

## Review Article

# Review of Water Problems in the Era of COVID-19

**Maria Del Rosario Molina Gonzalez<sup>1\*</sup>, Celia Yaneth Quiroz Campas<sup>2</sup>, Gilberto Bermudez Ruiz<sup>3</sup>, Francisco Espinoza Morales<sup>4</sup> and Cruz Garcia Lirios<sup>5</sup>**

<sup>1</sup>Department Leal Science, Universidad de onora, Mexico

<sup>2</sup>Department Administrative Sciences, Instituto Tecnológico de Sonora, Mexico

<sup>3</sup>Department Economy, Universidad Anahuac, Mexico

<sup>4</sup>Department Administrative Science, Universidad de Sonora, Mexico

<sup>5</sup>Department Social Work, Universidad Autonoma del Estado de, Mexico

\***Corresponding author:** Maria del Rosario Molina Gonzalez, Department Leal Science, Universidad de onora, Mexico

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## Abstract

The objective of this work was to establish press framing networks around the water problem in Mexico City. A documentary study was carried out with press releases related to shortages, shortages, unhealthiness and famine during the period 2019 to 2021. The results show a discreet framing of the press, although the structure of its framing suggests the representation of the problem in the shortage and the solution in the increase in rates, suggesting the extension of the investigation to other scenarios and samples of coverage of the printed media.

**Keywords:** Scarcity; Leaks; Framing; Mediation

## Introduction

The availability of surface water defines municipal water services. The reduction of this type of water leads to local shortages and residential supply. The Organization for Economic Cooperation and Development in its (2021) report warns of a downward trend in surface water bodies. Mexico registers a decrease added to an unequal distribution. In the north there is a severe shortage and in the south there is significant availability (Figure 1).

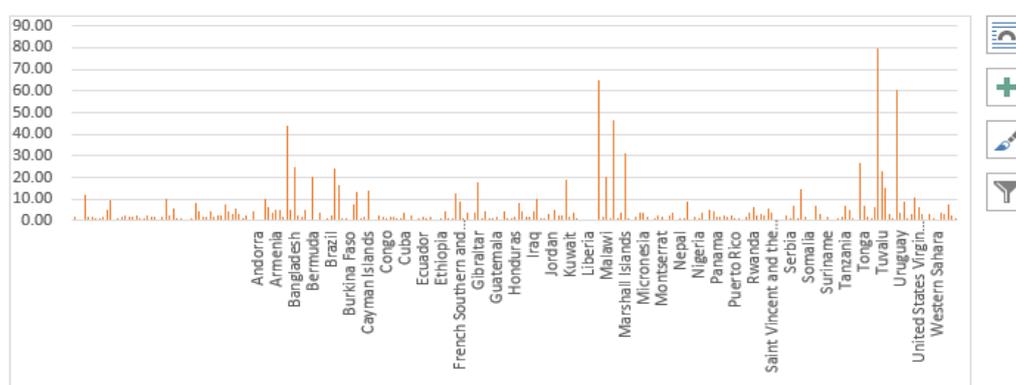
Within the framework of global confinement policies to mitigate the pandemic of contagion and death from the COVID-19 disease attributed to the SARS-CoV-2 coronavirus, which involves two phases, one infectious and the other terminal, since the coronavirus replicates immeasurably and is attacked by the immune system; generating a sudden and lethal loss of life in less than 6 hours once the symptoms have systematically manifested, water resources and services acquire an unusual relevance due to their preventive use in personal and material sanitation [1].

Water problems have become a central issue on the political

agenda of developed and emerging countries. It is estimated that the productive activity requires more and more aquifers with sufficient availability to encourage the production of soft drinks, beer, pharmaceutical or dairy products. However, water leaks are a significant item in terms of economic losses due to their obsolescence [2]. Institutions in charge of extracting, supplying and repairing leaks provide intensive maintenance that could increase as public networks are presented as obsolete in the media. In this sense, media coverage can influence the processing of information by users about shortages, shortages and leaks insofar as they are attributable to the drinking water service.

One of the main processes of water problems is the scarcity, scarcity and leaks that explain the action of the government and the participation of users in such situations [3]. Water leaks range between 40% and 60% of the public supply network in Mexico City. As technological advances allow the detection of non-visible leaks, a great impact on the public supply system is estimated.

In the case of perceptible leaks, users, authorities and the media have amplified the problem to such an extent that it could affect public



**Figure 1:** Surface water change.

investment and supply policies, as well as conflicts between users and authorities over the regularization of the service public supply [4].

In the present work, the theoretical, conceptual and empirical frameworks that describe the problem of water in its media dimension of scarcity, scarcity, unhealthiness and scarcity are exposed. Its methodological approach is included and the preliminary results are presented from a means analysis to discuss the scope and limits of the study.

## Water Mediatization Theory

In the field of social confinement as a mitigation policy to reduce pandemics, information biases are especially relevant because they influence the decisions and behaviours of their audiences. In this way, the approaches that have explained this symbiosis between political and social actors, public and private sectors as users of the media, mainly social networks, have highlighted: 1) the agenda setting theory showing the bias of the axes and topics of discussion in traditional media such as television, radio, the press or the cinema; 2) the theory of media framing (framing) by highlighting informational bias and dissemination of issues related to plausibility for audiences of emotional programs and verifiability of facts for rational and critical audiences; 3) the theory of media effects (priming) that focuses on the behaviour of audiences after being exposed to a media campaign; 4) the theory of participation (melding) by placing the topics of the sectoral agendas on Facebook, Twitter, YouTube, Instagram, WhatsApp, Periscope or Snap Chat [5].

The four theories agree that the central actors are the rulers and the ruled, distinguishing themselves as mediators of conflicts or agreements between these parties. When the public administration implements a policy, strategy or program, adherent and critical users are approached as passive before the quality of the water service [6]. Or else, conflicts between the parties spread as a result of poor public management in the face of supply demands.

The theory of the agenda (setting) when explaining the bias of the traditional media in terms of scarcity and scarcity seems to contravene the postulates of the theory of participation (melding) that maintains that scarcity and scarcity would be a management problem administrative that users can address by contracting a supply unit known as a pipeline [7].

The fusion approach suggests that the central issues on the agenda of the governed are in the quality of service. The fusion approach affirms the possibility of contracting residential water treatment or filtering technology, analyzing videos on YouTube where subscribers can appreciate sanitation or disinfection techniques for water consumption, but it is the perspective of the environment that establishes the systematization of these behaviors to identify them as an influence of television, radio, cinema or the press [8].

In this contest of explanations from the logical framework and the fusion around scarcity, scarcity, unhealthiness and scarcity of the public water service, a delimitation of these phenomena emerged [7]. It is the framing theory that understands these issues as symbols of persuasion. Rather, it proposes a transition from the coercive or authoritarian state to a persuasive or governing regime.

Even the setting approach seems to have been postulated to

explain the close relationship between state forms and authoritarian regimes with traditional media and the melding approach as the guardian of inclusive and participatory democratic systems known as co-government or governance [9].

Faced with this dichotomy, the framing view ensures that both coercion and persuasion coexist in two logics: plausibility of the facts for the authoritarians and verifiability for the participants in governance [10]. The novel idea of the framing version lies in the analysis of the ambivalence of political and social actors with extension in the public and private sectors.

The theoretical body of framing has successfully explained the distinction of the parties involved in water services. It has shown how the militant audiences of authoritarian parties prefer to listen to credible messages, in accordance with their ideologies and beliefs [11]. Instead, the conceptual matrix that frames verifiability has found at least differences between audiences in the face of irrefutable evidence of scarcity, scarcity, unhealthiness and scarcity of water services in situations of risk, uncertainty and contingency.

The development of the setting, melding and framing approaches seems to park in a very detailed line of research known as priming, which explains the degree of impact of plausibility and verifiability frames on the behavior of political and social actors [12].

The primary version of these theoretical frameworks has been very poorly developed since television, radio, the press or the networks acquire a persuasive dynamic of their contents, exacerbating their messages and segmenting them to specific age groups [13]. This is how the primary explanation has only been able to demonstrate some issues related to the prestige of the source, the innovation of the message or the personality of the receiver.

## Water Mediatization Studies

The theoretical perspectives reviewed by postulating as axes and topics of discussion the differences between the rulers and the ruled, as well as identifying the areas of conflict in scarcity, scarcity, unhealthiness and scarcity, focus their attention on policies, strategies and subsidy programs, forgiveness or the rates as axes of discussion and topics of agreements between the interested parties [14]. In this exercise, they place the media as an instrument of power that the State exercises over society or citizens with respect to their authorities.

In this way, studies of the mediatization of water have been limited to observing the possession, framing or behavior of political and social actors based on a common agenda: scarcity, lack of supply, unhealthiness and shortage of drinking water service [15].

On shortages, shortages, unhealthiness and scarcity, the predominance of press releases on conflicts and complaints has led to the reduction of subsidies or forgiveness, as well as the consumption indicated on meters and receipts after plausibility campaigns [16].

In the case of scarcity, lack of supply, unhealthiness and scarcity of the local drinking water service, the traditional media, the audiences and the users of the electronic networks have built multiple agendas; a) Preponderant themes and plausibility frameworks on shortcomings and shortcomings in the face of elections with effects on water saving and the dissemination of its care in networks; b)

secondary and verifiability issues framed in the issue of unhealthiness and scarcity in the face of public policies of subsidy or forgiveness with effects on the irrational use and demand for free service on the networks [17].

Psychological studies of water sustainability have established significant relationships between situations of scarcity and water storage [18]. This relationship has been nuanced by print media coverage of the problem in reference to the belief system of abundance or scarcity of water. Research on the subject has shown that anthropocentric beliefs about the abundance of water lead to waste of the resource. Instead, the information regarding scarcity has influenced the eccentric beliefs that determine the care of water.

In situations of low water availability per capita, less than 200 liters per day, psychological sustainability studies have established significant differences between users when perceiving the proximity of a leak [12].

It is true that the situation of scarcity influences the perceptions, decisions and actions of consumers, but between the shortages and leaks, the media seems to bias the situations to such an extent that the information could influence the belief system of consumers, users of public services [19]. The news about the deterioration of the supply network could influence the indiscriminate storage of water and, eventually, in the conflicts that are generated by its hoarding.

For this reason, a systematic and retrospective review of media coverage of water leaks could stimulate discussion about its impact on users' beliefs. of the public water network. This research would be preliminary if it is intended to explain the organized action of users against the variability of water availability in a demarcation [20]. In this sense, the present study aims to explore the coverage of the print media around the leaks of the public network during a period subject to the information available in the national press.

### Modeling of the Mediatization of Water

The main objective of this study was to explore the impact of the press on its readers on the coverage of the water situation in a commune in Mexico City. For this, the framing theory was used to establish the plausibility and verifiability of the framing according to the potential readers of press releases with national circulation.

The network, graph or Spectron proposed by the framing theory refers to peripheral nodes where raw data is managed, processed or translated, which can be real or symbolic, but with a plausible and verifiable distributable trend of information or knowledge depending on the type of emotional or rational hearing [21]. The distinction between incoming and outgoing data only refers to a problem or issue on the agenda. When the agenda is built an incoming layer of information is assumed, when that agenda is established an outgoing layer of data is considered, although in the processing (hidden layer) the framing theory does not know why emotional audiences avoid verifiability frames or rational audiences are unaware of plausibility frames.

The central node or public agenda, according to framing theory, refers to an integral framework of plausibility and verifiability whose effects are observed in the management, production and transfer of knowledge from rational audiences to emotional audiences, but its

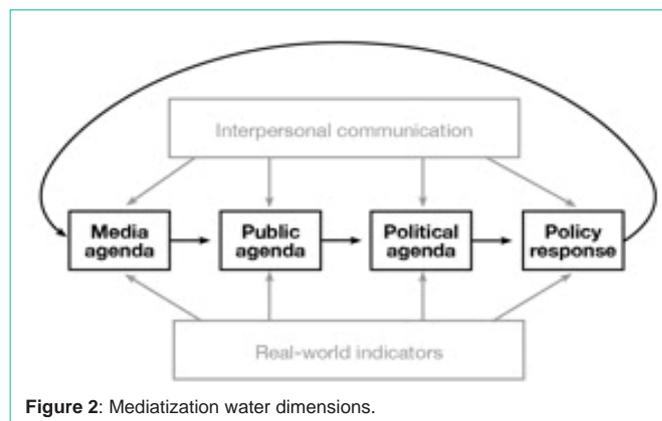


Figure 2: Mediatization water dimensions.

processing is not ruled out. Of emotional intelligence that contributes to the discussion of information [2].

This is how, from the framing approach, water resources and services are addressed from press releases that have been systematically published and disseminated in the local, national and international press, placing the Iztapalapa mayor's office as the epicenter of scarcity, scarcity, insalubrity and famine for at least the last 30 years (Figure 2).

In this accumulation of data, water problems are represented in peripheral nodes or public agendas that the literature has identified as scenarios for discussion, agreements, and co-responsibilities around scarcity, scarcity, unhealthiness, and scarcity. In the present work, we are dealing with journalistic data nodes in which the discussions between the governors and the governed are managed, derived topics are reordered and the responses of the actors are translated [21].

### Methods

A cross-sectional and retrospective study was carried out with a sample of 20 newspaper articles of national circulation on water leaks in Iztapalapa, a delegation located to the east of the Federal District (Mexico).

Content analysis matrices were used following the symptom technique [22]. Informative excerpts and images included in each press release were analyzed [23]. Once the 20 informative notes were selected, the messages related to water leaks were structured with images alluding to said leaks, repairs, floods or mobilizations derived from the problem of water scarcity.

The reliability and validity of the informative notes, excerpts and images was established from the verisimilitude of the speeches and their correspondence with the images [24]. Each shortage indicator derived from public or residential leaks was analyzed according to the coverage of the print media during the period from June 2019 to November 2021.

The first consisted of assigning a number to the discursive frame of each press release considering: 0= null framing (the reporter limits himself to describing the facts without expressing his own opinion or including a government or citizen opinion), 1= minimal discursive framing (a citizen or government opinion is external), 2= moderate framing (an opinion of his own regarding leaks), 3= broad discursive frame (an own opinion is expressed and it is linked to other issues

related to the problem) and 4= extremely discursive frame (an own opinion is expressed and is based on the opinions of authorities or citizens). Subsequently, the weights were added to establish a Discursive Framing Index (FDI) where the minimum value is 0, which means that there is no interference from the press in its coverage of the problem of public and residential leaks. The maximum value was 120 and was interpreted as the maximum incidence of the press to frame a problem considering only its intensity in the perception of the spectators.

The second weighting corresponded to the framing of the images [25]. The weighting criterion was as follows: the images that showed the problem were labeled with a 1 in which the waste was shown as unavoidable given the deterioration of the supply system or the supply network. A value of 2 was assigned to images that included moderate waste of water, but without the intervention of any authority or civilian. Number 3 corresponded to those public water leaks that were presented as evidence of government inefficiency in maintaining the public water supply network. Finally, number 4 was assigned to images that featured marches, sit-ins, boycotts, confrontations, pipe hijackings, and other belligerent acts in which the citizenry seemed to be organized to demand the supply of water. Or, images that reflected the control of the problem and were interpreted as a frame that biased the causes and effects of the supply system by reducing it to a simple image of repair that any individual could carry out. In the case of images out of context, they were assigned the number 0. The sum of each weighting allowed establishing an Image Framing Index (IEI) in which values close to zero mean no mediatization and those close to 120 imply high media coverage of the press about leaks.

Subsequently, the correspondences between speeches and images were weighted considering an icon-mediatization index that goes from 0= there is no correspondence between images and chronicles, 1= minimal correspondence between images and notes, 2= slight correspondence between illustrations and notes, 3= correspondence wide between images and discourse, 4= extreme correspondence between images and descriptions. The sum of each note with its corresponding image was used to estimate the Hybrid Framing Index (HFI), which reaches a maximum of 4 (30)= 120 points of high icon-mediatization and a minimum of 0 (11)= 0 icon-mediatization.

Finally, the sum of the weights of each press coverage on water leaks in Iztapalapa allowed establishing the Leak Framing Index (LFI) that would reach a maximum value of 270 (30 notes for a maximum value of 9 assigned to public leaks) points per extreme cases of high mediatization and 0 for extreme cases of no mediatization.

## Results

Table 1 shows the weightings of notes and images, as well as their mutual correspondence regarding the coverage of water leaks in Iztapalapa. The Discursive Framing Index (DFI) shows that news stories appear to be unbiased, reaching a total value of 27 out of 120 possible points. The press only seems to transfer the information to its readers without biasing the content of the facts or influencing their opinions or including others such as the opinions of the drinking water authorities. In this sense, the coverage of the print media seems to be limited to the description of leaks. Only in the notes n3 (Ready for the constitution of the water in Iztapalapa) and n5 (35% of the drinking water is lost in leaks) the reporters tried to express their opinion on

**Table 1:** Instrument Description.

	Medios de comunicación	Público	Político	Política
Valid	100	100	100	100
Missing	0	0	0	0
To mean	2.110	2.360	2.630	2.790
Standard _ Deviation	1.136	1.330	1.143	1.274
Obliquity	0.455	0.177	-0.099	-0.434
Standard _ Skew error	0.241	0.241	0.241	0.241
kurtosis	-1.269	-1.760	-1.422	-1.522
Standard _ kurtosis error	0.478	0.478	0.478	0.478
Minimum	1.000	1.000	1.000	1.000
Maximum	4.000	4.000	4.000	4.000

**Table 2:** Correlation.

Variable		Media	Public	Political	Policy
1. Media	Pearson's R	—			
	p-value	—			
2. Public	Pearson's R	0.014	—		
	p-value	0.893	—		
3. Policy	Pearson's R	-0.155	-0.383	—	
	p-value	0.124	< .001	—	
4. Policy	Pearson's R	-0.096	0.564	-0.602	—
	p-value	0.344	< .001	< .001	—

**Table 3:** Measures of centrality by variable.

Variable	Intermediation	Closeness	Strength	Predicted Influence
Public	-0.500	-0.789	-0.988	1.410
Politician	-0.500	0.394	0.099	-0.929
Politics	1.500	1.233	1.344	-0.109
Media	-0.500	-0.838	-0.455	-0.372

**Table 4:** Grouping measures by variable.

Variable	Barrat	Onnela	SW	Zhang
Media	-0.615	-0.570	-0.866	1.171
Politics	-1.085	-0.570	-0.866	-1.274
Politician	0.850	1.492	0.866	0.052
Public	0.850	-0.351	0.866	0.052

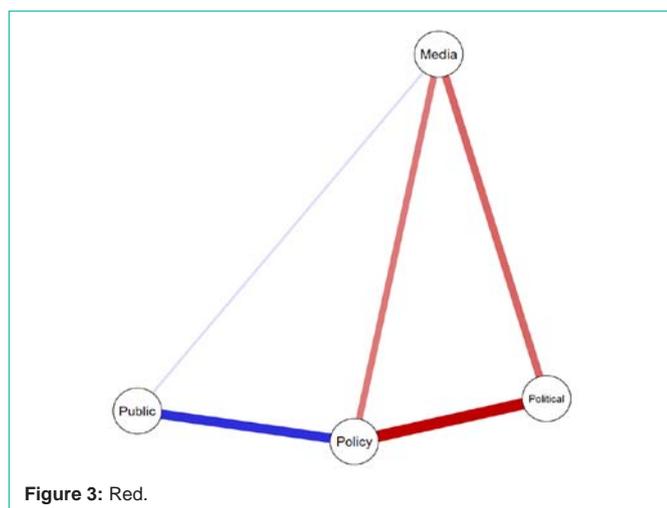
the problem. In note 5, the journalist cites two officials: David Robles and Héctor Reyes to support the heading of his report on the volume that is wasted due to visible and non-visible leaks without establishing a percentage distinction between the two problems or linking it to 35% which is announced in the header of the note.

Regarding the framing of images (IEI), the mediatization seems to be high since it reached a total value of 48 points out of 120 possible. A quarter of the selected notes reached the maximum weight with respect to the frame. Notes n9 and n10 included images out of context unrelated to the note. These notes were not intended to influence or confuse readers (Table 2).

However, notes n1, n2, n3, n4, n5, n6, n7, n8 and n9 include images in which an extreme situation of scarcity seems to be evident; utility

**Table 5:** Weighting matrix.

Variable	Public	Political	Politics	Media
Public	0.000	0.000	0.521	0.090
Politician	0.000	0.000	-0.634	-0.386
Politics	0.521	-0.634	0.000	-0.335
Media	0.090	-0.386	-0.335	0.000



**Figure 3:** Red.

users storing water in jerrycans, jerry cans and buckets. Or, images in which the leakage of the main shots seems to be uncontrollable (Table 3).

In the case of the interrelation between speeches and images, the Hybrid Framing Index was 37 out of 120 possible, which was considered moderate since only notes n3 , n6 , n9 and n10 included images that did not correspond to the informative notes.

However, the case of the note n3 that headed: “They prepare constitution of water in Iztapalapa”, included images of users drawing water. In other words, “El Universal” describes a leak to argue the need for a legal agreement and illustrates its message with images related to a possible consequence: the improvised storage of water (Table 4).

Finally, the Leak Framing Index obtained a total value of 136 out of 270 possible, placing it at a moderate level. In other words, the journalistic coverage of the scarcity caused by water leaks seems to have a strange bias in relation to the description and illustration of the water situation that is disseminated. Notes n5 and n29 reached the most significant values in which a public flight with local impact and referring to municipal management was appreciated (Table 5).

The nodal network measured by the Water Mediatization Index (IMH), which reached 248 points out of 630 possible explanations of the framing of water problems, mainly scarcity, scarcity, unhealthiness and lack weighted in the framing indexes of discourses, images, leaks and hybrids. The four problems prevail in the representation of the print media, with emphasis on scarcity as a dimension of low social trust in political action. Instead, the dimension of scarcity with a meaning of high confidence that the increase in rates will reduce water consumption and conserve the resource for future generations (Figure 3).

The results show that the media coverage of the press is moderate in reference to the leaks reported. The findings allowed delimiting the discussion on the impact of the media on the beliefs, decisions and actions of the users of the public drinking water service (Figure 4).

## Discussion

This study has exposed four framing indices to establish the degree of media coverage of the press regarding public and residential water leaks. The results showed moderate mediatization except for the Image Framing Index (IEI), which approached a very high degree of mediatization. Such findings agree with those found by the state of the art in which moderate levels of mediation are reported regarding the participation of users in situations of scarcity and scarcity.

However, the state of the art reported a substantial increase in the conflicts reported by the press as the situation of shortages and shortages in the Metropolitan Zone of the Valley of Mexico (ZMVM) worsened. On the other hand, this research has suggested that, although the print media report a resurgence of conflicts between authorities and users, these disagreements seem to be tinged with situations of water sales or proselytism rather than leaks and the consequent shortages. Apparently, a leak in the public supply when exposed to users justifies the scarcity and the public tends to be more tolerable in this sense [26].

On the contrary, the beliefs of abundance are related to the leakage of the supply network since the information disseminated by the media seems to justify the waste of water in the demarcation. In this sense, the present work has established that the newspapers of national circulation, by covering shortages and associating them with water leaks, moderately distort the facts because the description of the situation does not seem to correspond to the images that serve as illustration for the information. Note. For this reason, the problem of water leaks does not seem to be a determining factor in citizen action when demanding the regular supply of the service.

Indeed, the state of the art maintains that citizens assume lifestyles in accordance with their perception of the facts. In this sense, invisible water leaks, not perceptible by the public, seem to be a phenomenon inexorable to inaction. In other words, the concern for the water supply is perceived as a phenomenon so close that the user blames the authorities for it. In this context, this study has established that media coverage of water leaks by national newspapers tends to be moderate with respect to describing and illustrating a situation that is in the hands of the authorities and that they resolve efficiently.

However, a problem derived from water leaks is not only scarcity, but also the indiscriminate storage and hoarding of water resources. In other words, as water leaks intensify and become invisible, they foster anthropocentric beliefs and perceptions of utility that make public supply a business opportunity for those who control piped or networked supply. Thus, the hoarding of water would be a topic to be considered in the investigation.

Finally, the establishment of tariffs to prevent hoarding would be an effective intervention in areas with low water availability [27]. To the extent that the rates are adjusted to per capita consumption, international sufficiency standards will be respected, ranging from 200 liters per person per day. The supply system and the tariff system

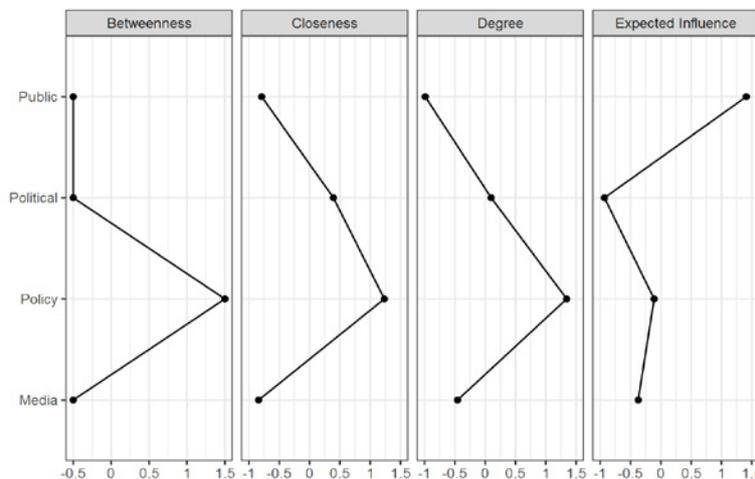


Figure 4: Centrality.

could adjust to a new environmental rationality that would recover the central visions of respect for nature because it would be part of an environment [28]. These are ethnic customs and uses that made implicit connections with nature in which water was considered an element of the community [29]. Or, it was a foundation of indigenous teaching that was passed down from generation to generation through experiential systems of direct contact with nature to form a worldview of the environment in reference to the situation of scarcity [30].

### Conclusion

The contribution of this work to the state of the issue lies in the establishment of framework indices of the water problem in its areas of scarcity and scarcity with implications for the unhealthiness and scarcity of water resources and services. Although the research design limits the findings to the sample of sources consulted, it suggests the extension of the network to other sources such as television, radio, press, cinema and electronic networks such as Facebook, Twitter, YouTube, Instagram, Periscope, WhatsApp with the objective of exploring the framing of these sources in terms of subsidies, forgiveness or rate increases, as well as the rejection or adoption of water registration, sanitation or recycling technologies.

In relation to the theories of the mediatization of water that focus their interest on the differences between the governors and the governed regarding the quality of public service, this work has revealed a symbolic network of water problems in order to establish the axes and themes of discussion on the public agenda, as well as systematically observing the influence of the media, considering the measurement of the frequencies of notes and images alluding to shortages, shortages, unhealthiness and scarcity. Lines of research related to the conflicts between the rulers and the ruled in a health contingency will make it possible to notice the phenomenon of the media coverage of a pandemic and its collateral effects on sanitation policies, strategies and programs.

Regarding the studies of water mediatization that enhance the frequency of dissemination of scarcity and scarcity with conflicts between authorities and users in political disputes, this study has

documented four indices that show the regularity of a moderate bias in notes and high in images, but without allusion to differences or conflicts between political actors and civil sectors. Future studies alluding to the plausibility and verifiability of information in the media will show a scenario of government persuasion to guide confinement programs in mitigating a pandemic.

Regarding the specification of the model for the study of the mediatization of water, which proposes the observation of problems in different media, as well as the analysis of their frames and their effects on public opinion or participation, this research found: 1) Center node first order of the Problematic Water Framework (FPH) in terms of participation, waste, optimization and exclusion; 2) Four second-order peripheral nodes of unhealthiness, famine, scarcity, and depletion with their corresponding dimensional relationships. Such results suggest the extension of the model towards the diversification of second-order peripheral nodes. This will make it possible to establish a network of perceptions, expectations and representations around the problem of water derived from information about the environment in the media.

In the context of confinement policies to mitigate the pandemic generated by the SARS-CoV-2 coronavirus and its disease COVID-19, the media coverage of water stands out as a central issue on the health agenda, but the bias of the media in conflicts between governors and the governed, taking the market out of the equation and reducing water problems to a collection system that excludes those who do not have to pay the increase, even when they allocate up to 20% of their income to the purchase of water.

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