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Proposal for a participatory model of social intervention to guarantee the human right to water

Propuesta de un modelo participativo de intervención social para garantizar el derecho humano al agua

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Abstract

The purpose of this research is to promote social advocacy through a systematic, participatory, functional, and replicable intervention model to ensure human rights to water in indigenous areas of the Sierra Wixárica in Mexico. The current state of water management models in rural and indigenous communities in Mexico and Latin America was examined; Ha Ta Tukari and Mexican Institute of Water Technology professionals were interviewed to design the model. The main contribution is the diagram of the main process for co-constructing rainwater harvesting systems and participatory transversal processes for co-constructing technical and educational capacities. In conclusion, the inclusion of community authorities and local inhabitants, for the co-creation, co-participation, co-responsibility, consensus, and compliance with participatory community agreements required during the project, is an added value of the proposed model and achieves sustainable adoption.

JEL Code: I38, M11, M12, I31, Q25, P28
Keywords: participatory social intervention; process management; stakeholders; human right to water; rainwater harvesting systems

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Resumen

Se presenta una investigación de incidencia social que propone un modelo de intervención sistematizado, participativo, funcional y replicable, para garantizar los derechos humanos al agua en zonas indígenas de la Sierra Wixárica en México. Se analizó el estado del arte de modelos de gestión del agua en comunidades rurales e indígenas de México y Latinoamérica; se entrevistó a profesionales de Ha Ta Tukari y del Instituto Mexicano de Tecnología del Agua, para diseñar el modelo. El principal aporte es el diagrama del proceso principal para la co-construcción de sistemas de captación de agua de lluvia y de los procesos transversales participativos para la co-construcción de capacidades técnicas y educativas. En conclusión, la inclusión de autoridades comunitarias y habitantes de las localidades, para la co-creación, co-participación, co-responsabilidad, el consenso y cumplimiento de acuerdos comunitarios participativos requeridos durante el proyecto, es el valor agregado del modelo propuesto y lograr la adopción sustentable.

Código JEL: I38, M11, M12, I31, Q25, P28
Palabras clave: intervención social participativa; gestión por procesos; grupos de interés; derecho humano al agua; sistemas de captación de agua de lluvia

Introduction

According to data from the National Council for the Evaluation of National Development Policy[1] (CONEVAL; Spanish: Consejo Nacional de Evaluación de la Política de Desarrollo Nacional), as of 2018, the indigenous population in Mexico represented 10.1% of the total population and 50% of them live in dispersed hard-to-access localities, with low human development and health indices and high levels of marginalization. In this population, basic human rights are not met, such as access to water and sanitation in proper quantity and quality.

Domínguez (2013) stated that "basic water services must be provided to a growing population to fulfill the human rights to water and sanitation, ensuring that they are of good quality and in conditions of equity and social and spatial justice." For which, as established by the INIFAP-Veracruz study (2018), "it is required to design strategies for the adoption of eco-technologies that guarantee access to water to a greater number of communities with urgent basic needs, and it is essential to promote its use in rural areas."

The localities with the lowest human development index for the period 2010-2015, according to data from the United Nations Development Program in Mexico (UNDP, 2019), are located in the Sierra Wixárika, in the lower basin of the Santiago River in the municipality of Mezquitic, in the state of Jalisco. San Andrés Cohamiata (TateiKie) is the main town of the Wixárika people. 62.4% of their homes do not

[1] Coneval (2018). Poverty in the indigenous population of Mexico, 2008 - 2018. Retrieved from https://www.coneval.org.mx/Medicion/MP/Documents/Pobreza_Poblacion_indigena_2008-2018.pdf#search=poblacion%20rural%20indigena

have piped water, and 48.2% do not have a toilet. Most of the Wixaritari (plural of Wixárika) live in about 21 scattered, hard-to-access localities of less than 500 inhabitants.

The main source of water supply is from natural sources that are often contaminated and, due to population growth, have significantly reduced their supply capacity in recent years. Residents live on about 12 liters per person per day, which is insufficient compared to the World Health Organization's (WHO) recommendations2. There is currently unsustainable management of its territory where the impact of the population, grazing, open defecation, and agriculture, among others, have degraded the environment and water sources. The above does not comply with the guarantee of human rights associated with water in the region and for this population in particular. Associated rights refer to the rights to water, sanitation, a healthy environment, health, education, and a dignified life free from discrimination.

The lack of development in this region involves two important issues. The first relates to the fact that the financial investment required to bring access to water and sanitation to remote and dispersed localities increases the operating costs of the municipal operating agencies, which limits their work, especially in urban and peri-urban areas, leaving as a pending task the rural areas with the aforementioned characteristics, which constitute the percentage of the population without coverage and without services. The second identifies the lack of adequate intervention strategies, programs, and projects that include technical training and support of the inhabitants of the localities throughout the project's development and ensure the proper and sustainable adoption of eco-technology.

According to Ortiz et al. (2014), the rural population's great deficiencies in satisfying basic needs have not yet been addressed. Some relevant factors associated with the failure of eco-technological projects are the misidentification of user needs, the use of technological designs that have not been validated or are imported directly from other contexts, and poor or no support after eco-technology installation. Additionally, the different levels of government tend to budget large amounts of economic resources to build dams that do not work, wind energy pump systems that remain unfinished, spring water distribution with deficient piping designs and inadequate maintenance due to the difficulty of reaching the localities, and other issues.

As highlighted by Murillo et al. (2018), the implementation of eco-technologies should emphasize the relation between the eco-technology and the beneficiary, and it should be clear that the fundamental part of this relation is to meet a need or a set of specific basic needs: sustainable access to water and sanitation and not the construction of the eco-technology per se. Furthermore, the attention to the need must include the cosmovision, customs, and traditions of the indigenous locality where the project is carried out.

[2] The recommendation is at least 20 liters of water daily.

Related research

Ensuring water supply and sanitation in hard-to-access marginalized communities in Mexico has been a continuous concern of academics, researchers, civil society organizations, and society in general. This is evidenced by the large production of articles, studies, reports, analyses, evaluations, implementation case studies, and books emphasizing different theories. Furthermore, supply model designs, assessment and implementation of projects, programs, and interventions, as well as recommendations for achieving access to water, are abundant. Based on the review of research conducted in Mexico, Latin America, and the Caribbean, they can be grouped according to the following.

- Research related to the improvement of public policies and governance for water management, as presented in the works of Villagómez and Gómez (2020), Mejía et al. (2016), Gutiérrez (2019), and World Bank (2007)
- Research related to the development of tools for the improvement of water management; papers presented by IDB (2019, 2020), Daza et al. (2018), and Davison (2009)
- Research on awareness and promotion of the different issues that impact water problems in indigenous communities; works by CEMDA (2006), Jiménez et al. (2014), Peña (2004), and Soares (2007)
- Research on social adoption of eco-technologies: definitions, benefits, barriers, challenges, and assessment; works by CEMDA (2016), Inifap Veracruz (2018), Ortiz et al. (2014), Romero et al. (2015), Murillo et al. (2018), Tagle et al. (2018, 2020), and GIZ (2019)

The following briefly describes four of the most relevant studies on participatory intervention in a social project to guarantee the human right to water in rural or indigenous areas through the construction and transfer of eco-technologies.

The German Agency for International Cooperation (GIZ; German: Deutsche Gesellschaft für Internationale Zusammenarbeit), in a study from 2019 titled "Analysis of eco-technologies applicable to the economic, political, social and environmental context of the federal entities," states that: "to ensure a successful transfer of eco-technology, in addition to the technical value of the technology per se and its potential to mitigate and adapt to climate change, social, economic, and public policy criteria must also be considered and there must be a participatory approach to encourage their adoption, which can direct local capacities and services to the most urgent needs."

The project's final report, developed by Romero et al. (2015), on government and civil society organizations' water and sanitation coverage programs in rural communities, identified the success factors in the social adoption of installed technologies. It defined four dimensions of the overall process of water and sanitation systems in rural communities: "1) the satisfaction of a basic need, 2) the sustainability of

the technology, 3) the interactivity between the beneficiary and the technology, and 4) the impetus for change of the recipients of the technological systems."

Tagle et al. (2019), in their study "Multidimensional analysis in the implementation of eco-technologies," state that "it is urgent to change the environmental and social development model to one that reformulates how technology is designed, created, adopted, and integrated so that its adoption and results have an impact on society and the environment in the long term." They indicate that technology transfer is a social process that must be learned and transferred dynamically, that is, by doing, using, and interacting, as well as making use of negotiation between multiple levels, with multiple actors, strategies, understanding, and participation. They point out that one of the main causes of inefficiency in technology transfer and adoption is that it should not be a linear process; there should be back-and-forth monitoring and feedback throughout the process to learn and improve it based on the conditions of the place and the needs of the beneficiaries.

The Mexican Center for Environmental Law (CEMDA, 2016; Spanish: Centro Mexicano de Derecho Ambiental) also designed a model at the municipal level that provides information and tools for municipal authorities to take care of water and provide the services they are constitutionally obliged to provide with quality and efficiency. The model proposed is at the strategic and municipal public policy level. Therefore, it does not provide a detailed description of the phases and activities to be implemented. It does not identify the stakeholders and the scope of their participation, nor the expected results in each stage or phase of its implementation.

The research described above promotes the guarantee of the human right to water by adopting eco-technologies in rural or indigenous areas of Mexico. All of them coincide in explaining that the process must develop activities such as a participatory approach or interaction between the beneficiary and the technology, developing local capacities, promoting the sustainability of the technology, identifying needs, a technological feasibility diagnosis, social organization and support in the use of the technologies, dynamic transfer, negotiation among multiple actors, feedback, maintenance, and assessment of the eco-technologies. Nonetheless, a comprehensive, collaborative, and participatory model of social intervention that guarantees the human right to water and not only defines the stages and activities of the process but also describes and documents them has not been defined, proposed, or constructed. The model should explain how the project can be implemented on site and use the methodology of the process-based approach and the stakeholder approach for its design and development. In Mexico, systematized, defined, and documented models are scarce at the operational level to carry out replicable interventions and impacts in social projects in indigenous localities.

This paper aims to present a documented research and social advocacy process that includes conceptual, methodological, and logistical aspects that, through a process and stakeholder approach,

facilitate the definition and systematization of processes and sub-processes that make up a proposed intervention model. Therefore, the human rights associated with water can be guaranteed by constructing functional and replicable rainwater harvesting systems (SCALLs; Spanish: Sistemas de Captación de Agua de Lluvia) in hard-to-access indigenous areas and rural regions.

Methodology

Qualitative and documentary research was chosen for this paper, with an exploratory approach since it examined a research problem that has been little studied. It has a cross-sectional approach as the fieldwork and observation process were conducted at a specific time (December 2021 to September 2022). Finally, it uses a non-experimental approach where the information was collected through key informants and ethnographic case studies referring to the work carried out by Ha Ta Tukari in the indigenous localities of the Sierra Wixárica in the lower basin of the Santiago River in the Municipality of Mezquitic in the State of Jalisco, Mexico.

Table 1 is presented below for a detailed description of the characteristics of this research project and its application to the field of a descriptive case study.

Table 1
Research technical datasheet

Purpose of the research	Design and carry out a proposal for a social intervention and advocacy model to guarantee the human rights associated with water by installing SCALLs in hard-to-access indigenous areas and rural regions and that, in addition to being functional, can be replicated.
Research methodology	Single case study (the unit of analysis to be studied is the Ha Ta Tukari organization); exploratory study as it examines a little-studied research problem; cross-sectional as the fieldwork and observation process was conducted at a specific time (December 2021 to September 2022); and finally non-experimental as the information for identification and assessment is collected through key informant interviews
Unit of analysis	Ha Ta Tukari Project for the adoption of rain harvesting systems (SCALL installation and adoption experts)
Geographic scope	Indigenous localities of the Sierra Wixárica in the lower basin of the Santiago River in the Municipality of Mezquitic in the State of Jalisco, Mexico
Type of sample	Convenience sample obtained from the selection of key informants by the researcher; they must meet the following requirements: be current members of the Ha Ta Tukari project, have five or more years of experience in the project and fieldwork in participatory projects of social impact with indigenous localities, and lead a process to install or adopt rainwater harvesting systems and have the knowledge to assess it.
Sample	Five process leaders to install and adopt rainwater harvesting systems and two process leaders for water quality in water tanks and natural water sources

Evidence collection methods	Documentary review (physical and electronic files), multiple in-depth interviews with open-ended questionnaires, face-to-face and virtual interviews, and direct observation during the training workshops and during fieldwork in the Sierra Wixárica where diagnostic and adoption activities were carried out (tape recorders, notebooks, and cameras were used to collect data)
Sources of information	Documents, archives, videos, electronic and physical files, historical records, and in-depth interviews
Key information providers	Leaders of the processes of diagnosis, installation, maintenance, assessment, and construction of technical and educational capacities, and also a leader of the evaluation of water quality in water tanks and natural water sources located in the indigenous territory
Methods of evidence analysis	The first step is triangulating the collected evidence to compare it directly with the research objectives. The information is classified by tables and then defined and documented through processes and sub-processes.
Methodological assessment	Validity and reliability (interpretative and conceptual theoretical)

Source: created by the author based on Villareal and Landeta R. (2010)

Selection of the unit of analysis

The unit of analysis is a single case called Ha Ta Tukari. The first step for the selection was to present the objectives and benefits of the research to the Coordination and members of the Ha Ta Tukari Network, as well as the products and benefits to be obtained, the design of the methodology, and finally, to accomplish the requirements for the realization of the project by Ha Ta Tukari and the Mexican Institute of Water Technology (IMTA; Spanish: Instituto Mexicano de Tecnología del Agua). The result was the acceptance to collaborate with the research and the provision of the necessary resources to carry it out.

Selection of key information providers

The selection of key information providers with knowledge of installation and adoption of rainwater harvesting systems was of critical importance. They were selected due to their experience in a given area or their relationship with the authorities or inhabitants of indigenous communities. The requirements for the selection were the following:

- Being a current member of the Ha Ta Tukari project
- Five or more years of experience in the project
- Experience in fieldwork in participatory social impact projects with indigenous localities
- Leading a process to install or adopt rainwater harvesting systems
- Being knowledgeable in the assessment of the process they are leading

Specific research techniques employed:

a) The state-of-the-art water management models in rural and indigenous communities in Mexico and Latin America were analyzed through an exhaustive search of documentary information in books, articles, theses, and project reports.
b) In-depth interviews were conducted with professional experts from the IMTA and Ha Ta Tukari, an organization that has worked for twelve years in indigenous localities of the Sierra Wixárica in the installation and adoption of SCALLs.
c) Two training workshops were held for a bicultural team of ten young Wixás on implementing community and participatory activities to install and adopt SCALLS in their communities. The workshops' purpose is to directly observe the training, the reflection on the importance of human rights in general, and the human right to water in particular. The workshop activities are also recorded to conceptualize the model and define the proposed process-based methodology.
d) Fieldwork was conducted from September 1 to 14, 2022, which consisted of a tour on foot and in vans through three Wixaritari communities of San Andrés Cohamiata TateiKie located in the Municipality of Mezquitic, Jalisco. The purpose of this tour was to observe the community and participatory work of the Hata Tukari organization and IMTA technologists on site and in direct contact with the inhabitants of the communities. With this, it was intended to triangulate, confirm, and complement the information obtained from the interviews and training workshops to subsequently design the model proposal that was the object of the research.
e) The information gathered in interviews, workshops, and in the field was classified and systematized, and then contrasted and completed. Interviews and voice notes were recorded during workshops and fieldwork and notes were written in notebooks.

Instrument in the field:

Once the key information providers were selected, the interview instrument was designed, which consisted of ten open-ended questions as follows:

1. What is the name of the process you lead?
2. What is the objective of the process?
3. With which activity does the process start?
4. What products are generated, and to which internal or external beneficiaries are they directed?
5. What are the requirements that the products generated by your process must have in order to be released?
6. What requirements does the process you are leading need to be effective?

7. Describe the activities to be performed to carry out the process you are leading.

8. What are the inputs and requirements of the process you lead to generate the expected outputs?

9. What records or evidence should the process generate on completion?

10. How is the efficiency of the process assessed?

Analysis of the information

The audios of the interviews and training workshops given to the Wixá youth, as well as the notes and audios recorded during the fieldwork carried out in the town of San Andrés Cohamiata, were transcribed, analyzed, and interpreted to give rise to the proposed conceptual model and the classification of the information required to prepare the tables of relations and the subsequent documentation of the processes.

Validity of the research

The validity was determined through triangulation, which consists of analyzing data from different angles to compare and contrast them. In this research, the information obtained is the result of interviews with key information providers related to the processes for the installation and adoption of SCALLS in hard-to-access indigenous localities. The next support point for the triangulation was the training workshops for the ten young Wixás, where they were trained in the processes and activities to be carried out to install and adopt SCALLs in their communities. Finally, the last point of support was the field visit to the locality of San Andrés Cohamiata TateiKie, where some of the activities described in the workshops and interviews were conducted in real time.

This combination of sources of information and records made it possible to analyze the event in depth, observe facts, and compare the information in order to carry out a crossed or triangulated analysis of the information (Pettigrew, 1990). This research aims to provide the necessary and sufficient elements to design a proposal for a participatory model of social intervention to guarantee the human right to water and then to prove that data collection operations can be repeated with the same results (Yin, 1994). Figure 1 is presented to demonstrate this approach:

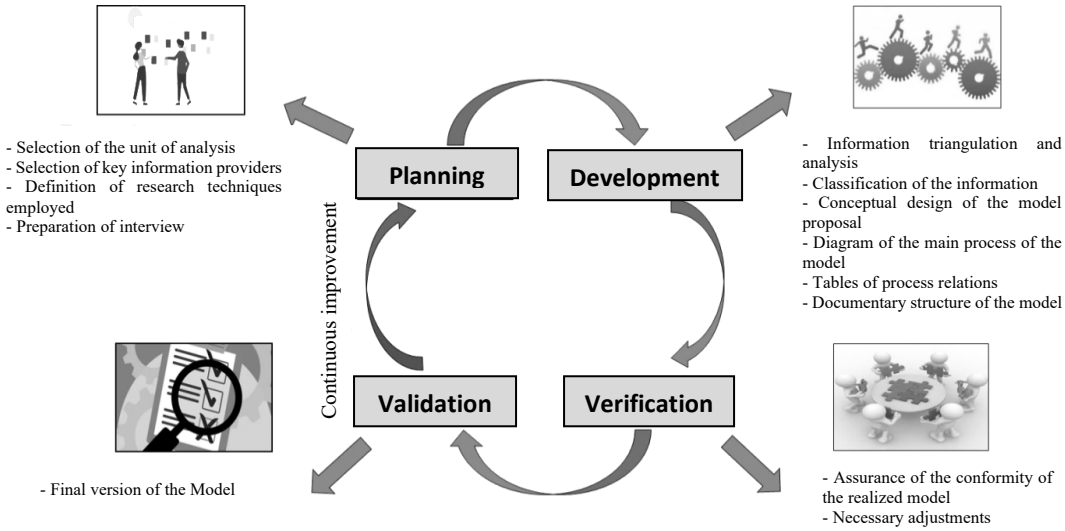

Figure 1. Conceptual design of the research
Source: created by the author

Planning phase

This consisted in selecting the unit of analysis and the key information providers, defining the ideal research techniques, and preparing the field instrument for the interview.

Development phase

The information was triangulated and analyzed to develop the conceptual design of the model proposal for intervention and advocacy to guarantee the human rights associated with water and sanitation in hard-to-access rural or indigenous communities, the ultimate goal of the research. Once the information obtained was transcribed, classified, and analyzed, the model was integrated with the following products: 1) Diagram of the main process, 2) Tables of process relations, and 3) Definition of the model's documentary structure.

Verification phase

The verification began with the review of the conformity of the inputs for the development of the design of the model proposal. The results were compared, and the degree of compliance with the conformity was

determined. This review was carried out first personally with each expert and then as a group. Finally, with the group of experts, it was ensured that the design developed complied with the requirements previously established during the conceptualization of the Model.

Validation phase

The validation stage was carried out to demonstrate that the design and development of the Model met the objectives, scope, and needs of the direct and indirect beneficiaries for whom the Model was developed. After validation, the final version of the Model was constructed. The requirements for the validation of the model proposed in this research were the following:

- The designed Model should be adequate (understandable and comprehensible) for the context of the indigenous locality and should ensure respect for the customs, traditions, and cosmovision of the indigenous culture where the intervention takes place.
- The Model designed should improve the Human Rights associated with water in the localities involved, that is, promote the guarantee of access to water and improve social, environmental, and water conditions for the inhabitants and localities.
- The Model designed should be systematized and replicable. Thus, it should have the capacity to be used by other professionals in indigenous regions of Mexico with similar characteristics and contexts.

Limitations of the research

Some of the limitations of the design, development, and application of this case study are as follows:

a) The in-depth interviews provide a large amount of information. 20% of them were conducted in person and 80% virtually. Authorization was requested to make audio recordings. However, the interviewees were at their place of work, so there were interruptions, and sometimes it was difficult to follow up on the information provided during the interview. This characteristic can inevitably create doubts about any missing or inconsistent information.

b) The data collection regarding the interviews was subject to certain limitations related to the participation of only one researcher to conduct the interviews and to select, classify, analyze, and triangulate the information.

c) Regarding the observation process carried out during the fieldwork in the indigenous locality of San Andrés Cohamiata in the Sierra Wixárica, the activities and processes conducted were those of initial community agreements and diagnosis, as well as the taking of samples from natural water

sources and water tanks already installed. These activities were carried out by the young Wixás trained during the workshops. The language used during the activities was Wixá. Although the activities were supervised in Spanish by the Ha Ta Tukari and IMTA participants in the field, there is a possibility that the researcher who observed the process and collected the information in the field might not have understood them because she does not speak Wixá.

d) The social, political, religious, environmental, and economic context of the indigenous localities in the Sierra Wixárica of the Municipality of Mexquitic in Jalisco, Mexico, is unique. Therefore, the Model proposal in this research is linked to the characteristics, cosmovision, context, customs, and traditions of the indigenous Wixás. Although for twelve years the work methods have been tested and improved, it will be a challenge to transfer the methodology to the context of different indigenous groups located in other regions of Mexico, such as the Zapotecs, Mayans, or Tzotzils, and implement it by improving it, standardizing it, and making it functional.

Results

As a strategy to guarantee the human rights associated with water, Figure 2 presents and describes the proposed conceptual model for the social adoption of eco-technology for SCALLs in hard-to-access indigenous areas and rural regions: La Sierra Wixárica in the lower basin of the Santiago River. It is made up of processes for organizational management, processes for resource management, processes for product or service realization, and processes for measurement, analysis, and improvement. The main part of the Model is the description of the substantive community and participatory process for water supply through rainwater harvesting systems in hard-to-access indigenous areas. Based on the application of the methodology, the analysis of information, and the design and development of the model, the following results are presented:

1. Diagram of the main community and participatory process of water supply through SCALLs in hard-to-access indigenous areas, detailed in Figure 2
2. Beneficiaries-Participants, Suppliers-Inputs relation tables

Based on the tables, documents are prepared to systematize and standardize the processes describing objective and scope, relations and interactions between processes and sub-processes, responsibilities, scope and authority of participants and deliverables, and records to be generated in each process. An example of these is presented in Table 2. The total number of tables prepared according to the documented processes is listed below:

1. Table of relations of the linkage process and initial agreements
    1.1 Table of relations of linkage sub-processes and initial community agreements
        - First contact and initial linkage
        - Initial community agreements
2. Table of relations of the diagnostic process
    2.1 Table of relations of the Diagnostic Sub-processes
        - Baseline and participatory mapping
        - Visit and technical feasibility of the community sites selected for SCALL installation
        - Water Quality
3. Table of relations of the installation process
4. Table of relations of the follow-up process
    4.1 Table of relations of the Follow-Up Sub-Processes
        - Inspection, verification, and monitoring
        - Major and minor repairs
        - Water quality (SCALL water tanks)
        - Final diagnosis
5. Table of relations of the assessment process
6. Table of relations of the process of Co-Creation and Consensus of specific community and participatory agreements
7. Table of relations of the communication process
8. Table of relations of the training, education, and capacity-building process

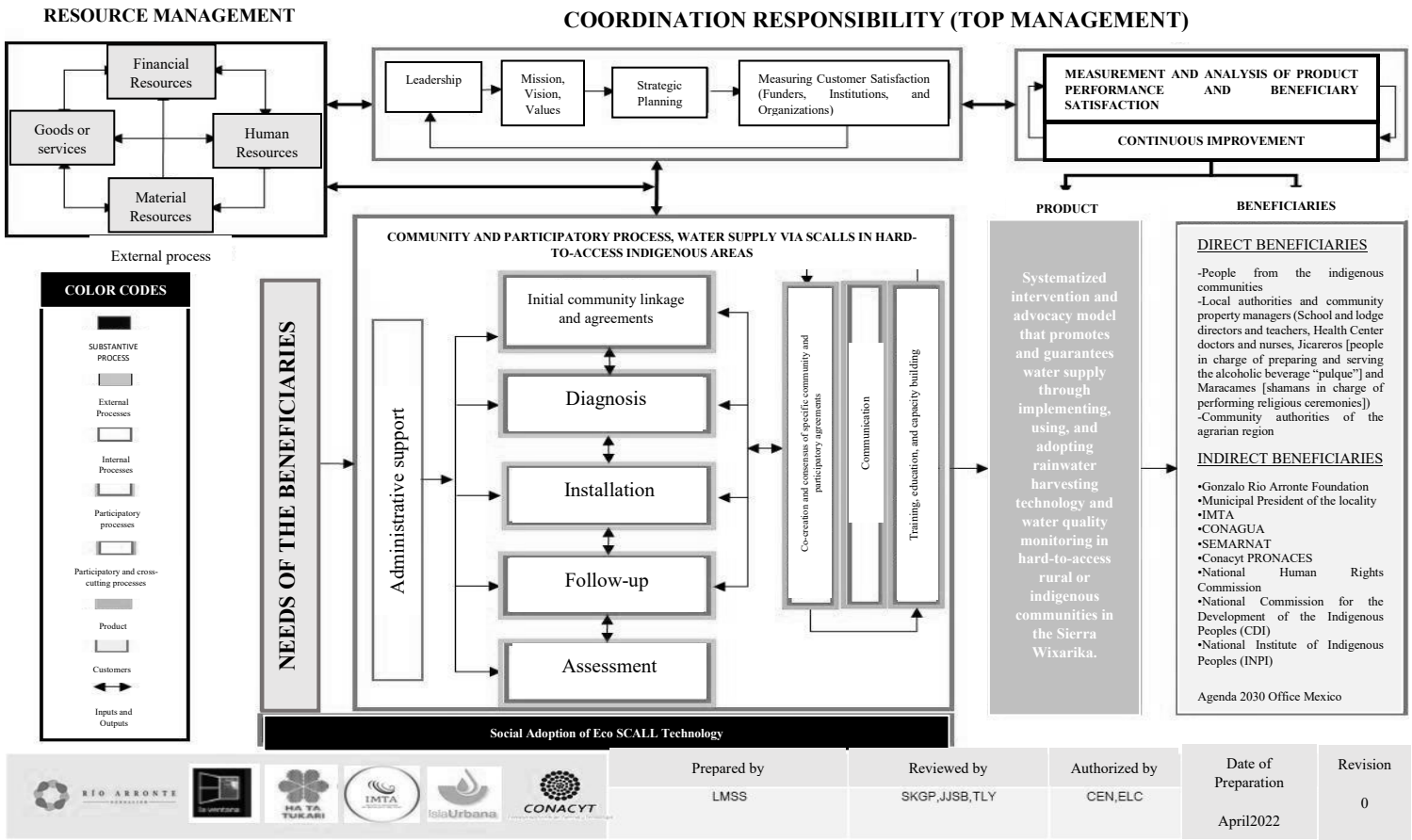

Figure 2. Innovative and systematized conceptual management model for intervention and advocacy to guarantee the human rights associated with water in hard-to-access indigenous areas and rural regions (Case: Sierra Wixárica in the lower basin of the Santiago River)
Source: created by the author

Table 2
Linkage process and initial community agreements (Relations: Beneficiaries-Participants Suppliers-Inputs Activities-Products)

PROCESS	ACTIVITIES AND/OR PRODUCTS	PARTICIPANTS / SUPPLIERS	INPUTS	BENEFICIARIES	FOLLOWING PROCESS/ SUB-PROCESS
Linkage process and initial community agreements	1. Support request form addressed to the Ha Ta Tukari Coordination for the implementation of the rainwater harvesting project signed by the authorities and local people 2. Format of co-creation of first initial community agreements, validated by vote in the community assembly and/or signed by any of the different authorities of the community assembly, which can be the following: Commissioner and members of the community agency, Maracame, Directors and Teachers of the schools, Doctors and Nurses of the Community Health Center, Lodge Director and Jicarero(s), and also by the total number of people participating in the community assembly 3. Providing awareness training on rainwater harvesting systems and their benefits 4. Date for conducting the initial assessment and prior compliance of the authorities to carry out a publicity activity and convene the community to participate in the assessment 5. Record of process activities (videos, photos, documents, on-site material, etc.)	A. Coordination of the Project B. Any of the authorities of the community assembly of the indigenous locality, which may be: ▪ Maracame of the community ▪ Commissioner of the municipal agency ▪ Principals and teachers of local schools ▪ Community Health Center Physicians and Nurses ▪ Lodge Director ▪ Jicarero(s) C. Total number of people participating in the community assembly	1. To know and respect the Wixárika culture, its customs, and times 2. Previous meeting with community authorities of the agricultural region 3. First contact meeting with the Maracame, the Commissioner, or some local authority 4. Have a translator (if necessary) 5. Presentation of the work team that will collaborate in the development of the project 6. Material for the realization of awareness training on rainwater harvesting systems and their benefits, addressed to the community during the community assembly 7. Tools for recording diagnostic activities (tape recorders and cellular phones)	<u>Direct</u> A. Coordination of the Project B. Managers for the diagnostic and installation processes and the water quality sub-process C. Technical installers, field technicians, and education facilitators participating in the project <u>Indirect</u> D. Group of federal, state, or municipal institutions, associations, companies, and foundations that collaborate in project development.	• Diagnosis • Installation • Water quality (sub-process) • Communication process • Technical and educational capacity-building process • Social Adoption Process of SCALL technology

Source: created by the author

3 Documentary structure of the model

For a better understanding, Figures 3 and 4 show the documented processes and sub-processes identified and defined for the development of the Model. Figure 3 shows the main processes and sub-processes of the Model, and Figure 4 shows the cross-cutting processes and sub-processes. Both groups of processes make up the Model proposal.

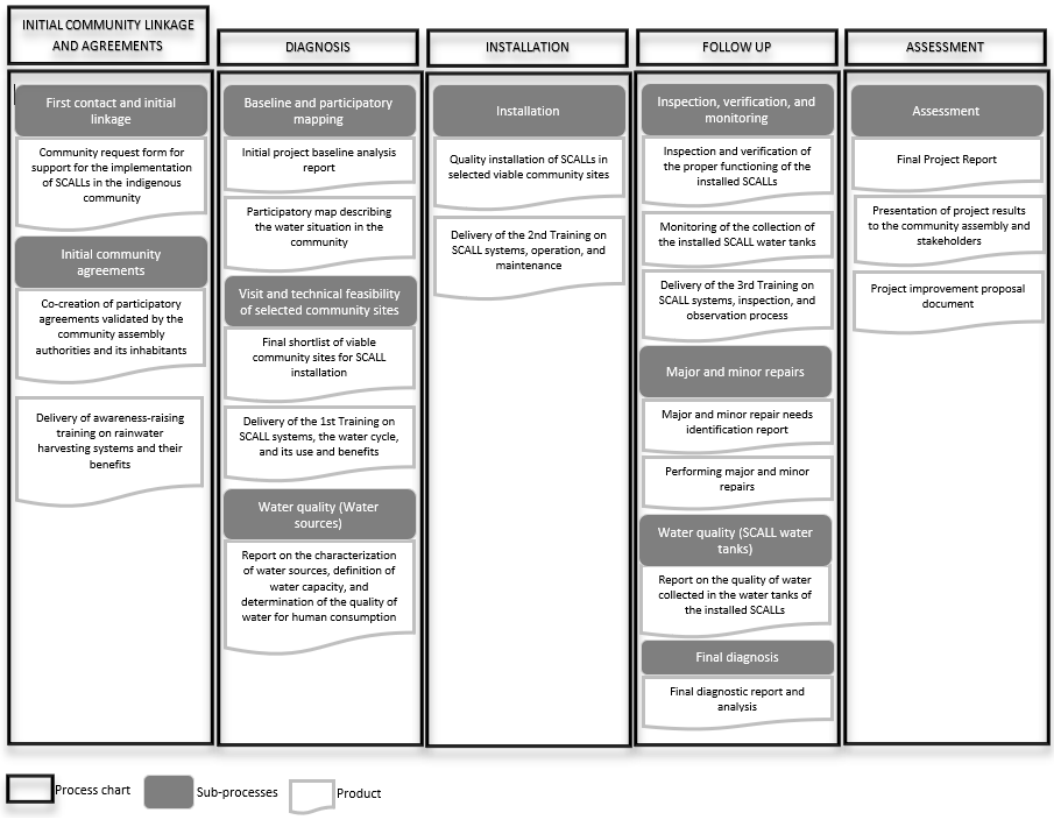

Figure 3. Processes, procedures, and products of the participatory water supply model using SCALL technology in hard-to-access indigenous areas
Source: created by the author

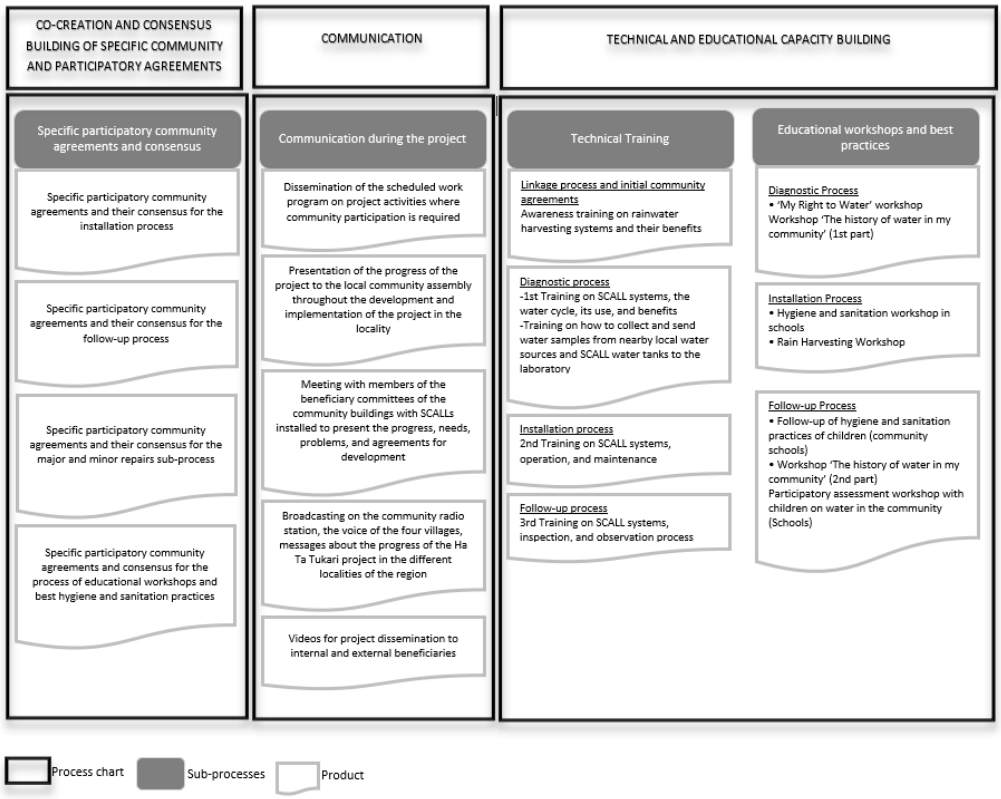

Figure 4. Processes, procedures, and cross-cutting products of the participatory water supply model using SCALL technology in hard-to-access indigenous areas
Source: created by the author

Discussion

The systematization and documentation of processes, procedures, and activities seek to identify, describe, and process traditional and scientific knowledge and fieldwork experiences. By ordering, organizing, documenting, and systematizing the current forms of operation, this facilitates obtaining results, identifying lessons learned, and solving potential problems during the development of similar social projects. It also reduces risks, avoids rework and duplication, and improves productivity, innovation, the use of resources during implementation, and the search for creative solutions. Systems that use records, such as texts, images, and videos, assume a condition of active agents within the processes of knowledge generation, providing relevant information to analyze social interaction and social organization patterns present in practice (Rivera-Aguilera, 2017).

This is the case of the research proposal in which a collaborative, community-based, and participatory intervention model was defined, designed, and developed to implement social intervention projects that guarantee the human right to water in hard-to-access rural and indigenous areas, using the methodology of the process and stakeholder approach. Through documentation and systematization, it contributes to the capacity building of social science professionals and to the knowledge of engineering professionals working in collaborative planning, co-design, and co-construction of eco-technologies that are adopted by inhabitants of indigenous localities, replicable and used as induction and training for new collaborators during fieldwork. Standardizing processes and activities avoids individual criteria or those of professionals with little or no experience in participatory social impact projects.

This proposal for a systematized model includes relevant aspects for adopting eco-technologies according to the study conducted in 2019 by GIZ, such as a participatory approach and local capacity building. It also considers the elements presented in the research report by Romero et al. (2015), specifically concerning the identification of a basic need, the sustainability of the technology, and the interactivity between the beneficiary and the technology. It additionally considers elements presented in the research by Tagle et al. (2019) on participatory collaboration between multiple levels, with multiple actors, and the necessary feedback throughout the process to improve the needs of the beneficiaries.

Although the model developed has worked for more than a decade in the indigenous localities of the Sierra Wixárica of the Municipality of Mezquitic, Jalisco, Mexico, it would be relevant to replicate and validate it in other indigenous areas of the country with similar characteristics (lack of access to water in dispersed and hard-to-access places), even if they have a different context. For example, areas in the States of Oaxaca, Chiapas, Veracruz, Puebla, or Yucatan could be used for the construction of SCALLs or some other eco-technology such as solar stoves and panels, dry toilets, and biodigesters to be later able to compare results and continuously improve the design of the Model.

In the long run, the Model presented as a result of this research project—once it has been implemented and validated in different indigenous areas of the country—is intended to be a proposal of input for the definition of a public policy that can be translated into a Mexican, state, or municipal regulation. The method can be used by any federal, state, municipal entity, or civil society organization to implement participatory eco-technological projects for social intervention in hard-to-access indigenous areas in Mexico.

Conclusions

The qualitative methodology of the case study and the key information providers enriched the development of the model, and the use of the process and interest group approaches facilitated the

systematization and transdisciplinary work, resulting in the proposal of the participatory and community social advocacy model. The instrumentation of the relation tables and the design and identification of the processes facilitated the construction and systematization of the model, whose base was the organic form of work of Ha Ta Tukari in the Sierra Wixárica. They integrated the customs, traditions, knowledge, and cosmovision of the Wixárika people's culture, and all the key elements that generate an advantage and make the substantive difference between achieving the adoption of an eco-technology in an indigenous community or simply carrying out a technology transfer.

A solid linkage was generated between the definition and description of the operational activities and the way of life of the local inhabitants, which made it possible to generate knowledge constructs that were integrated into the model, ensuring methodological operability and, thus, compliance with the requirements previously established in the proposal.

The validation of the design and development of the model was a complex and collaborative process among stakeholders and demanded a considerable investment of time. It was carried out through stakeholder dialogue and constant feedback with Ha Ta Tukari and IMTA experts.

The proposed model is based on the working methods that have been tested for twelve continuous years for installing and adopting rainwater harvesting systems in the indigenous localities of the Sierra Wixárica, located in the Municipality of Mezquitic in Jalisco, Mexico. One of the greatest benefits has been the ability of the inhabitants of the communities to articulate their own perspectives and opinions, prioritize needs, and solve problems related to rainwater harvesting in community buildings in their locality.

The impact of this model is to provide a methodological and systematized tool for government officials, professionals, or workers who have not had training on how to carry out social impact projects and community participation processes or who are in charge of planning and developing projects for the adoption of eco-technologies in rural or indigenous populations located in hard-to-access areas of the country. The description of the model's processes is practical, which supports the smooth technical and educational training of trainees and effective collaboration with the community. The current challenge of the model is to implement it in other indigenous regions of Mexico with different contexts, traditions, customs, and cosmovisions to validate its replicability.

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