

Title:

International partnerships contribute to a One Healthier Community in Baja California Sur, Mexico.

Original article

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Abstract:

The Colorado State University Todos Santos Center (CSU-TS Center) in Baja California Sur (BCS), Mexico, is a hub for education and research where CSU and BCS communities benefit from cultural exchange and co-created discovery. The nascent One Health Institute (OHI) at CSU has as its purpose “*To benefit the health of animals, peoples and environments, by collaborating across boundaries, in a way that sees and integrates the whole system*” so that the CSU-TS Center and OHI share the common vision of framing challenges about complex systems into aspirational futures by engaging directly as communities. These relationships have also catalyzed a One Health movement in BCS, Mexico. We held a One Health Regional Workshop to build a co-creative dialogue and reflection among members from diverse nationalities, backgrounds, and affiliations within academia, public

health, and governmental agencies to collectively identify regional challenges and opportunities relevant to One Health in BCS. Water-related issues, nutritional health, and conservation of natural resources were identified as major, priority needs. Social awareness and governance were also recognized as essential components to consider. The findings from this process revealed strong synergies that will enable future collaborative actions among the regional and international stakeholders in BCS so that we may engage in sustained and focused research, education, and outreach projects. Together, we seek to co-create a One Healthier community in BCS, Mexico.

Keywords: Baja California Sur, Americas, One Health, partnerships, participatory process, community needs

One Health

The concept that human health is interconnected with the health of animals, plants, and ecosystems has been recognized since the 19th century [1], and much earlier by diverse native peoples and in ancient Greece. While this concept has been presented under a variety of different names, the extant One Health movement was initiated in part by the [Wildlife Conservation Society](#) through a symposium entitled "Building Interdisciplinary Bridges to Health in a 'Globalized World'," which called for an international, interdisciplinary approach to prevent disease and formed the basis of the "One Health, One World™" [6] concept and as a product of the Global Response to outbreaks of

Highly Pathogenic Avian Influenza Virus [2] and recognizes actions to maintain the health of animals, plants, and ecosystems need to be implemented to maintain and improve human health.

The Nascent One Health Institute at Colorado State University

As a major US land grant university, Colorado State University (CSU) focuses on education, research, extension, and engagement. Similarly, One Health at CSU is rooted in this land grant mission and recognizes elements of Leopold's "land health" [3], the principles of conservation medicine [4], the concept of a "health ethic" [5], and the Manhattan Principles [6] in its One Health ideation and development of the One Health Institute (www.onehealth.colostate.edu).

In 2008 the first One Health student club emerged at CSU, followed by significant internal activities in 2013-14 under the rubric of the One Health Initiative, culminating in the recruitment of the founding director for the One Health Institute in September 2015. Throughout Fall and Winter of 2015, strategic engagement and development of an internal One Health Strategic Advisory Council, representing all eight of CSU's Colleges and the CSU School of Global Environmental Sustainability (SoGES, <http://sustainability.colostate.edu>), led to a multi-day "Partners in One Health" workshop through which OHI's foundational Purpose, Principles, and Programs were co-created with about 70 people.

The Purpose of the OHI is "*To benefit the health of animals, peoples and environments, by collaborating across boundaries, in a way that sees and integrates the whole system.*" Additionally, OHI developed its three foundational Principles that support its Purpose and that form the shared conceptual framework from which its Programs and the projects therein emerge. The three Principles

are: 1) Create Futures We Desire (“Communities Creating Health”, [7, 8]), 2) See the Whole System (“Systems Sensing/Thinking”), and 3) Collaborate Across Boundaries (“Co-Creative Design Thinking”). The three initial OHI Programs are: Food Systems and Health, Urbanization and Health, and Environmental Change and Health. The fundamental backbone these Programs share is the *interdependent relationship* among Food Systems, Urbanization, and Environmental Change *and* the health of humans, non-human animals, and environments; these Programs are the focus of OHI activities and projects. To establish an initial within-CSU One Health community, seven OHI Pilot Projects were competitively awarded in Fall 2015, ahead of the strategic planning (Table 1), and these Pilot Projects have helped shape the CSU-based One Health community and governance model.

CSU Todos Santos Center in Baja California Sur, Mexico

In April 2015, CSU opened its first international center in the town of Todos Santos, Baja California Sur (BCS), Mexico. CSU-TS Center is an outpost offering novel opportunities to build cross-cultural connections, long-standing partnerships with Mexican universities, and collaboration among communities. An ongoing physical and participatory presence in Todos Santos brings both responsibility and possibility. Complex issues call for ongoing engagement, dialogue, and an extended learning community that can be a foundation for enduring collaborations and change. This is the very purpose of the CSU-TS Center: to act as a hub for dialogue, learning, and engagement around real-world issues, including many that require One Health approaches.

In June-July 2015 the CSU-TS Center conducted a community assessment of Todos Santos and surrounding region [9] as an initial effort to gain a better understanding of the regional community,

and to ground programs and research in priorities identified by local residents and institutions already working in the area. The community assessment team (i.e., CSU-TS Center staff members, CSU faculty members and students, and local associate researchers) talked with more than 150 individuals through informal interviews and focus groups, gathering baseline data on socio-economic, demographic, geographic, environmental, health [10], and agricultural factors [11]. The results of the community assessment (Table 2) help prioritize research and educational programs that the CSU-TS Center offers to the local and CSU communities.

In March 2016, members of CSU and the CSU-TS Center including Huyvaert, Kita, and Straatmann from Colorado met with local researchers Castro-Prieto and Zenteno-Savín to discuss opportunities for collaboration in BCS. The idea of organizing a regional One Health workshop to catalyze action around common research interests relevant to One Health emerged. Once the aim of the workshop was identified, and logistics finalized, invitations were extended to academic and government institutions in BCS. Each participating organization was asked to provide a short presentation on their approach to research and programming in the context of their concept of One Health. The workshop, entitled “One Health: Conceptual Framework and Future Perspectives” took place at the Centro de Investigaciones Biológicas del Noroeste (CIBNOR), a research institution in La Paz, the capital city of BCS. A total of 29 people from diverse nationalities, backgrounds, and affiliations within academia, public health, and government agencies attended the workshop (Table 3).

The One Health Regional Workshop

The workshop was intended to raise a shared sense of possibility and opportunity, to strengthen confidence among institutions for collaboration, and to initiate and inspire a long-term dialogue that leads to coordinated and impactful actions and outcomes. The specific objectives of the workshop were: 1) to listen and learn about the One Health conceptual framework; 2) to share One Health perspectives and experiences from diverse institutions; 3) to collectively identify regional needs relevant to One Health approaches in BCS; and 4) to explore opportunities for collaboration aimed at regional needs and global/planetary health priorities [12]. The workshop was designed using a participatory approach [13] by facilitating a co-creative dialogue, built upon a series of pre-determined questions specially crafted for the workshop. Key aspects to this process included: 1) defining triggering questions, 2) setting a clear intention, and 3) managing expectations. Similar approaches have been applied to facilitate collaboration among diverse stakeholders to enable dialogue within a One Health context in other countries [14, 15].

A general overview of the workshop is shown in Figure 1. The workshop was initiated by sharing different perspectives and experiences in One Health through a series of short presentations from participants on examples of their institution's approach and perspectives on One Health. The goal was to build a knowledge-base which ultimately facilitates the co-creative process. Participants then identified and prioritized the main needs relevant to One Health in BCS through an activity in which ideas of every participant were presented and visually expressed on a whiteboard. As a group, workshop participants identified three principal needs and each of these needs was represented by a focus group. Finally, all participants were initially randomly assigned to, and then rotated through, the three focus groups to discuss the past, present, and future actions needed to address the principal

needs. The focus group process consisted of several rounds of dialogue, with each group facilitated by a moderator who captured, linked, and presented the main ideas derived from the previous conversation to build upon the next one. Rotations allowed all participants to meet and share their knowledge and thoughts on each need from their academic or agency perspective. The findings from these dialogues were shared among all participants and recorded during the workshop.

Workshop Outcomes: Identification of One Health priorities in BCS

The outcomes from the co-creative process suggested that the central, most urgent prioritized needs that would benefit from a One Health approach in BCS are: 1) water, 2) human nutritional health, and 3) conservation and management of other natural and biological resources (Table 4). The main concerns surrounding water as a resource were: water availability, the effects of water quality on human health, and the impact of water exploitation on marine and terrestrial ecosystem health.

Regarding human nutritional health, access to nutritious food and obesity were considered serious public health concerns in BCS; limited access to lifelong health care and related programs were highlighted. Other public health needs in BCS were: reducing heavy metal pollution, improving domestic animal health, and understanding infectious diseases at the interfaces among humans, wildlife, and domestic livestock, including aquaculture. Finally, the foremost needs related to conservation and management of biological resources in BCS were: conservation of biodiversity, control of invasive species, wildlife diseases, and understanding the effects of climate change on marine and terrestrial ecosystem health.

206 Additional needs relevant to One Health in BCS are governance and social awareness; both of
207 these underlie needs related to water, public health, and natural resources. The general belief that local
208 communities are willing to participate in identifying strengths and weaknesses, and to work towards
209 enhancement of government plans and programs to improve human, animal, and ecosystem health,
210 emerged from the workshop. The existence of educational and outreach programs to raise social
211 awareness in local communities was acknowledged. These programs include a wide array of activities
212 (e.g., public seminars, workshops at schools, diffusion of material related to gender issues, civil
213 protection, responsible use of natural resources, recycling, among others) geared towards children,
214 youth, and adults. Current programs include prevention campaigns for vector-borne zoonotic diseases
215 such as dengue fever and chikungunya fever, among others. These programs, however, are most often
216 implemented independently by governmental agencies, academia, and NGOs for which
217 communication and collaboration among organizations can be a challenge. The need of improving
218 communications among these organizations was acknowledged. The federal, state, and municipal
219 government representatives suggested that initiating collaborative programs with common objectives
220 between diverse sectors is of highest importance; they stressed the need for further actions on
221 sustainable use of water and environmental education, and to extend those actions to the most isolated
222 communities in BCS. Furthermore, the government representatives suggested utilizing more
223 interactive collaborations with local academic institutions for rapid decision-making. The current
224 actions from local NGOs, and the positive impact these activities have had on the community, were
225 acknowledged. Continuing these established programs, while building upon them with appropriate
226 inclusion, was suggested as a way to enhance program reach and effectiveness. Capacity building

programs on environmental and public health, oriented to educators and mass media communicators, were considered necessary to help disseminate information about the adequate use and management of natural resources which, in turn, will benefit human, animal, and environmental health.

Discussion

The Todos Santos Community Assessment and the One Health Regional Workshop are the first foundational steps in the identification of One Health opportunities in Baja California Sur. Both the workshop and the Community Assessment are examples of a participatory approach in action, representing collaborative engagement in building a healthier future in BCS as the OHI and the CSU-TS Center promote.

To guide thinking about future opportunities in One Health in BCS, we explored connections among the Programs of the OHI, the main One Health efforts in BCS as emerging from the workshop, and community priorities in the Todos Santos region as identified in the Community Assessment (Table 2). At these intersections, community needs and aspirations, and institutional resources, are both maximally aligned. Projects that are co-created from these intersections meet community aspirations, and thus are likely to generate a greater engagement and therefore impact, potentially leading to better outcomes than other possibilities.

One of the priorities for the Todos Santos region identified in the community assessment was water – namely, availability, usage, and management – a challenge also highlighted in the One Health in BCS workshop. Water issues can be addressed by leveraging any of the three Program areas at OHI, depending on the perspectives of those interested in engaging in the work. Based on the Todos Santos

Community Assessment, financial, community, and personnel capacity are available for participation in the co-creation of meaningful projects to address water impacts on health, broadly writ, given that water affects the many interdependent relationships among the environment, humans, and non-human animals. This way of thinking extends to other topics, including nutrition and sanitation, challenges that could be addressed through the lenses of the OHI Programs Food Systems and Health or Urbanization and Health. Inter-sectorial, inter-professional and transdisciplinary teams, like those being developed via OHI through its Programs, embrace as their guide the goal of changing current needs into future desired states *with* the communities most strongly engaged and affected. A typical future project team could be composed of relevant members representing the Todos Santos community, scientists, students, professionals from various sectors, and other public and private organizations from throughout the region.

As a result of this One Health Regional Workshop and the Todos Santos Community Assessment in BCS, the next step is already underway. The OHI is hosting the First Annual One Health in the Americas (OHTA) Conference at the CSU-TS Center in November 2016. This conference is a two-day event, with presentations from various institutions ranging in location from Alaska to South America. The conference emerged from the collaborative momentum of the One Health Regional Workshop. OHTA will be topically focused on the three Programs of OHI, helping to share and highlight novel work and best practices in One Health approaches throughout the Americas. The OHTA Conference is also an opportunity for the CSU-TS Center to act as a hub in the creation of a network of One Health communities, researchers, and practitioners throughout the Americas. This network will serve as a vital resource for the development of One Health programs and

269 projects, encouraging collaboration, learning, and coordination across diverse communities and
270 organizations.

271 The approach presented here, combining community assessment and long-term community
272 engagement, has the potential to inform other One Health efforts and to advance the collective
273 knowledge about One Health best practices and foundational Principles. It is only through the
274 involvement and deeply rooted influence of a community, using co-creation, co-design, and
275 implementation of projects, that outside organizations like OHI can begin to be useful to a
276 community. Project implementation without asking “For Whom?”, “How?”, and “Why?” is
277 ineffective (7), resulting in impact that is smaller in scope and shorter in duration than necessary and
278 often marginalizing deeper community assets, interests, and actors (7,8). The impact of projects that
279 begin with extensive community engagement will be an integral element of One Health projects in
280 Todos Santos, in BCS, in the Americas, and around the globe.

281 Strategic direction following the workshop has been compelling, yet the process of refining
282 that direction is iterative and ongoing by design. The opportunities for Todos Santos specifically, and
283 BCS broadly, are constantly in flux, and any projects implemented must have built-in mechanisms to
284 adapt as well as the commitment to continued engagement (7,8). To reinforce these mechanisms,
285 stakeholder groups in BCS intend to continue to hold regular community engagements and meetings
286 to gauge the effectiveness of any project. Most of this work will take place on the ground in BCS, when
287 future project teams interface routinely with the community. Finally, the regional network created at
288 the OHTA Conference will be a critical element in long-term planning and coordination of education,
289 research, and community engagement efforts that transcend BCS and Mexico.

290 One Health as a model of action, learning, and thinking has the transformative power to
291 catalyze the co-creation of the future we desire, though action will not always be easy or obvious. The
292 partnerships among the OHI, the CSU-TS Center, and the larger BCS community have brought
293 together a diverse group of stakeholders, all with the shared goal of improving health in BCS through
294 intentional and collaborative projects.

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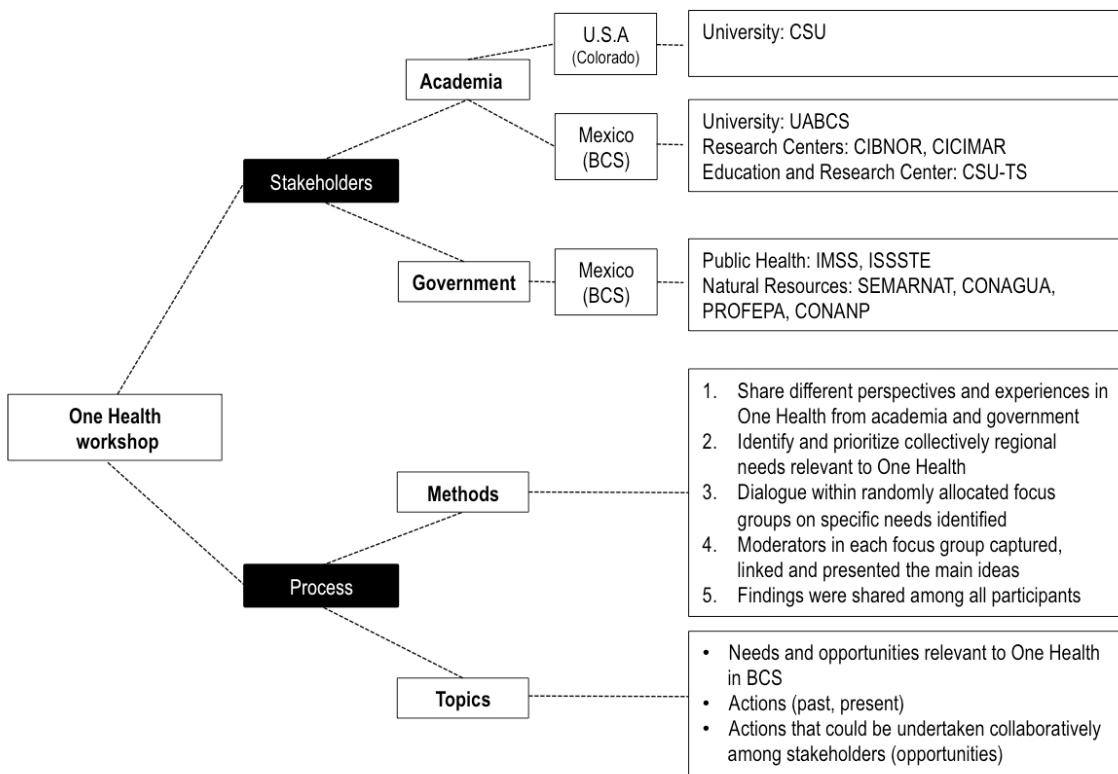


Fig. 1. General overview of the stakeholders involved and process used in the One Health Regional Workshop held in La Paz, Baja California Sur, Mexico in March 2016.

| Environmental Change and Health |
|--|
| An Interdisciplinary Approach to Bison Reintroduction |
| The Development and Implementation of a Consortium to assess the Role of Common Free-Living Amoebs (FLA) in Environmental Persistence and Facilitation of Pathogenic Organisms |
| Food Systems and Health |
| An International Study of Antimicrobial Resistant Bacteria in Diverse Farm, Water And Wastewater Sewages As Sources For Human Exposure |
| Living at the “EDGE”: Translating Physiological-Metabolic Responses of Native Grassland Species to Engineer Drought Resistance in Crops |
| Exploring Short Chain Food Systems |
| Urbanization and Health |
| One Health in Residential Ecosystems |
| Disease Community Ecology: Understanding the Transmission Pathways and Consequences of <i>Toxoplasma gondii</i> Infection in Humans, Domestic Animals, and Wildlife |

Table 1. Initial portfolio of Colorado State University’s One Health Institute Pilot Projects.

| TODOS SANTOS PRIMARY COMMUNITY PRIORITIES <i>There is a wide range of hopes and visions for the future by community members, there are several re-occurring themes, shown here in no specific order of priority.</i> | |
|--|--|
| Youth Engagement | Desire to create options for youth to help them succeed in the future and to keep them engaged now. Opportunities: Youth Leadership and Empowerment Club, Extracurricular sports, arts and language. |
| Language Classes (Especially English) | English language has become an increasing need for young people entering the work force. There is opportunity for advanced/profession oriented English courses. |
| Education System | The education system in Todos Santos could benefit from support; as schools face high teacher turn-over and there are few continuing education opportunities for teachers. |
| <i>Valuing the Environment</i> | Importance of a clean and healthy place to live and kindling environmental values. |
| Water | Concern over the quantity and quality of the water supply, infrastructural challenges, conservation and future growth. |
| Waste Management | Solid Waste - No sanitary landfill, open burning practices, poor waste collection system, lack of treatment for hazardous residues and accumulation of agro-plastics. Human Waste – Limited infrastructural capacity. |
| Mines | Proposed open pit gold mine and off-shore phosphorus mine threaten the watershed and agricultural, fishing and tourism industries. |
| Public Health | Primary Health Concerns - Acute respiratory infections, intestinal infections, diabetes and obesity, Dengue, Rickettsia, cancer, kidney issues, STDs and teen pregnancy. |
| Sustainable/Responsible Development | Growth is happening quickly and often without a development plan. Todos Santos grew 25% to 5,148 residents and Pescadero, 43% to 2,338 from 2005-2010 [16]. Current and future development has social, cultural, environmental, economic and infrastructural impacts. |
| Business Training and Alternative Models | Concern over lack of preparation within the native resident workforce to meet the needs of tourism industry. Desire for increased training in trades, small business management and entrepreneurship. Intermediaries were identified as a challenge for Agricultural and Fishing industries. |

Table 2. Todos Santos Community Assessment Outcomes

| Main Challenges Relevant to One Health in Baja California Sur | Community Priorities in Todos Santos Region |
|---|--|
| <p>Natural resources management and conservation</p> <p>Nutritional health</p> <p>Water</p> | <p>Business training and alternative models</p> <p>Education system</p> <p>English/Spanish lessons</p> <p>Proposed mines</p> <p>Public health</p> <p>Sustainable development</p> <p>Valuing the environment</p> <p>Waste management</p> <p>Water</p> <p>Youth engagement</p> |

Table 3. Visualization of intersecting themes from community engagement to identifying future opportunities. Color-coding indicates how theme is categorized within One Health programs.

Key: Environmental Change and Health; Food Systems and Health; Urbanization and Health

| Organization acronym | Spanish name | English name | Role | Name of participants (in alphabetical order) |
|----------------------|---|--|--|---|
| CSU | Universidad Estatal de Colorado | Colorado State University | US land grant university. It offers undergraduate and graduate degrees and is home to the One Health Institute | McKenzie Campbell, Kate Huyvaert Kim Kita, Dan Salkeld, Bruno Sobral, Danielle Straatmann |
| CSU-TS | Centro Todos Santos de la Universidad Estatal de Colorado | Colorado State University Todos Santos Center | Hub for education, research, and cultural exchange | McKenzie Campbell, Aines Castro-Prieto, Kim Kita, Danielle Straatmann |
| UABCS | Universidad Autónoma de Baja California Sur | Autonomous University of Baja California Sur | Academic and research institution. It offers undergraduate and graduate degrees | Ramón Cepeda Palacios, Juan Manuel Ramírez Orduña, Héctor Reyes Bonilla |
| CIBNOR | Centro de Investigaciones Biológicas del Noroeste | Center for Biological Research of the Northwest | Mexican federal research Institution. It offers graduate degrees | Carlos Angulo, Bertha Olivia Arredondo Vega, Felipe Ascencio, Eduardo F. Balart, Thelma Castellanos Cervantes, Aines Castro-Prieto, Sara Cecilia Díaz Castro, Patricia Galina-Tessaro, Fredy Hernández Uribe, Daniel B. Lluch Cota, Tania Zenteno-Savín |
| CICIMAR-IPN | Centro Interdisciplinario de Ciencias Marina-Instituto Politécnico Nacional | Interdisciplinary Center of Marine Sciences-National Polytechnic Institute | Research center of marine sciences from the federal public university IPN. It offers graduate degrees | Víctor René Magallanes Ordóñez, Bertha Liduvina Pérez Gómez |
| ISSSTE | Instituto de Seguridad y Servicios Sociales de Trabajadores del Estado | Institute for Social Security and Services for State Workers | Federal government organization of health care and social security systems | Erika Dheli Garibay Cossio |
| IMSS | Instituto Mexicano del Seguro Social | Mexican Social Security Institute | Federal organization of public health, pensions and social security | Ramón Gaxiola Robles |

| | | | | |
|----------|--|--|--|--|
| SEMARNAT | Secretaría del Medio Ambiente y Recursos Naturales | Ministry of Environment and Natural Resources | Federal environment ministry to protect, restore and conserve the ecosystems and natural resources | Maria Teresa Hernández Huerta |
| CONAGUA* | Comisión Nacional del Agua | National Commission on Water | Administration and preservation of national waters | Luis Emitterio Morales Prado, Gamaliel Vázquez Jaubert |
| PROFEPA* | Procuraduría Federal de Protección al Ambiente | Federal Attorney for Environmental Protection | Surveillance and environmental law enforcement | Kathya Yulizma Navarro Muro |
| CONANP* | Comisión Nacional de Áreas Naturales Protegidas | National Commission of Protected Natural Areas | Instrument of environmental policy for the conservation of biodiversity through protected areas | Maria Alicia Jimenez Gallegos |

(*) SEMARNAT-derived institution with technical and operational autonomy.

Table 4. Members and affiliations participating at the One Health Workshop in Baja California Sur.

| Challenges | Actions | |
|---------------------------|--|---|
| | Past and Present | Future (Opportunities) |
| Water | <ul style="list-style-type: none"> • Industrial water treatment and desalinization • Available low-cost water filters (lime, colloidal silver) provided by CONAGUA • Research studies on water quality and availability of basins and aquifers at local academic and research institutions • Educational and outreach programs for the sustainable use of water and the impacts of water quality on public health implemented by Non-government organizations, NGO's (i.e. Niparajá, Ecological Project International and Pronatura) • Water surveillance citizen-participatory program | <ul style="list-style-type: none"> • Increase the number and territorial coverage of research studies on water availability and quality at basins and aquifers, their interconnectivity and saline intrusion • Increase the communication on actions, results, political-structure used by decision makers, to provide consistent information to the citizens • Provide better monitoring and surveillance of domestic and industrial leaks. • Promote technification of agriculture to reduce the amount of water used for irrigation • Provide economic incentives for adopting hydraulic infrastructure to reduce water loss, maximize rain-water collection, favor water recycling/treatment at home and industries • Increase the number of educational programs and actions by joint programs with academia, government and NGO's |
| Nutritional Health | <ul style="list-style-type: none"> • Outreach programs in schools (e.g. nutrition lectures in primary schools; provision of healthy meals for the students designed by nutrition care professionals; "Plato de Buen Comer" program to teach appropriate portions of food; and prohibition of the sale of junk food in and around schools) • Health campaigns in mass media • Physical exercise programs (e.g. sports devices in public spaces; "Promueve" to promote physical activity by the Instituto SudCaliforniano del Deporte, INSUDE) • Public kitchen program (Sistema | <ul style="list-style-type: none"> • Promotion of family and school gardens • Promotion of local food production and consumption • Follow up on health care of people suffering from obesity that were initially supported in programs • Better access to healthy/functional food • Strengthen and expansion of the educational programs on functional food • Engaging parents in education of functional food and activities to promote physical exercise • Extend communication of nutrition care-related programs to rural areas • Regulation of food production • Organized network or system of |

Nacional para el Desarrollo Integral de la Familia, DIF) that provides food from their organic gardens to make organic and healthy food accessible to the local community

- Food security alliance, a food security network across BCS
- Community outreach programs on food health education and access implemented by local NGO's such as Raíz de Fondo and Sistemas Naturales y Desarrollo (SINADES) as well as research institutions such as Programa de Acercamiento a la Ciencia (PACE) from CIBNOR.

communication to formalize actions, share what programs are being done and to work together to promote known programs to success, as well as utilize resources efficiently across the system

- Mobile health station that travels to rural areas to provide health evaluations/care and follow-up for human, animal and environmental health
- Expand information dissemination to engage all ages

| Challenges | Actions | |
|---|--|---|
| | Past and Present | Future (opportunities) |
| Conservation and Management of Natural Resources | <ul style="list-style-type: none"> • Compliance to federal laws, namely Normas Oficiales Mexicanas (NOM), emitted by public environmental agencies (i.e. SEMARNAT) to protect and promote the improvement of the environment and ecosystems as well as preservation of the natural resources • Seasonal bans on hunting and deforestation • Administrative and economic penalties • Implementation of natural protected areas (ANP's) by CONANP • Environmental education and communication programs from local NGO's, academic and research institutions • Social-based participatory environmental programs • Educational and outreach programs | <ul style="list-style-type: none"> • Strict compliance to the environmental legislations • Better leadership of environmental stakeholders • Custom-designed environmental management plans • Link industry to meet environmental challenges • Develop more research studies focused on local climate change effects and carrying capacity for different environments in the region • Increase and strengthen environmental education in schools and local communities • Effective communication and implementation of ecological land-use planning • Inter-institutional committee that involves different sectors • Community network to raise awareness |

conducted by local NGO's and research institutions (i.e. PACE from CIBNOR)

on the environmental challenges and to catalyze proposed actions to solve problems

Table 5. Challenges and actions relevant to One Health in Baja California Sur, Mexico identified by the participants at the One Health Regional Workshop.