and participants in outreach programming should be shared, depending on the project, through iNaturalist, eBird, FishChum, or the Citizen Science Alliance, all of which facilitate the internet-based collection and dissemination of data associated with citizen science projects.

In Addition, CICHAZ will establish an exhibit hall on our premises. The front of CICHAZ features a mural that pays homage to the natural and cultural history of the region, and highlights the rivers and fish that have been central to research at the field station. When visitors enter the main CICHAZ building we want them to feel welcomed and inspired to explore their surroundings. Accordingly, we want to redesign the entrance way (a 4x4 meter room) to evoke such feelings. The exhibit hall would highlight findings from the natural and science projects based at CICHAZ as well as student projects generated from workshops, summer camps, counselor trainings, and other outreach activities. Rotating photos and the work of local artists, interactive exhibits, and fish tanks are ideas under consideration.

Goal 3.5. Connect art, science, and sustainability initiatives in partnership with the community

To promote the natural habitats of the Calnali Municipality, CICHAZ will continue to collaborate with sin Fronteras and promote sustainable development and ecotourism with the community.

Long-term Personnel

Co-Directors will continue to lead and manage the underlying NGOs in the United States (CICHAZ USA) and in Mexico (CICHAZ, A.C.), and oversee operations and development at CICHAZ

Executive Coordinator – Ing. Gabriela María Vázquez Adame of ASPAC is a major partner in outreach and sustainability activities, and our collaboration has expanded to include research projects as well as technical supervision of construction and major maintenance projects. She focuses on facilitating research and ongoing experiments at CICHAZ and works closely with visiting researchers before and during their visits to the field station.

Facilities Manager - Clemente Hernandez Cisneros and family will continue to maintain the physical property of CICHAZ, provide daily animal care, and work to accommodate visitors and respond to immediate needs.

Science educator – Goal 3.1 is to hire a science educator who is multi-lingual (fluency in Spanish, Náhuatl, and English highly desirable), and who can work with the science and outreach coordinator to:

1) Host visiting researchers throughout the year (not just in the peak dry season between March and May)
2) Advise interns for semester-long projects
3) Further build relationships with the local community to establish citizen science projects as after school programs or as part of the school curriculum
4) Establish CICHAZ as a resource for environmental conservation efforts, ecosystem knowledge, and environmentally and culturally sustainable entrepreneurial initiatives

Accountant - In Mexico CICHAZ needs support managing finances and filing all required tax and expenditure reporting. Accountant Alfonso Cortes (cp.acortes@hotmail.com) has primary responsibility for all Mexican accounting; co-Director Dr. Struminger handles all CICHAZ USA accounting.

Consulting Attorneys – Maintaining CICHAZ's status as an Asociación Civil (A.C.) and Donataria Autorizada, a non-profit, tax-exempt status in Mexico that allows CICHAZ to apply for funding and qualify for other benefits, requires filing the necessary paperwork and keeping up with changing legal requirements. Accordingly we have retained two attorneys – one who

specializes in civil associations and another to handle international issues that arise; co-Director Dr. Struminger makes sure that CICHAZ USA retains its non-profit status.

Research Partnerships – We have a formal partnership with Texas A&M University through its Mexican business presence, MPS Services. The partnership permits inventoried Texas A&M property to be housed at CICHAZ and facilitates transfer of funds to CICHAZ.

Administrative Assistant to the Coordinator – The logistics of running a field station and multiple research projects requires someone to be on call 24/7 at the station and one person cannot do that work alone. An administrative assistant will help the Coordinator make sure CICHAZ runs smoothly which includes making sure all bills are paid on time, inventories are restocked or procured for research and habitation purposes, and that visitors are checked in and out after their stay.

CICHAZ Executive Committee

To develop an integrative research station and to guide CICHAZ in achieving its research and outreach mission and goals, the CICHAZ Executive Committee (CEC) was formed in mid-2012 and re-evaluated in 2016. The CEC consists of biological and social scientists, researchers, educators, and business community members from the U.S. and Mexico, as well as members of the local Calnali community. The CEC supports the co-Directors as needed to fulfill strategic goals. In addition to the co-Directors, CEC members are:

- Ing. Gabriela María Vázquez Adame
- Dr. Eduardo Salas Reyes
- Sr. Clemente Hernández-Cisneros
- Doña Irma Hernandez
- Dr. Molly Schumer
- Dr. Manfred Schartl
- Dr. Yamila Hussein

Broadly described, the local Committee members include those familiar with the CICHAZ objectives and who can help CICHAZ leadership navigate the local politics and community priorities. They are well connected within the community to advise on those who can support and promote the work of CICHAZ. National-level advisors are able to help with the research and outreach efforts of the field station and are familiar with how to navigate the Mexican bureaucracy and laws as well as funding opportunities. International-level advisors are able to help CICHAZ achieve its research objectives and outreach support including fundraising.

Five-year Strategy for CICHAZ

Over the next five years CICHAZ needs to implement the work recommended above. The following appendices lay out the five-year strategy for meeting our sustainability, research, and education goals: a planning chart is featured in Appendix A and outlines the targets CICHAZ needs to meet each year; Appendix B lists the anticipated operating and capital investment costs expected and a description of those costs follows in Appendix C.

Appendix A. Maintenance and Planning Chart

5-Year Planning Chart	2020	2021	2022	2023	2024	2025
Personnel						
Facilities Manager	X	X	X	X	X	X
Executive Coordinator	X	X	X	X	X	X
Administrative Assistant		X	X	X	X	X
Accountant (on retainer)	X	X	X	X	X	X
Attorney (on retainer)	X	X	X	X	X	X
Science Educator				X	X	X
Facilities/Equipment						
Mobile Research & Learning Laboratory		X	X	X	X	X
On-premise field Vehicle	X	X	X	X	X	X
Clean lab	X	X	X	X	X	X
Recirculating water system		X	X	X	X	X
Research Dissemination & Education						
Symposium		X		X		X
Day of Science		X	X	X	X	X
Science Workshops		X	X	X	X	X
STEM Summer Camp	X	X	X	X	X	X
After school programming				X	X	X
Citizen Science Projects					X	X
Funding & Financials						
NSF or CONACyT	X	X	X	X	X	X
Donations	X	X	X	X	X	X
Foundation grants	X	X	X	X	X	X
Boarding & bench fees	X	X	X	X	X	X
Research collaborations	X	X	X	X	X	X

Appendix B. Estimated Costs ($USD)

	2020	2021	2022	2023	2024	2025
OPERATING COSTS						
Personnel						
Facilities Manager	$8,742	$9,004	$9,274	$9,553	$9,839	$10,134
Exectuve Coordinator	$30,000	$30,900	$31,117	$32,050	$32,782	$33,765
Administrative Assistant		$3,000	$3,000	$3,000	$3,000	$3,000
Accountant (on retainer)	$500	$500	$500	$500	$500	$500
Attorney (on retainer)	$500	$500	$500	$500	$500	$500
Science Educator				$15,450	$15,914	$16,391
Research Dissemination & Education						
Day of Science (Workshops & Symposia in alternate years)		$2,000	$350	$2,000	$350	$2,000
STEM Summer Camp & Counselor Training	$500	$500	$500	$500	$500	$500
Learning Laboratory/after school programming		$3,000	$1,000	$1,000	$1,000	$1,000
OBFS Membership	$150	$150	$150	$150	$150	$150
OBFS Conferences		$1,000	$1,000	$1,000	$1,000	$1,000
Maintenance						
Utilities (e.g., Internet, electrical, water, propane)	$3,000	$3,300	$3,600	$3,900	$4,000	$4,000
Taxes	100	150	200	250	300	300

	2020	2021	2022	2023	2024	2025
General upkeep	$1,500	$1,500	$1,750	$1,750	$1,800	$1,800
Lab maintenance	$1,000	$1,000	$1,000	$1,000	$1,000	$1,000
CAPITAL INVESTMENT COSTS						
Mobile Lab + supplies	$25,000					
TOTAL	$70,992	$56,504	$53,941	$72,603	$72,635	$76,040

Appendix C. Description of Estimated Costs

	General Description
OPERATING COSTS	
Personnel	
Facilities Manager	Manages the property – part time
Executive Coordinator	Coordinates researchers visiting the property and all outreach activities – full time
Administrative Assistant	Supports CICHAZ administrative activities in Mexico
Accountant (on retainer)	Files CICHAZ taxes and government accounting forms
Attorney (on retainer)	Assures A.C. status and keeps CICHAZ apprised of associated laws
Science Educator	Oversees education initiatives based at CICHAZ
Education	
Days of Science	Promotion materials, transportation, and supplies for activities (volunteers run activities); Every other year will be a symposium year and we will bring in visiting scholars and cover room, board, and provide a stipend as necessary.
Workshops	Materials and food for activities.
STEM Summer Camp & Counselor Training	Materials and food for activities; volunteer counselors are housed at CICHAZ at no charge
Symposium	Materials and food for activities.

	General Description
Learning Laboratory/after school programming	Materials depends on activities but initial year plan to purchase waterproof digital cameras, microscopes, nets, terrariums, binoculars, and water testing chemistry sets.
OBFS conference and dues	Fees cover costs of maintaining membership in OBFS – an organization dedicated to helping member stations increase their effectiveness in supporting critical research, education, and outreach programs.
CAPITAL INVESTMENT COSTS	
Facilities	
Lab maintenance	Supplies and repairs
Mobile lab and related research equipment	Provide visiting researchers with a vehicle for transporting heavier equipment and expand the outreach programming to more rural communities. Cost includes a smart board (up to $5000) and Internet Satellite.

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