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Centro de Investigaciones Científicas de las Huastecas “Aguazarca”
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Centro de Investigaciones Científicas de las Huastecas “Aguazarca” (CICHAZ)
Five-Year Strategic Plan
November 2016

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Executive Summary

The Centro de Investigaciones Científicas de las Huastecas (CICHAZ) is poised to be the premier center of scientific research in the biogeographically distinctive Huasteca region of central Mexico. CICHAZ has spent the last 10 years establishing itself as a resource for the Mexican, U.S., and international research community. The station has attracted over 150 researchers and visitors, fostered over 55 publications, and CICHAZ-based research has attracted over US\$2,000,000 in funding. CICHAZ is based in the small town of Calnali, Hidalgo, 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.



Participants in the 2015 Day of Science and Sustainability Conference pose between presentations in Calnali, Hidalgo (MX).

This strategic plan arises from a 2014 planning grant from the National Science Foundation’s Field Stations and Marine Laboratories program. In addition to a visit to an “aspirant peer” field station, UNAM’s Estacion Biológica Los Tuxtlas, the grant funded a four-day conference as part of CICHAZ’s annual Day of Science to bring together



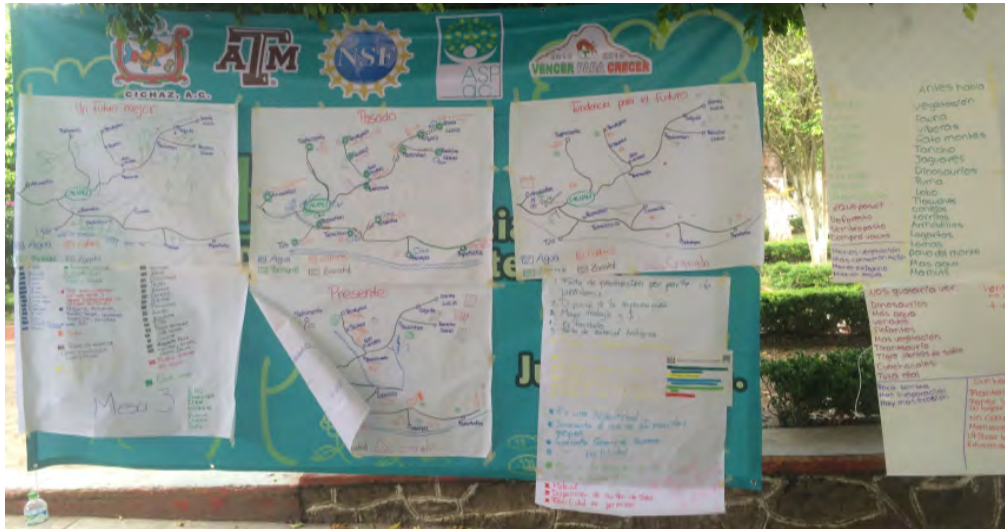
Roundtable sessions between visiting scholars and members of the Calnali community at the 2015 Day of Science and Sustainability Conference.

researchers from Mexico, the United States, and Panama with interests in the region’s natural and community resources. Throughout the conference this group of visitors had opportunities to engage with the local community, to develop ideas for collaborative research, and to explore the region. Round table discussions between the local community and visiting researchers, exploratory hikes, and presentations brought participants together to interact with local nonprofits, educators, and other interested members of the



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community; a special roundtable was organized around teaching and informal learning in particular. Discussions centered on how CICHAZ can be a larger contributor to the region's efforts to grow sustainably and promote environmental responsibility, as well as help with science education. A follow-up workshop was held in conjunction with the 2016 Day of Science, and focused on building a regional network of conservation researchers and on setting up structured K-12 science learning activities over summer vacation.



Roundtable session notes included maps of land use and environmental health in the past and present, as well as a vision of the future and the role of community members.

Based on these activities, this strategic plan outlines: 1) the CICHAZ mission and vision; 2) station history, resources, and activities; 3) the research and education goals of the field station; 4) the personnel needed to implement the goals and manage the station; 5) the plans for achieving financial sustainability; 5) the role of the Executive Committee; and 6) the five year strategy for CICHAZ to meet its objectives.



Visiting researchers present their work to the Calnali community in the town Zocalo (main square).



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The CICHAZ Mission

The CICHAZ mission is to bring science and service together by promoting science, education, and community outreach in the 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 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 training of a diverse group of students from the U. S., Mexico, and elsewhere.

Station History, Resources, and Activities

Administration and staff

CICHAZ is constituted as a tax-exempt nonprofit in both the U. S. (501(c) 3 corporation) and in Mexico (Asociación Civil, Donataria Autorizada). We are a scientific research station registered with CONACyT, the Mexican federal research agency (RENIECyT # 20083) and a member of the Organization of Biological Field Stations (OBFS). The



La Aguja - the main landmark visible throughout the Calnali municipality.

station is located at 1000 m elevation in the Aguazarca neighborhood of Calnali, Hidalgo, Mexico, on a small remnant of Veracruz moist forest in a mosaic of agricultural and residential-use land. The co-directors of CICHAZ, Gil Rosenthal and Rhonda Struminger, founded the station in 2005 and lead underlying NGOs in the United States and Mexico. The facility is supervised by Clemente Hernandez Cisneros and his family, and economic support is anticipated through 2024 thanks



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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 ASPAC, A. C., 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 main building of CICHAZ is a two-story former family home on the main highway connecting Calnali to Pachuca and Mexico City. The remainder of the property is approximately 2 acres of mature mesic rainforest with shade-grown coffee in the understory, astride a 150-m stretch of the Río Calnali. The station is equipped to comfortably host up to twelve people, with six bedrooms (at least two beds each), two full bathrooms, a fully equipped kitchen, two living/sitting areas, dining area, a utility room with a small refrigerator/freezer dedicated to research, and a washing machine.



The front/street view of the CICHAZ field station.

There is a fully functional aquarium lab (250ft²) in the station with glass aquaria, pumps, filters, aerators and other equipment for the maintenance of fish and other aquatic species while researchers are at the station.

A small molecular lab (300ft²) that is used for a variety of methodologies from simple molecular protocols dissections and parasitology to morphometrics. Current equipment in the laboratory provides for basic needs and includes: compound and dissecting microscopes, digital balance, dessicator, centrifuge, incubating shaker, lighting for digital



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photography and dedicated microwave. There is also an office area on the second level of the field station that currently has a single desk with additional available space.

The outdoor space at the station 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. An outdoor array of 24, 1 m X 2 m mesocosms is used for a variety of studies, including the LTREB project that provides core support for CICHAZ.

Cyber-infrastructure

Thanks to recent improvements in regional access to the Internet, the field station is now equipped with high-speed (10 Mbps) wireless Internet. This improvement addressed the most urgent infrastructure recommendation that emerged from the 2015 Day of Science and Sustainability conference.

Access and transportation

CICHAZ is directly on the main road from Calnali to higher-elevation points including Pachuca and Mexico City. A standard bus to Pachuca (6 hours) and Mexico City connects directly to a first-class airport shuttle bus (1 ½ hours from Pachuca). Taxi drivers can also provide the ride to Pachuca in 3 hours. Neither Hidalgo state, where CICHAZ is located, nor any of the areas between there and Mexico City have been under a U.S. State Department travel warning since at least before 1993.

Research and Training Activities (2012-2016)

In the last five years, CICHAZ has hosted 135 researchers from 16 institutions worldwide. Since 2012, research has resulted in 38 publications with several more in preparation or in review. Seven Ph.D. dissertations and two master’s theses 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 500 or more, fluctuating mostly because of long stays by individual researchers.

Year	2012	2013	2014	2015	2016
User-days	608	664	494	701	572

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 universities – the state universities



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of Michoacán and Veracruz, as well as UNAM –developing substantial research programs at the station.

Outreach and Strategic Planning Activities

The first Day of Science in 2014 featured three events. The first was in the town square and showcased research presentations, graduate student posters, and a poster competition between local high school students on the topic of a healthy environment. The second event was tours of the field station and the third was a guided nature walk. These events put our name out into the local community and initiated our relationship with ASPAC, a local NGO focused on conservation and sustainable development. ASPAC was a major partner in the 2015 Day of Science and Sustainable Development conference previously discussed, and helped with activities in 2016 including a successful pilot program for a science summer camp. The STEM-focused summer camp hosted 59 students and 14 volunteers over the course of a week, at a cost of about US\$500. Students who participated learned about the environment, pollution, and other issues through game play and hands on activities. Participant enthusiasm throughout the program stayed high and confirmed a demand for structured outreach activities targeting K-12 students.

We also have gone to schools and indigenous communities to do outreach presentations about four times each year, and established an annual guided nature hike to educate the community on the work of researchers visiting CICHAZ. Over the years we have invited expert guests to be a part of these hikes including a myrmecologist, riparian ecologist, and animal behaviorist. We plan to continue bringing guest experts to the community every other year rather than annually as these experts require CICHAZ to cover their room, board, and travel expenses.

We recognize that the perspective of an established, successful station operating in a similar cultural environment is invaluable for guiding long-term planning at CICHAZ. In addition to helpful suggestions from workshop participants who had done research at field stations throughout Latin America, we focused on the Estación Biológica Los Tuxtlas (Los Tuxtlas), a field station operated by UNAM. Accordingly, we sponsored a site visit in the summer of 2016.

Los Tuxtlas is located in a rural area 30 km from Catemaco, Veracruz, on 700 hectares of land. It was established as a small, rustic field station by UNAM's Biology institute (IBUNAM) in 1967 and was upgraded to its current form in 1984. The station is substantially larger than CICHAZ, with five detached laboratory spaces and about 20 rooms, with two beds and a pullout couch set up for long-term researchers. An additional dormitory serves short-term visitors. Some spaces are air-conditioned. The site visit, over two days, included a meeting with director Rosamond Coates and casual, open-ended interviews and discussions with researchers and employees. The station is continuously used and serves UNAM field courses as well as the long-term research projects of multiple UNAM researchers. The station charges MXP\$170 (~US\$9-10) per extramural visitor per day including lodging and meals (there are two full time kitchen



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staff). The key elements of success we identified were: 1) major institutional support from a flagship public university; 2) the large amount of forested land under station management and available for research; 3) the quality of accommodations for long- and short-term visitors; and 4) the commitment and enthusiasm of the nine station staff, which we attribute to being well-paid by local standards and being actively engaged in station research.

Research and Education Goals

Based on feedback from the Days of Science, hikes, roundtables, and visiting scientists, and our assessment of Los Tuxtlas, we have established the following eight research and education goals. The first four, to be funded by a proposed NSF-FSML infrastructure grant, will increase the visibility and attractiveness of CICHAZ to the international research community; this in turn should result in more return from user fees and more support for activities at the station. These monies will allow us to hire a full-time coordinator (goal 5) who can then oversee curriculum development (goal 6) and capital improvements to accommodations and common areas (goals 7 and 8).

1. Sustainably increase electricity and Internet access.
2. Develop state-of-the-art facilities for molecular research.
3. Develop state-of-the-art, flexible vivarium facilities.
4. Equip a mobile laboratory with core research equipment.
5. Hire a full-time scientific and education coordinator.
6. Develop informal STEM outreach curriculum in Spanish and Náhuatl.
7. Expand capacity to accommodate more long-term researchers.
8. Develop meeting, classroom, and short-term visitor space.

The recommendations for meeting these goals are outlined below.

Goal 1: Sustainably increase electricity and Internet access.

1A. Maintain Cyberinfrastructure. Reliable Internet is key for uploading and downloading data, and the station needs to establish reliable cyberinfrastructure. While there were major improvements in 2015 and 2016, CICHAZ should continue 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.

1B. Add Solar Power and a Generator. An array of **26 solar panels** would give CICHAZ the potential to operate free of ‘dirty power’ producing most or all of its electricity right on the roof of the field station. Located inside the Tropic of Cancer, the station receives a relatively large amount of overhead sunlight throughout the year. Over 44 months, peak monthly demand was 415 kWh while average peak demand in the 10 highest months was 430 kWh. With solar panels, the station would have the capability of producing up to 540 kWh/month. Additionally, a 3 kWh system would exceed current



peak power demand and allow for future increase in users and associated increase in electricity demand; it would also only require about 11 % of currently open roof space.

Second, a **solar water heater** should replace the current propane version that accounts for the greatest propane gas consumption at the station. A 300-L solar heater should provide enough hot water for the current two bathrooms and can support two more, as well as the kitchen sink and laboratory during peak demand. This heater would easily fit next to the solar panel array and would take up a nominal amount of additional space.

A third key upgrade involves reliable power and a **back-up, eco-friendly generator** that could be used in case of emergency. The generator would power ongoing experiments in the dry lab, a science refrigerator, a -80C freezer (see Goal #2), and would provide critical air and filtration for live specimens in the wet lab. This generator should run on natural gas so is more sustainable and more readily available in Calnali than gasoline.

Power outages at the field station are unfortunately more common than would be expected and can often last for up to a day and sometimes more in this rural area. While the solar panels would account for most of the station’s electrical needs and theoretically eliminate concerns of grid outage, thunderstorms and periods of heavy rain that result in grid power outages would also substantially reduce power generation by the solar panel array and thus a generator would be necessary in case of emergencies.

Goal 2: Develop state-of-the-art, self-contained facilities for molecular research.

The CICHAZ molecular laboratory is currently lacking key features required for sensitive work, notably a sink, climate control, and a fume hood. Renovations should build in well-filtered air conditioning, a built-in fume hood and sink, 10 linear meters of benches, and museum cabinets for storage. A Qubit fluorometer, a -80 freezer, a water purification system, and other standard lab equipment is also needed.

The laboratory should be equipped to perform on-site next-generation nucleic acid sequencing. A MinION DNA sequencer and VolTRAX automated library preparation device would allow researchers at CICHAZ to gather genotype data in the field with minimal preparation steps; notably, individual samples can be rapidly prepared and sequenced to the desired coverage, eliminating the need to barcode samples for multiplexed sequencing. This would allow researchers and students to go from collecting samples in the field to generating and analyzing large sequence data sets without having to ship samples off-site.



Dr. Gil Rosenthal gives a tour of the CICHAZ molecular laboratory during the 2014 Day of Science events.

Goal 3: Develop state-of-the-art, flexible vivarium facilities.

The construction of two **greenhouses** for housing aquatic and terrestrial animals and plants is recommended. These should include reservoirs for water storage and treatment, and adjacent facilities for behavioral testing and other procedures. In addition to serving the immediate and growing needs of researchers working on a variety of systems amenable to experimentation, the greenhouses can serve as a nucleus and proof of concept for a biodiversity stock center.



The 24 (2m x 1m) existing aquatic mesocosms on the CICHAZ property in Calnali.



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As with existing mesocosms at CICHAZ, greenhouses should be plumbed with a flow-through system, with outflows triple filtered to 100 μm to avoid accidental release of organisms and drained widely to a wooded flat area.

The greenhouses should either be constructed on existing CICHAZ land or on adjacent land that could be purchased. The greenhouses should be wired for electricity and built-in lighting, and ventilated with solar fans. Facilities and practices should comply with Texas A&M University IACUC standards and with other U.S. and international norms for research universities.

Goal 4: Equip a mobile laboratory with core research equipment.

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** has been suggested to transport certain types of equipment to normally inaccessible sites. A YSI system for water chemistry, a backpack electroshocker for aquatic vertebrate sampling, and a core drill for sediment core analysis are among the resources scientists have asked CICHAZ to provide. The mobile laboratory would need to be outfitted with secure storage compartments for such equipment as well as animal transport containers for captured specimens. The mobile laboratory would also be invaluable for outreach efforts to surrounding schools and indigenous communities – bringing materials for informal STEM activities to underserved populations.

Goal 5: Hire a full-time scientific and education coordinator.

The field station needs a permanent scientist in residence who can serve as an ambassador to the community. Accordingly, this coordinator should be fluent in Spanish, Náhuatl, 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 arrange logistics for researchers’ visits. If more long-term post doctorate fellows or interns come to CICHAZ, the coordinator should also support them in their work. The coordinator should also meet with local community members on a regular basis to organize STEM teaching and learning activities to fulfill Goal #6.



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



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Goal 6: Develop informal STEM outreach curriculum in Spanish and Náhuatl.

CICHAZ should 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. To keep costs down, every other year CICHAZ should plan to host an expert who can bring a new perspective to topics of interest to the community.

In addition, CICHAZ should further explore STEM-based summer camps for



Hike participants learn about water quality and soil erosion from a CICHAZ researcher.

youth, continue to establish itself as a resource to the local schools, and develop after school and weekend programs that target all ages.

The after school curriculum should 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.

Visitors and users of CICHAZ should also be 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 its Spanish-language counterpart, *iNaturalista*, *Soy Naturalista*, FishChum, or the Citizen Science Alliance, all of which facilitate the internet-based collection and dissemination of data associated with citizen science projects.

Goal 7: Expand capacity to accommodate more long-term researchers.

While visitors can comfortably stay at nearby hotels, as programming expands and courses or internships are added to the CICHAZ offerings, the facility should be able to comfortably sleep up to 30 researchers at one time. This requires adding both bedrooms



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and bathrooms. Adding a floor to the existing building or a separate structure on the property are suggested; an adjacent field could be purchased and the property expanded to accommodate the additional housing.

Goal 8: Develop meeting, classroom, and short-term visitor spaces.

Spaces throughout the facility and the outdoor *palapa* should be set up for meetings and presentation purposes.



Small group meets for a lesson on behavioral ecology on the back patio at CICHAZ.

The back patio has been used for small group sessions but as the facility expands, spaces should be created that are designed specifically for teaching and learning (proper desks, white boards, a projector system, etc.).

As more local and visiting groups use CICHAZ as a research and informational resource, there also needs to be space for them to orient themselves to the station and to the Huasteca region. A small library of science

and literature currently exists at the field station in both Spanish and English and this collection should continue to grow, as should the station’s collection of local flora and fauna that could be labeled and made available to the public in educational ways.

Long-term Personnel Vision

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

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.

Community Support - Collaboration with the personnel of ASPAC should continue. ASPAC is a major partner in outreach and sustainability activities, as well as technical supervision of construction and major maintenance projects.

Science and Education coordinator – CICHAZ needs an on-site multi-lingual scientific coordinator (fluency in Spanish, Náhuatl, and English highly desirable), who can:

- 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



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- 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

Postdoctoral Fellows - The field station should support one or two concurrent postdocs who want to spend 6 months to a year in the area for research purposes and who can support science and outreach coordination efforts as well as help with facilities management.

Accountants - In both the U.S. and in Mexico, CICHAZ needs support managing finances and filing all required reporting.

Financial Sustainability Plan

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 \$50 USD/day for accommodations and bench and office access. Though well below typical per diem rates for the majority of R1 institutions, these fees help CICHAZ achieve a level of financial sustainability. Students and researchers without dedicated funds receive discounts in order to accommodate those without financial means. Fees for resource intensive research such as long-term husbandry of fish indoors, which require aeration, filtration, etc. or experiments requiring 24hr/day use of electrical equipment, are assessed on an as needed basis.

Professor-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. Since students pay their own way on trips, and to encourage a good relationship between the field station and university groups, special fees have been designed for these groups based on the number of students in the group and range from \$60-100 MXN (approximately \$4-8 USD) per student. Discussions with collaborators at the Universidad Autónoma del Estado de Hidalgo indicate that CICHAZ is a prime location for student field trips given its relative proximity (compared to traditional, distant coastal locales), safe location, and the substantial benefit of offering educational/research space not available at hotels where students groups typically have to stay.

The fee schedule is modest and fees are comparable to and 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. The addition of solar panels and a water heater would help reduce anticipated costs, and fundraising activities are expected to begin in earnest as CICHAZ continues to expand its offerings.



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Executive Committee

To develop an integrative research station and to guide CICHAZ in achieving its research and outreach mission and goals, an executive committee was formed in mid-2012 and re-evaluated in 2016. The executive committee 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 Committee supports the co-Directors as needed to fulfill strategic goals.

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



Students at a local school prepare to hear a presentation by a visiting CICHAZ researcher.



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Appendix A. Planning Chart

5-Year Planning Chart	2017	2018	2019	2020	2021
Personnel					
Facilities Manager	X	X	X	X	X
Scientific Coordinator & Educator		X	X	X	X
Post-Doctoral Fellow			X	X	X
Facilities					
Lab renovation & Green houses, adding solar power and a generator	X				
Mobile Lab	X				
Expand mobile lab for outreach purposes			X	X	X
Expand bed capacity			X		
Education					
Day of Science	X	X	X	X	X
Citizen Science Projects	X	X	X	X	X
STEM Summer Camp	X	X	X	X	X
After school programming (using the mobile lab)			X	X	X
Funding & Financials					
NSF or CONACyT	X	X	X	X	X
Set up a donation structure @ cichaz.org	X				
Secure a U.S. accountant with a focus on international non-profit work	X	X	X	X	X
Maintain MX accountant & set up appropriate bank accounts	X	X	X	X	X



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Appendix B. Estimated Costs (\$USD)

	2017	2018	2019	2020	2021
OPERATING COSTS					
Personnel					
Facilities Manager	\$8,000	\$8,240	\$8,487	\$8,742	\$9,004
Scientific Coordinator & Educator		\$30,000	\$30,900	\$31,827	\$32,782
Post-Doctoral Fellow			\$15,000	\$15,450	\$15,914
Education					
Day of Science	\$300	\$700	\$350	\$750	\$400
STEM Summer Camp	\$500	\$500	\$500	\$500	\$500
After school programming and citizen science projects	\$100	\$100	\$2100	\$2100	\$2100
Maintenance					
Utilities (e.g., Internet, electrical, water, propane)	\$3000	\$3300	\$3600	\$3900	\$4000
Taxes	100	150	200	250	300
General upkeep	\$1500	\$1500	\$1750	\$1750	\$1800
CAPITAL INVESTMENT COSTS					
Facilities					
Lab renovation & Green houses	\$78,000				
Research Equipment & chest freezer (i.e., fluorometer and DNA sequencer)	\$32,000				
Mobile lab and related research equipment (i.e., drill and fishshocker)	\$50,000				
Solar (water heater & electricity)	\$30,000				
Generator	\$6,000				
Expand bed capacity				\$40,000	
TOTAL	\$209,000	\$43,990			



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Appendix C. Description of Estimated Costs

General Description	
OPERATING COSTS	
Personnel	
Facilities Manager	Manages the property – part time
Scientific Coordinator & Educator	Coordinates researchers visiting the property and all outreach activities – full time
Post-Doctoral Fellow	Will work with the scientific coordinator on research project(s) and outreach
Education	
Day of Science	Promotion materials and supplies for activities (volunteers run activities); Every other year bring in visiting scholars and cover room, board, and provide a stipend
STEM Summer Camp	Materials and food for activities.
After school programming/Citizen Science Projects	Materials (depends on activities)
CAPITAL INVESTMENT COSTS	
Facilities	
Lab renovation & Green houses	Upgrade the facilities to include a sink, purified water, climate control, a fume hood, benches, and storage for collections.
Research Equipment & chest freezer (i.e., fluorometer and DNA sequencer)	Provide equipment to improve research capacity
Mobile lab and related research equipment (i.e., drill and fishshocker)	Provide visiting researchers with a vehicle for transporting heavier equipment and expand the outreach programming to more rural communities.
Solar (water heater & electricity)	Keep the field station self sufficient to not overburden the communities’ power resources and model environmental responsibility.
Generator	Assure consistent quantities of power for research activities, and to support animal life dependent on electricity-dependent equipment.
Expand bed capacity	To allow for more people to stay simultaneously at the field station, expand the sleeping space for up to 30 people.