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Notes

Subsystems explain the lack of water supply in El Pericón, community of Guerrero, Mexico

Subsistemas explican la falta de abasto de agua en El Pericón, comunidad de Guerrero, México

Oscar Figueroa-Wences[1], ORCID: https://orcid.org/0000-0002-0212-0044

Humberto Antonio González-González[2], ORCID: https://orcid.org/0000-0001-6718-9942

Hugo Rayón-Elacio[3], ORCID: https://orcid.org/0009-0002-0010-2405

[1]Superior School of Environmental Sciences, Autonomous University of Guerrero, Road Cayaco-Puerto Marques, Acapulco, Guerrero, México, 13472@uagro.mx

[2]Superior School of Regional Development Sciencies, Autonomous University of Guerrero, El Pericón, Tecoanapa, Guerrero, México. 14380@uagro.mx

[3]Bachelor of Sustainable Development, Intercultural University of the State of Guerrero UIEG, Atliaca, Tixtla, Guerrero, México, re.hugo83@gmail.com

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Corresponding author: Oscar Figueroa-Wences, 13472@uagro.mx

Abstract

The objective was to know the causes of the lack of water supply in the El Pericón community, municipality of Tecoanapa, located in the Costa Chica region of the southeast of the state of Guerrero; Mexico, through an analysis with subsystems.

A mixed methodology was used, on the one side, with the qualitative one, semi-structured interviews were carried out with key informants and citizens; on the other side, with the quantitative one a survey was applied.

With the results, it was found that there is disorganization to direct water issues, there is not interest about the water supply, water is a business for citizens who have wells and for resellers who sell it in other communities. The results also show that 98 % of those surveyed consider that there is a water shortage in the community; however, according to data from the Climatological Station 00012053, of the National Water Commission, National Meteorological Service, the average annual rainfall in the area is 1 200.9 mm (Conagua & SMN, 2022).

It is concluded that the social subsystems, political-administrative and cultural are the ones that best describe that the shortage of water in the community is due to the lack of community organization, the lack of application of actions by the governments and the water operation system. As well as consumption habits. The technological and economic subsystems also explain that there is a shortage of water, on the one side

due to the lack of maintenance of the water distribution networks and on the other, due to the water trade.

Keywords: Water supply, lack of water, subsystems, disorganization, water trade.

Resumen

El objetivo fue conocer las causas de la falta de abasto de agua en la comunidad El Pericón, municipio de Tecoanapa, localizada en la región Costa Chica del sureste del estado de Guerrero, México, a través de un análisis con subsistemas.

Se utilizó una metodología mixta. Por un lado, con la cualitativa se llevaron a cabo entrevistas semiestructuradas a informantes claves y ciudadanos; por el otro, con la cuantitativa, se aplicó una encuesta.

Con los resultados se encontró que existe desorganización para atender asuntos de agua; hay falta de interés en el tema del agua; el agua es un negocio para ciudadanos que tienen pozos y para revendedores que la comercializan en otras comunidades. Los resultados también muestran que el 98 % de los encuestados considera que en la comunidad hay escasez de agua; sin embargo, de acuerdo con datos de la Estación Climatológica 00012053 de la Comisión Nacional del Agua, Servicio Meteorológico Nacional, la precipitación pluvial anual promedio en la zona es de 1 200.9 mm (Conagua & SMN, 2022).

Se concluye que los subsistemas social, político-administrativo y cultural son los que mejor describen que el desabasto de agua en la comunidad se debe a la carencia de organización comunitaria; la ausencia

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de aplicación de acciones de los gobiernos y el sistema operador del agua, así como a los hábitos de consumo. Los subsistemas tecnológico y económico también explican que hay desabasto de agua por la falta de mantenimiento de las redes de distribución de agua y por el comercio del agua.

Palabras clave: abasto de agua, carencia de agua, subsistemas, falta de organización, comercio del agua.

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Introduction

For the study of social problems related to community water supply, the subsystems model is gaining importance. For this case, Alvarado and González (2012) propose five subsystems: the socio-cultural, economic, technological, biophysical and political-administrative subsystems. The importance of this model is that it allows investigating water supply problems in a holistic way.

For theirs part: "Politicians often call for the systems approach to be applied to pressing problems, such as air and water pollution" (Wolfe, quoted in Bertalanffy, 1989). Also: "People, water and nature are part of the same system. This makes it necessary for any policy related to water to incorporate a comprehensive and systemic vision" (Guerrero, 2007).

The study of the lack of water supply through subsystems allows the generation of relevant information not only to understand the phenomenon and its causes, but also to establish adequate policies that reduce the problem.

The supply of water is very important, as goal number six of Sustainable Development of the United Nations Organization (UN) speaks of guaranteeing the availability and sustainable management of water, as well as sanitation for all. It is also argued that: "water free of impurities and accessible to all is an essential part of the world in which we live" (ONU, 2016).

The water supply in Mexico has presented constant problems. According to Sandoval-Moreno (2011): "Supplying water to the entire mexican population involves serious problems when the government's capacity to meet the demand for water resources is low".

For his part, Pimentel-Equihua, Velázquez-Machuca and Palerm-Viqueira (2012) point out that: "The sustainable (or sustainable) management of water seeks to guarantee the supply and adequate distribution of the liquid among the users involved, also ensuring the control of its quality and quantity. One of the mechanisms recognized for adequate management is social participation".

However, social participation in issues related to water is still low in our country. For example, "Mexico shares with the Latin American region the experience of more than fifty years of community water management; however, they have not experienced the strengthening that is observed in other countries" (Domínguez-Serrano & Castillo-Pérez, 2018), and

"Projects for the supply of drinking water and environmental sanitation require good organization and administration to be efficient and effective" (Triviño, 1987).

Contrarily, in the state of Guerrero there is only 29.79 % of homes with piped water and it occupies the last place in the country in terms of drinking water coverage (Gobierno del Estado de Guerrero, s/f). This situation occurs despite the fact that the state of Guerrero registers significant annual rainfall. Therefore, it is necessary for the authorities to take into account that there are subsystems that can help explain and improve the water supply.

At a community level, water subsystems are an alternative to study and understand water supply problems.

The document is organized into four sections. In the first, the mixed methodological design is exposed to know the causes of the lack of water supply in the El Pericón community, municipality of Tecoanapa, Guerrero; Mexico. The second section shows the quantitative and qualitative results. The third section presents the discussion and the fourth section presents the conclusions on the lack of water supply in the community studied.

Materials and methods

The study was carried out in the El Pericón community, municipality of Tecoanapa, Costa Chica region in the southeast of the state of Guerrero; Mexico. As shown in (Figure 1).

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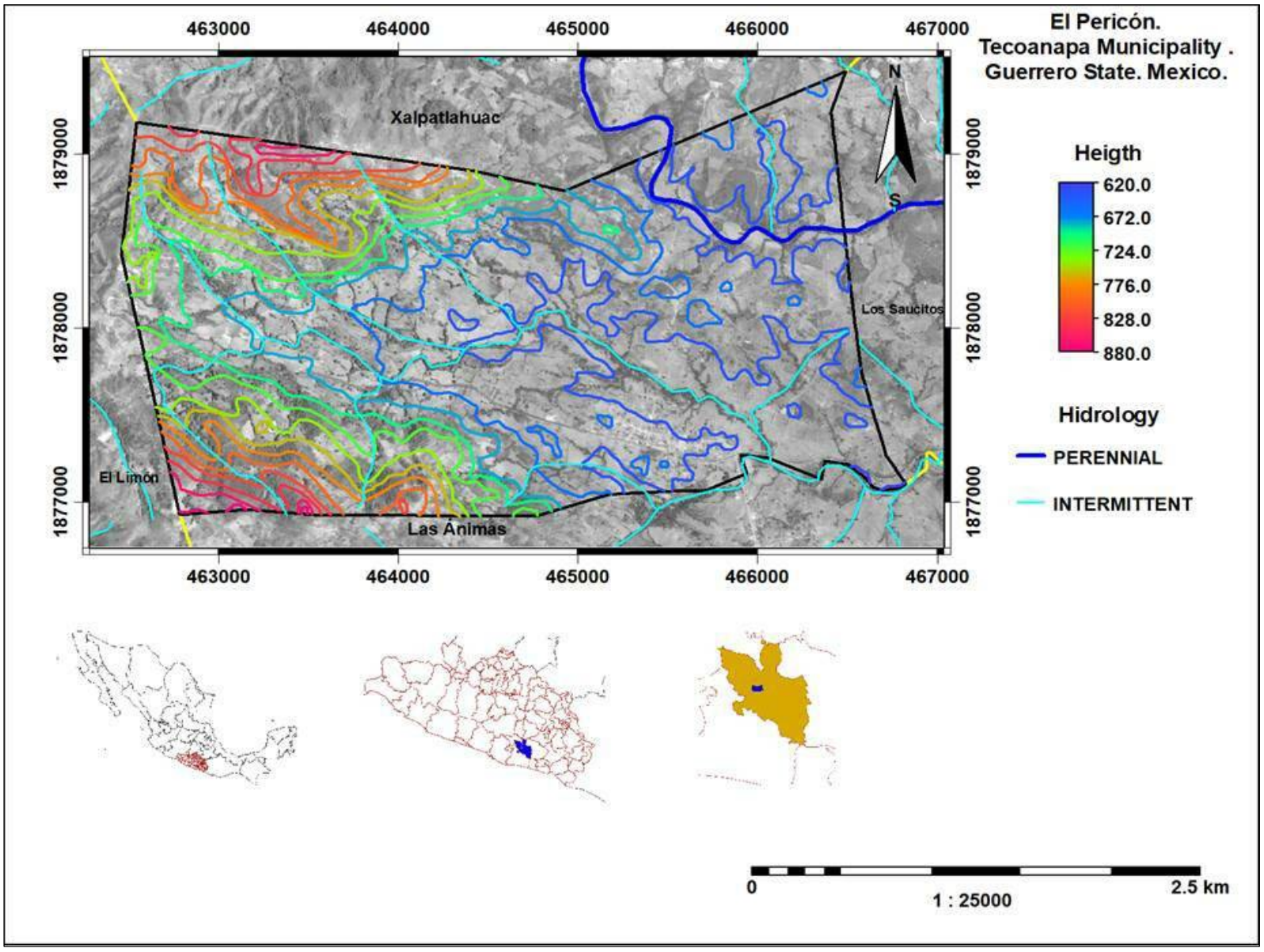

Figure 1. Location of the study community, own elaboration.

The study area is located on Tierra Colorada-Ayutla federal highway and borders the communities of El Limón, Las Ánimas, Xalpatlahuac and Los Saucitos. This area is located in the Nexpa River micro-basin

(Hydrological Region 20D) that drains into the Chautengo lagoon and borders the Papagayo basin (RH20E).

A mixed methodology was used, which constitutes a new approach and implies combining quantitative and qualitative methods in the same research (Hernández, Fernández, & Baptista, 2014) (Figure 2).

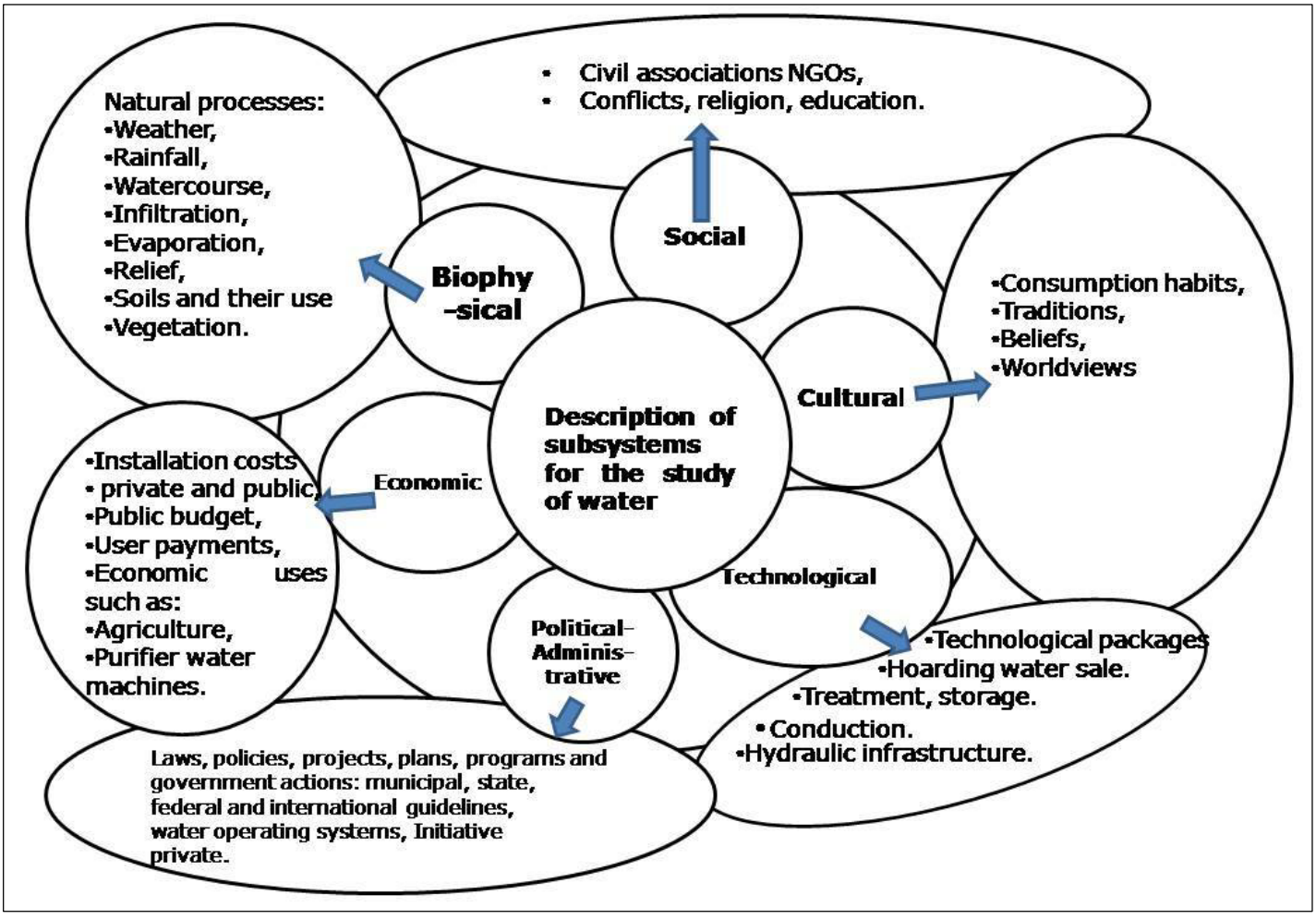

Figure 2. Description of subsystems for the study of water. Own elaboration based on information from Alvarado and González (2012).

The subsystems studied are social, cultural, technological, political-administrative and economic.

Quantitative methodology

In the quantitative methodology, the survey was used, which was applied in 57 homes of the 360 that exist in the community. The survey was conducted from August 29th to 31st, 2020.

The survey questionnaire consisted of 43 closed multiple-choice questions and was divided into two sections: 1) General data; 2) Subsystems involved in the water supply.

The survey was validated through pilot tests.

The most representative questions of the survey were the following:

1. Do you consider that there is a water shortage in the community?
2. If you answered yes, for you which of the following factors influences in water shortage?
3. If for you there is a bad organization to deal with the problems of thewater, what would be the cause?
4. Has the community received external guidance for a better organization in the water supply?
5. Do you know what type of technology exists in the community for the supply of water?

6. Have there been conflicts or problems with other communities due to water?
7. About what activities do you consider that the community is better organized?
8. When invited to participate in tasks to repair leaks of water or cleaning of the main storage tanks, with how often do you go?
9. Do women participate in tasks to repair water leaks or cleaning of the main storage tanks?
10. What would you propose to organize the community and improve the water service?
11. What are you willing to do to improve the service of water in the community?
12. Do women participate in the Water Committee?
13. Has there been conflict or problems between neighbors to obtain water?
14. How has the construction of water public works been achieved in the community?
15. In the community, who takes the decisions to solve the water problems?
16. How often does the community meet to talk about the water problems?
17. Are meetings held to talk about water without waiting for the problems arise?
18. Are there citizens or families that appropriate, control or condition the use of water works?

19. Are there citizens or families that control access to the springs or water sources in the community?
20. What recent or previous works on water have been built incommunity?
21. Has the community participated in the construction of the works to water?
22. From which dependencies have the resources been obtained to buildthe works on water?
23. Do you consider that the works carried out by the government have resolved the water supply problem?
24. What do you think about the water wells that have been built in the community?
25. Do you know that there are policies and laws to improve the service of water?
26. Have you bought water from private wells?
27. If you answered yes, how often do you buy water from the wells private?
28. Do you consider that the sale of water from wells is a new way to get money in the community?
29. Do you consider that buying water from wells is good or bad?
30. Approximately how much do you spend per month to buy water from the wells?
31. What is the approximate monthly cost you pay for the water you does it come to your house through the community pipe?

The data was processed and analyzed with Excel software and percentages were obtained and graphs were made.

Qualitative methodology

The qualitative methodology was used to understand and deepen the phenomenon, exploring them from the perspective of the participants (Hernández *et al*., 2014).

As a tool for collecting information, the semi-structured interview was used, considering what was established by Álvarez and Gayou (2003).

The interview was validated through pilot tests with key informants.

Seventeen people were interviewed, among them the municipal authority, the ejidal authority, the president of the Water Committee, municipal ex president, five agricultors who sow in times of drought, two owners of water wells and six citizens during the month of September 2020.

The interviews were made up of guiding and open questions.

The questions of the interviews conducted with citizens were the following:

1. Do you know what technology is in the tanks that supply water to thecommunity?
2. What do you think about the conditions of the water pipes?

3. Do you know what condition the water valves are in?
4. Does the roof of your house have a water collection rain system?
5. Does the water generated in the sink and the bathroom have any treatment?
6. Where do you store the water in your home?
7. Do you know what projects, plans or programs on water have you carried out the municipal, state or federal government in the community?
8. Do you know what projects, plans or programs have been carried out by thecivil associations or non-governmental organizations in favor of the water in the community?
9. In the community, who is in charge of managing and resolving the water needs?
10. Has the community created regulations that regulate the use of water?
11. Are the laws of the government taken into account in the community to regulate the use of water?
12. Is there citizen participation to resolve the needs ofWater?
13. What meaning does water have for you?
14. What uses do they give to water?
15. Is there any tradition related to water?
16. Do you have any beliefs about water?
17. How important is water to you?
18. What do you think about the cost of water in the community?
19. How much do you pay for water?
20. How much did you pay to have the water intake installed?

21. When a pipe breaks down, do they ask you for any cooperation?
22. Have you bought water?
23. Have you lacked money to buy water?

The questions asked of the community authorities were the following:

1. For you, is there a shortage of water in the community?
2. What do you have to do as an authority to attend to these problems?
3. ¿As an authority, have you looked for alternatives to the problem of the supply of water?
4. What is the relationship of your position with the City Council to deal with water problems?
5. What is the relationship of your position with the state and federal governments to deal with water problems?
6. How have you worked with the Water Committee?
7. What problems have you faced in meeting the needs of water supply in the community?
8. What is your suggestion to solve water problems?

The questions asked to the president of the Water Committee were the following:

1. How is the community Water Committee integrated?

2. What are the functions of the Water Committee?
3. Does the Water Committee have a work plan?
4. How is the Water Committee organized to work?
5. Are there women who make up the Water Committee?
6. What are the main problems faced by the Committee of Water to solve water problems?
7. Have there been problems within the Water Committee to work?
8. What kind of problems has the current Water Committee resolved?
9. What does the Water Committee propose to improve the water service water in the community?

Each interview lasted more than 20 minutes according to the response ability of each interviewed and also because some citizens were interviewed doing work activities.

The instrument for recording the interviews was a Sony model SX712 audio recorder, later they were captured verbatim in a word processor, then classified and compared through content analysis.

Quantitative results

Factors related to the lack of water supply

Among the factors related to the lack of water supply in the community, it was found that for 62 % of the surveyed it is due to poor community organization, 12 % believed that it is due to the use of water, 7 % to

hoarding of water, 12 % to public works and 7% to other causes (Figure 3).

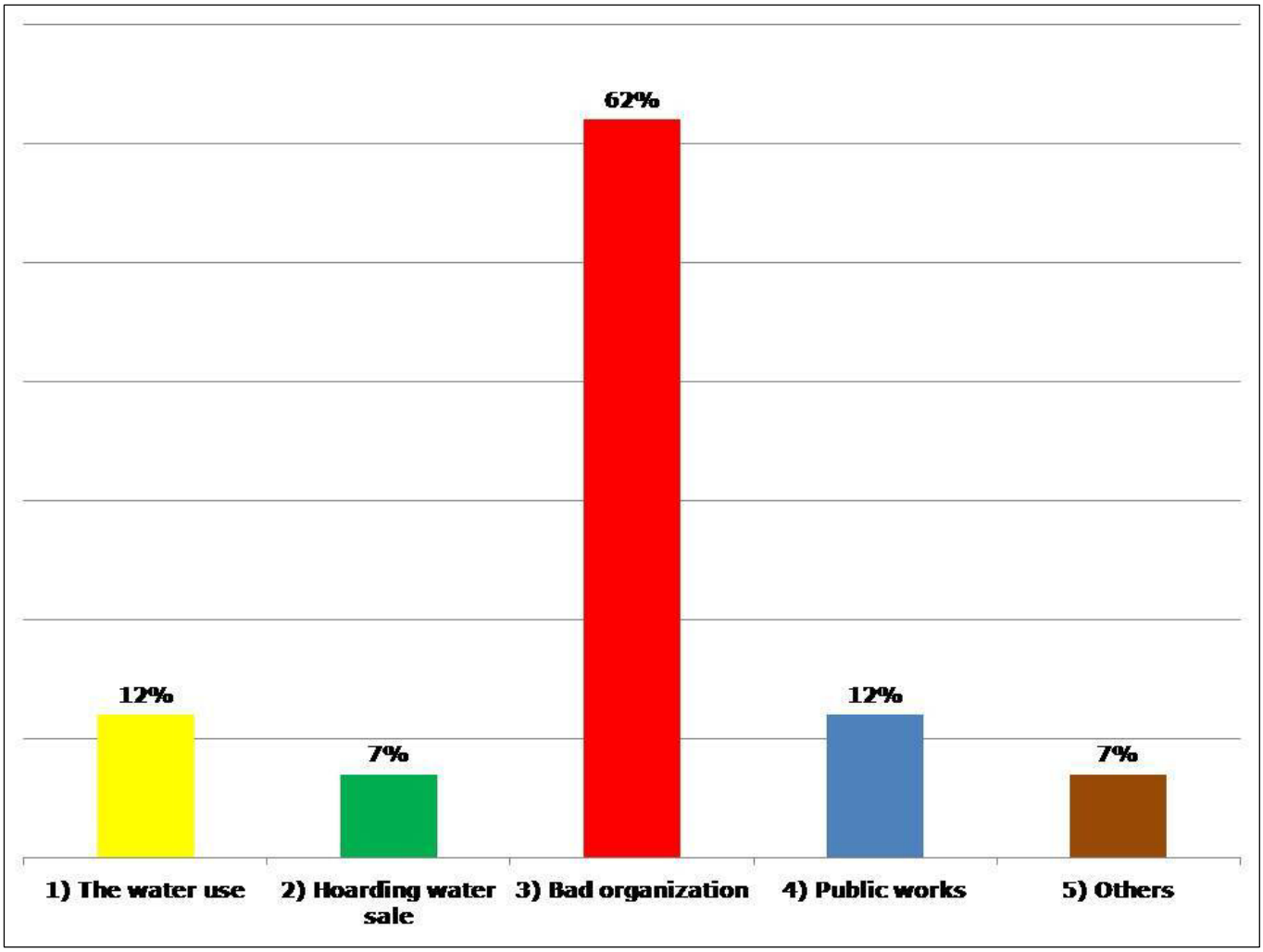

Figure 3. Factors related to the lack of water supply.

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Better organization activities

Regarding the activity in which citizens are better organized, it was discovered that 58 % think that it is the patronal festival that is celebrated every year between january 26th and 30th in honor of the Virgin Mary of Guadalupe, the second activity the best organization is agricultural production with 19 %, in third place is the water supply with 14 % and lastly other religious activities not related to the patron saint's festival with 9 % (Figure 4).

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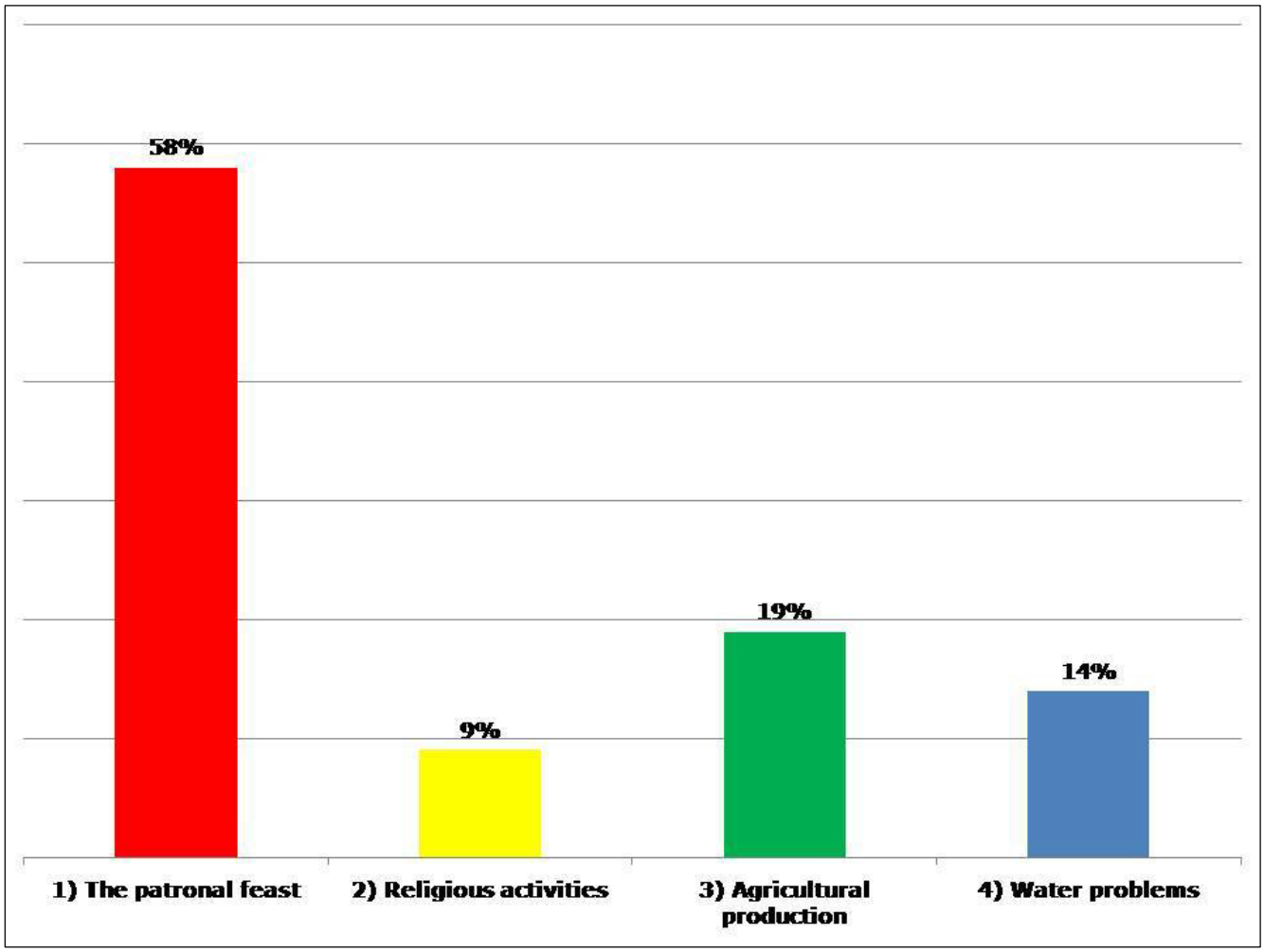

Figure 4. Activities of better community organization.

The economic subsystem of water

In relation to the extra monthly expense that some families make for water, it was found that 10 % spend less than $100.00; 39 % pay from $100.00 to $200.00; 21 % from $200.00 to $300.00; 14 % from $300.00

to $400.00; 11 % spent between $400.00 and $500.00; 2 % spent more than $500.00, and 3 % had no opinion.

This expense is in addition to the $15.00 per month they pay for water to the community Water Committee. It is appreciated that for some families buying water from private wells is very expensive. However, there are areas of the community where water does not arrive for weeks or months and citizens find it necessary to buy it.

The expense for water varies for each family depending on the number of members and the amount of water they consume (Figure 5).

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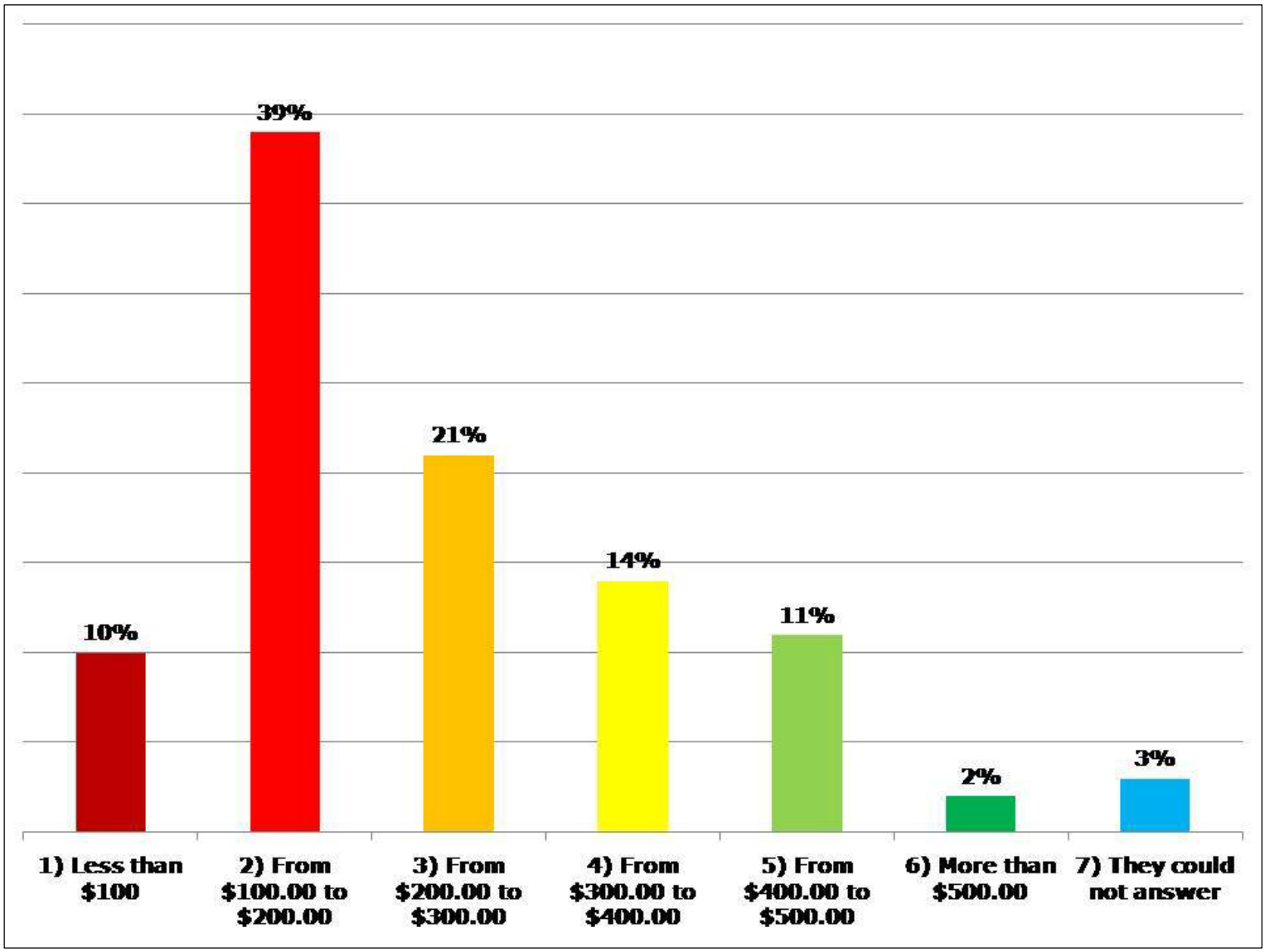

Figure 5. Additional monthly spending for water and per family.

It was also discovered that the construction of private water wells has grown in the community, some are for family use and others for water trade. 58 % of those surveyed considered that the wells are good because

they help reduce water scarcity, but 42 % commented that they are bad because they reduce the level of water in the public wells.

It was discovered that there is no regulation regarding the construction and use of water wells. There is no official record of how many wells there are in the community, it is estimated that there are more than 80 and most of the owners of water wells do not process permits for their construction. Only the ejidal authority commented that he obtained a permit issued by the National Water Commission (CONAGUA) under the condition of not selling water.

It was found that water resellers who take it from wells in the study community, sell it in other communities such as: Parota Seca, Los Saucitos, Las Ánimas, Huamuchapa, Villa Hermosa, La Colonia Lázaro Cárdenas and El Limón; overexploiting part of the Nexpa aquifer.

The social subsystem of water

In relation to whether the community has received training and external guidance from a government agency, educational institutions or non-governmental organizations for a better water supply, 65 % of those surveyed answered no; while 35 % mentioned yes.

Regarding whether the community has incorporated experiences from other communities on good water management. It was found that 91 % said no and only 9 % said yes.

It was observed that there is no collaboration between neighboring communities to meet water supply needs, each community independently solves its water supply.

In relation to the frequency of citizen participation in the tasks of cleaning the water tanks. 67 % of those surveyed stated that they participate sometimes, 17 % indicated that they always attend, and 16 % commented that they never participate.

Regarding the participation of women in the tasks of cleaning the community's water tanks. 53 % said that they do participate and 47 % commented that they do not. Participation focuses on the preparation of foods and cocoa beverages for men.

The technological subsystem of water

It was found that 91 % of those surveyed do not know the type of technological packages installed in the community for water supply, while 9 % said they do know. Part of the citizens who answered that they do know, have been members of the Water Committee or community authorities. (Figure 6).

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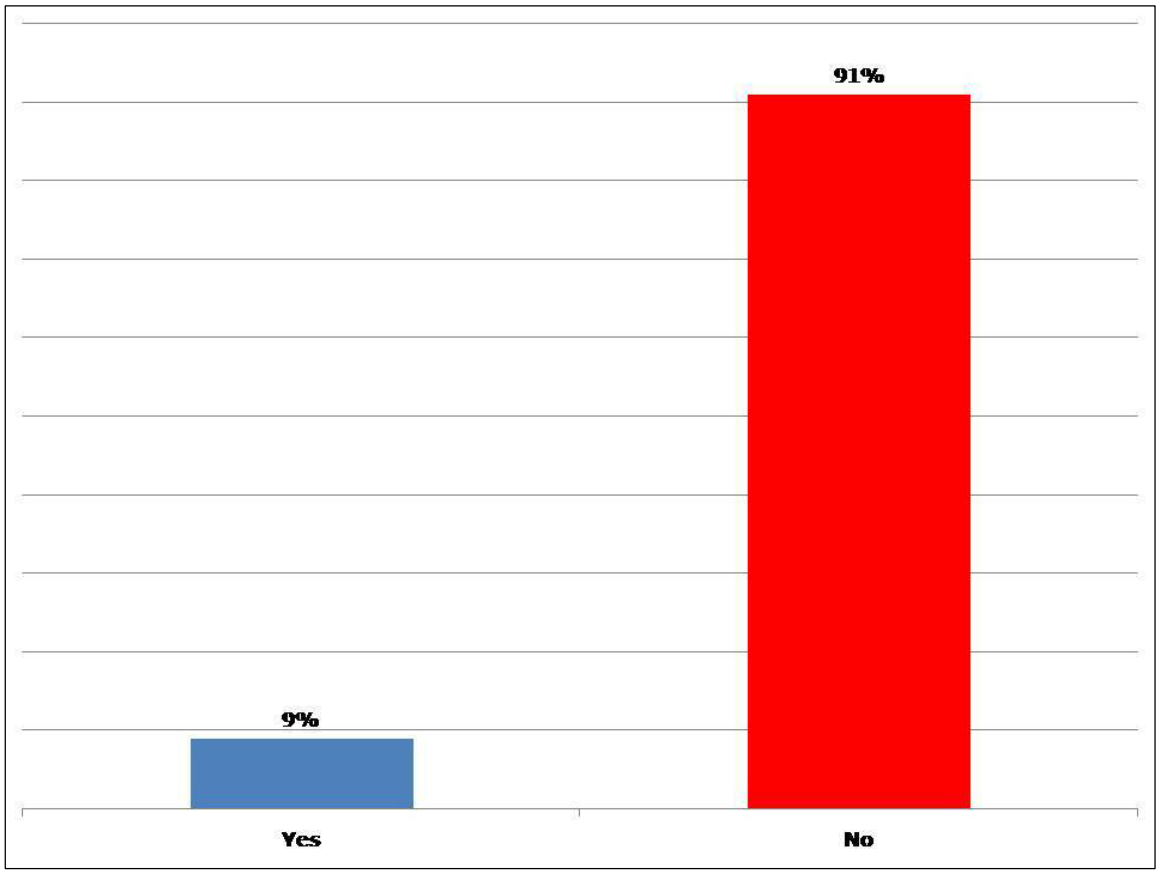

Figure 6. Knowledge about technological packages for water supply.

In relation to whether the public works built for the water supply have resolved the demand, it was found that 68 % said no, while 32 % mentioned yes (Figure 7).

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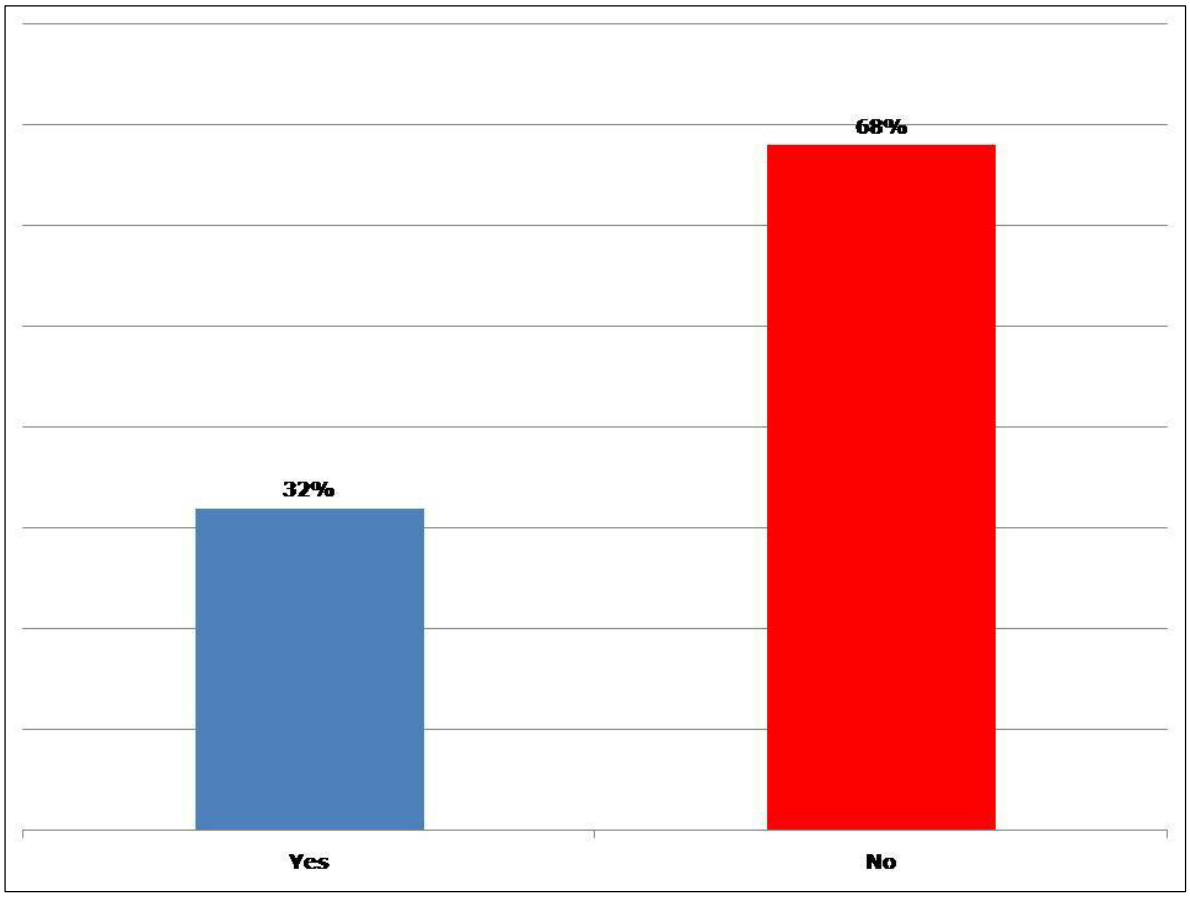

Figure 7. Public works and the solution to water supply.

The political-administrative subsystem of water

Regarding knowledge of policies and laws related to the water issue, 75 % stated that they do not know that there are policies or guidelines, while 25 % commented that they do know (Figure 8).

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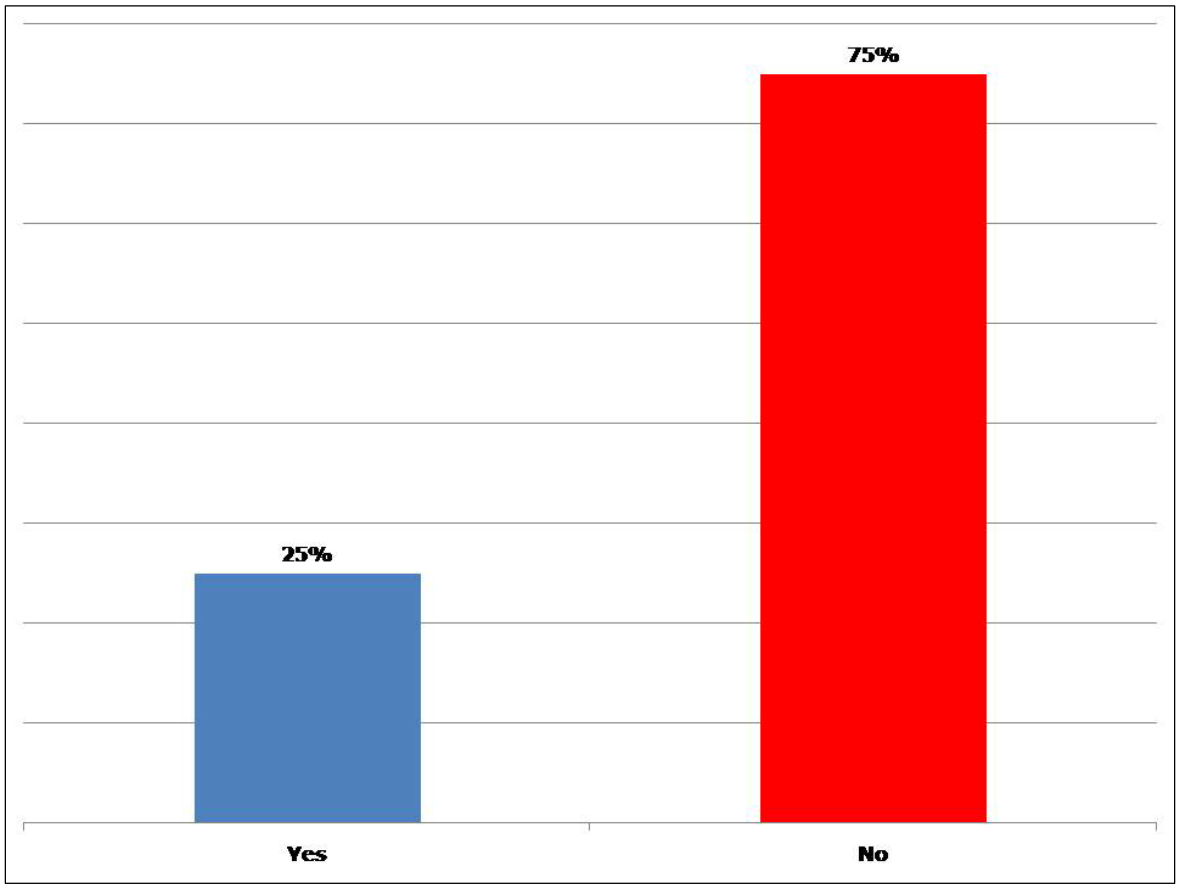

Figure 8. Knowledge of policies and laws related to the issue of water.

Qualitative results

Technological water subsystem

Of 17 people interviewed, 16 have no knowledge about the technology used to supply water to the community. The principal of the Water Committee commented that he was not sure he knew. It was found that the ejidal authority did have information on the subject because he was

the person who negotiated with the state government the newest public work to supply water to the community, which consists of a deep well built in the intermittent river, two tanks of water storage and expansion of the water distribution network.

In relation to the conditions of the water pipes, of 17 people interviewed, 10 commented that they are in good condition, while seven indicated that they are in poor condition. Of those who consider the latter, two pointed out that they were used pipes and that they only painted them, for that reason they mentioned that there are problems with the water valves.

Of the 17 interviewed, five commented that there is not a good distribution of water, they pointed out that sometimes members of the Water Committee distribute for several days to the same area of the community and leave others without water.

The 17 interviewed indicated that there are no rainwater harvesting systems in the community and no storage of large volumes of water.

The few families that collect rainwater use it immediately, mainly for the toilet, other citizens stated that they had not thought of collecting rainwater, some said that they do not do it because they have nowhere to store it, there were also citizens who think that the Rainwater cannot be stored for a long time because larvae reproduce.

It was found that most of the inhabitants are not aware that there are natural methods for the treatment of domestic gray water, which is usually discharged into the streets and ravines. Some responses from the interviewed were: "No, it does not have any treatment, everything is

weathered with a drum and then thrown away so that it does not smell bad and sometimes to spray", "No, it is because that goes to the stream, the bathroom has the pipe and that pipe goes out to the creek".

It was discovered that there are other final destinations for gray water, as pointed out by some interviewed: "Look at that water that is used after washing dishes in times of drought, it is watered in the yard and is used to water the plants", "The water from the laundry it is thrown on the ground so that at least it does not raise dust, in the dry season the soap is thrown with the water", "Well, the regular thing when it does not rain, we do use it for the bathroom and for the plants, to do not waste it or spray it to avoid having a puddle of water, since they produce mosquitos".

It was discovered that most of the interviewed do not give a second use to the water and those who do, only use it to water plants, the patio or the street.

In a complementary manner, some citizens interviewed stated that the participation of women when water tanks are cleaned is limited to preparing and bringing food, fresh water and "chilate" (cocoa drink) to the men who do the cleaning.

One of the reasons that citizens pointed out for the fact that there is little participation of women was that it is a job of physical strength for them to carry out because they have to get into the water tanks and remove mud.

Another citizen commented that it is because there is machismo in the community and women are considered physically weaker than men.

All the interviewed pointed out that no external experiences have been taken. Even the ejidal authority stated that: "Not because there is no community that stands out."

For the citizens interviewed, there is no model community to follow in terms of water supply.

It was discovered that there is disagreement among citizens when more water arrives in some homes than in others. In this regard, it was found that it is due to the fact that there is a main pipe on the federal highway and the houses that are located in front of it usually have water more frequently, unlike the houses on the edges of the town. The families that most lack water are those whose houses are located in the upper parts of the community where the water rises with little pressure.

Conflict has also arisen when a citizen does not allow another house's water pipe to pass through his property.

It was also discovered that there are social actors that affect the water supply in the community and they are the citizens who have private water wells and market it, the peasants who plant in low water and irrigate from the river, the peasants who irrigate in drought from wells own, the agricultors who capture water with dams to irrigate in low water. These social actors usually always participate in meetings for decision-making on water.

The political-administrative subsystem of water

It was found that there is no government program, private initiative or non-governmental organizations related to the care or supply of water, only interventions have been carried out by the university sector that has a presence in the community.

In the study area there are two tanks that store water for distribution. It was observed that both the new tank and the previous one have problems of spilling water that causes shortages. Even during a field trip, water from a tank was spilling while in the community there was no water supply.

It was found that during the 2002-2005 municipal government, a deep well was built on the banks of the so-called "Rio Grande" which is located far from the populated area and which also belongs to another micro-basin, the project intended to transfer water, but It did not work because a large amount of electrical energy had to be used for the water to rise several slopes of land. Despite this, the work was reported as completed and in operation. The ejidal authority commented that due to this public work, the state and federal authorities consider that the water supply in the community is guaranteed, although in reality it is not in this way.

The federal government also built a dam named "El borde", which is located in the upper part of the community and was intended to supply water to the agricultors with nearby plots. However, a former member of the Water Committee commented that this water is only used by the

owners of the land where the dam was built, despite the fact that the purpose was for common use.

The interviews also asked about government intervention for water supply and the following was found:

Regarding the construction of public water works, a citizen mentioned: "Yes, the new pipeline, in a few words, the drinking water project, the federal government provided the financial resources and we provided the workforce. That project included the solar tank that It works according to the weather, but the water comes every eight days.

Another citizen pointed out: "Well, I really don't know, well now that I remember I do know of one that is the new pipe and the new tank that Clemente managed."

An agricultor said: "The water project when drinking water was put into the houses, supported the state and federal government with economic resources."

Another citizen commented: "The water tank and pipes for the network of the new drinking water pipe. The documents went to Chilpancingo because the City Council did not pay attention to the respect of the project, but the project came out and now we have a new pipe ".

Nine out of 10 interviewed indicated that the laws that regulate the use of water are not taken into account. Only one citizen said that they are taken into account because they are supervisors in reference to the staff of the Drinking Water, Sewerage and Sanitation Commission of the State of Guerrero.

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The cultural subsystem of water

Regarding the meaning that water represents, the 17 citizens interviewed commented that water is a necessary liquid to live, both for people and for animals and plants.

At the cultural level, it was found that there is a worldview about the meaning of water, which became a tradition and ritual. Which consists of citizens going to a mountain called "Cerro de la Cruz" or "Crucita" to beg nature to rain when there is a delay in the rain and the crops are not affected.

In this regard, an agricultor mentioned: "the only tradition is that we go to the hill to beg for water."

The economic subsystem of water

For the water supplied by the Water Committee, in the interviews most of the citizens said that they pay between $15.00 and $20.00 per month, "the current Water Committee charges $15.00 per month", it was discovered that four months after starting operations the The new Water Committee has just started charging the monthly fee for the service.

The Secretary of the Water Committee commented: "You pay $15.00 per month per intake, each owner of the intake pays $15."

Most said that the installation of the water intake was free because it was a government project.

All the people interviewed indicated that they buy water through rotoplas (water tanks). One citizen stated: “Yes, he bought it, because it barely arrives and it is a basic necessity to be able to live.”

In the same way, a welder guy said: "Yes, I do buy since almost no water arrives and I have to buy water, it is a very interesting resource for one, without water one does not live, water is needed for everything, that is why I have to buy water”.

It was common for the people interviewed to comment that they lack money to buy water and that they do not have a job.

An agricultor commented: "Yes, when we don't have money we have to go and carry water from the wells so as not to pay since we don't have money."

The welder guy commented that: "Yes, there are times when I don't have a job and I don't have money either, so I have lacked money, but I have to borrow money to buy water, since water is very important to survive."

Discussion

The results allow us to point out that in the case of the community, the lack of community organization is the one that mainly intervenes in the shortage of water. These results agree with what was reported by Domínguez-Serrano and Castillo-Pérez (2018), who point out that: "Mexico shares with the Latin American region the experience of more than fifty years of community water management; however, although there are organizations constituted for the self-sufficiency of the liquid in

rural and peri-urban areas, these have not experienced the strengthening that is observed in other countries".

In El Pericón it also intervenes in the inadequate supply of water, the hoarding carried out by peasants in times of drought through rudimentary dams, the lack of knowledge about appropriate technologies such as eco-technologies, the sale of water by owners of private wells. These results are related to what was reported by Pimentel-Equihua *et al*. (2012), who, in a study carried out on local capacities and social management for domestic water supply in rural communities of the Zamora Valley, Michoacán, Mexico, discovered that: "The social responses to the lack of water include (...) buying water from delivery trucks (...), requesting water from neighbors in nearby neighborhoods or transporting the liquid from more distant places"

Regarding the construction of water wells, it is necessary to mention that they are causing overexploitation of part of the Nexpa aquifer, large amounts of water are being extracted. Since water resellers come to supply themselves from the wells of the study community and sell it in other communities. When the touts extract water from the wells, the water level drops and they have to wait for hours for the level to recover so they can extract water again. The results allow us to point out that there are important water problems in the communities where the water is sold.

In addition, in the community there is a type of privatization of water that the owners of the wells do and profit from it.

The community is located in an area with significant rainfall records. The average annual rainfall is 1200.9 mm according to data from the Climatological Station 00012053, of the National Water Commission, National Meteorological Service (Conagua & SMN, 2022); therefore, the population in the study area should have guaranteed water supply in sufficient quantities. Another advantage is that the community is located in the upper part of the Nexpa aquifer where the rivers and springs are born. In addition, the type of vegetation and soil are conducive to water conservation. However, it is convenient to mention that in the community there is an important deforestation of trees, this activity could have a negative impact on the availability of water in the future.

Regarding the activity of deforestation, there is a tendency to continue, because it is carried out as part of common activities, which is rooted and is transmitted from generation to generation, the wood of the trees is used as firewood (fuel) to cook. In addition, the high marginality and poverty of most of the inhabitants make it difficult to obtain other sources of fuel such as LP gas, due to the high economic cost that many citizens cannot pay and due to the lack of knowledge it is possible that other alternatives such as biogas are not sought.

On the other hand, women and children play an important social role in household water supply. It is common to see women and children carrying water containers on their heads and walking long distances on rough terrain.

This reality is related to what is reported in the State Development Plan (2016-2021) where it is mentioned that the state of Guerrero ranks last in the country in terms of drinking water coverage.

Conclusions

The objective of the research was to know the causes of the lack of water supply in the El Pericón community, municipality of Tecoanapa, located in the Costa Chica region of the southeast of the state of Guerrero; Mexico, through an analysis with subsystems and with a mixed methodology.

In relation to the subsystems that explain the shortage of water in the community, the social, political-administrative and cultural subsystems are the ones that best describe that the shortage of water in the community is due to the lack of community organization, the lack of application of actions of governments and water operating system, as well as consumption habits.

It is concluded that the lack of community organization is the main factor in the lack of water supply and this is related to what Triviño proposes: "Projects for the supply of drinking water and environmental sanitation require good organization and administration to that are efficient and effective" (Triviño, 1987).

On the other hand, the technological and economic subsystems also explain that there is a shortage of water due to the lack of maintenance of the water distribution networks and the water trade. Water trade is a type of monopolization and privatization of this common good.

Agriculture is the main economic activity of the community and rudimentary irrigation demands a significant amount of water that influences its shortage.

The insufficient training of the members of the Water Committee is also related to the lack of water supply. In addition, it influences that the positions in the Water Committee are honorary without a salary and frequently the members of the committee attend to the activities related to the water supply in their free time or in the afternoons, after leaving work.

There are water supply problems in communities near the study area, for which it is necessary to carry out studies in this regard.

It is also necessary to carry out studies on the biophysical environment related to water in the community.

The public works built by the three levels of government have not fully resolved the water supply in the community.

The limitation of this research was the lack of study of the biophysical subsystem, so it is recommended to do so in future research.

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