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Analysis of Discourses and Narratives Around the Public Administration of Water Services in Two Colonies of Mexico City

Julio E. Crespo
Universidad de Los Lagos, Osorno, Chile

Alejandra Navarrete Quezada
Universidad Autónoma Metropolitana, Xochimilco, México

Javier Carreon Guillen
Universidad Nacional Autónoma de México, Mexico City, Mexico

Arturo Sanchez Sanchez
Universidad Autónoma de Tlaxcala, Tlaxcala, México

Tirso Javier Hernández Gracia
Universidad Autónoma del Estado de Hidalgo, Pachuca, México

Héctor Daniel Molina Ruiz
Universidad Autónoma del Estado de Hidalgo, Pachuca, México

Cruz Garcia Lirios
Universidad de la Salud, Mexico City, Mexico

The objective of this work is to reveal the meanings surrounding the discourses and narratives around drinking water services. A documentary, exploratory, and interpretive work was carried out with participants from two colonies in central Mexico, examining community participation, public functions, and economic occupations. Central and peripheral indicators were generated, although the design of the study limited the results to the sample, suggesting an expansion of the work to include other categories of analysis such as risk perception.

Keywords: social expression, central symbol, peripheral meaning, social meaning

Julio E. Crespo, Ph.D., Professor, Department of Biological Science, Universidad de Los Lagos, Osorno, Chile.
Alejandra Navarrete Quezada, Ph.D., Professor, Department of Social Work, Universidad Autónoma Metropolitana, Xochimilco, México.
Javier Carreon Guillen, Ph.D., Professor, Department of Social Work, Universidad Nacional Autónoma de México, Mexico City, Mexico.
Arturo Sanchez Sanchez, Ph.D., Professor, Department of Management, Universidad Autónoma de Tlaxcala, Tlaxcala, México.
Tirso Javier Hernandez Gracia, Ph.D., Professor, Department of Management, Universidad Autónoma del Estado de Hidalgo, Pachuca, México.
Héctor Daniel Molina Ruíz, Ph.D., Professor, Department of Engineering, Universidad Autónoma del Estado de Hidalgo, Tepeji, México.
Cruz Garcia Lirios, Ph.D., Professor, Department of Social Work, Universidad de la Salud, Mexico City, Mexico.

Introduction

An examination of the history of local elections shows that there was an alternation of governments in terms of concentration of votes (Alcántara-Santuario & Marín-Fuentes, 2018). Local voters decided not to be loyal to a political party and in the last elections a new party emerged (Pérez & González, 2014). This implies a climate of political pragmatism characterized by support and voting for various proposals regarding supply, prices, and health (González & Pérez, 2019). Know that the review of the literature shows that there are significant differences between those who govern and those who are governed with respect to the resources and services that are considered public in the case of water: similarities (Sánchez & Díaz, 2015).

The state participates in the management of the actors involved in the water economy, preventing and repairing leaks, reduction and reuse, as well as paying fees and demanding subsidies or amnesties (Postel & Richter, 2003). The shared social and political management of water sustainability is demonstrated through local water conservation, prevention and repair of leaks, reduction and reuse, as well as payments, subsidies, and exemptions from public water supply services (López & Ramírez, 2013).

Governance and co-management, as well as research on governance, self-management, and co-management, have shown similarities in the corruption of political and social actors in the procurement, hoarding, subsidies, and causes of payment for poor quality water supply services (Alvarado & Martínez, 2014). State governance and social self-administration are or are limited to the corruption of actors (Ramírez & López, 2018). This reflects the lack of transparency, arbitrariness, and negligence, leading to the obstruction of discussion, negotiation, mediation, conciliation, and co-responsibility (Torres & Gómez, 2011).

In terms of leak prevention and treatment, mitigation and reuse, as well as payments, subsidies, and rebates, this scenario will worsen before, during, and after the presidential elections, as the customer structure determines subsidies and incentives among industries that comply and sympathize with the agencies that set the prices of water services (Rodríguez & García, 2020). Water authorities, with the participation of civil society, will contribute to the management of water sustainability by establishing an agenda with guiding themes and principles towards a culture of quality water services, transparency, and accountability (Martínez & Hernández, 2017). The shared management of water resources and services will include an ethic of care for the environment and resources, where water is a central and significant symbolic element of feelings of compassion, commitment, and satisfaction for the conservation of water for the benefit of future generations and local flora and fauna (see Table 1).

Table 1

State of the Art of Discourses and Narratives Around Water Management

Author(s)	Conceptual definition	Operational definition	Sample	Instrument	Psychometric properties
Alcantara-Sanctuary & Marin-Fuentes (2020)	Water governance as the set of institutions, processes, and actors that manage water resources.	The interaction between government entities and civil society for the management and distribution of water.	Government entities and community groups.	In-depth interviews and discourse analysis.	High internal consistency ($\alpha > 0.80$) in analysis of political and community discourses.
Ramos & Gonzalez (2018)	Public water management involves the design and implementation of policies to ensure equitable access.	The process of formulating and evaluating public water policies, with a focus on equity and sustainability.	30 experts in public water policies.	Structured survey on water policies.	Adequate convergent validity, moderate discriminant validity ($\rho > 0.70$).

Table 1 to be continued

Martinez & Ortega (2022)	**Narrative analysis examines stories and social representations about water resource management.**	**Interpreting the narratives of key actors in the water sector through qualitative analysis.**	**50 stories from decision makers and users.**	**Content analysis of narratives.**	**Good inter-judge reliability (κ > 0.75).**
Sanchez & Lopez (2017)	Discourses on water management reflect ideological and technical visions that guide public action.	Analysis of institutional and political discourse on water management in urban and rural contexts.	Official policy documents and interviews.	Critical discourse analysis.	Adequate internal reliability (α > 0.75) and content validity relevant in the political context of water.
Perez & Martinez (2019)	Narratives about water scarcity are part of the construction of public policies aimed at addressing the crisis.	Analysis of the representation of the water crisis in the media and government speeches.	40 journalists and public officials.	Survey and interviews with content analysis.	Excellent internal consistency (r > 0.80) and reliability in the interpretation of complex narratives.
Garcia & Lopez (2021)	The analysis of narratives about water allows us to understand the conflicts between actors in public management.	Study of different views on water management through interviews with key stakeholders in the sector.	60 interviews with political and social actors.	Semi-structured interviews.	High internal consistency (α > 0.85), good reliability index and construct validity.

However, the state of the art has not observed the learning sequence that involves the study of public water administration in order to anticipate contingency and risk scenarios in the event of a prolonged shortage (Gómez & Torres, 2016). Therefore, the objective of this work will be to observe institutional learning regarding public water resources administration. To this end, two models will be compared, one theoretical model reported in the state of the art with respect to another model taken from surveys and interviews with officials, users, and experts on the subject. The purpose is to analyze the decisions related to water management in Iztapalapa, taking into account the perspectives of users, officials, and experts, and how these decisions can influence water governance in the area.

Are there differences between the theoretical structure of public water administration and the structure observed in the present study?

Given that the problem of water scarcity is local, significant differences are expected between the findings reported in the literature with respect to the results observed in this work (Díaz & Sánchez, 2010).

Method

Design

The research is qualitative, transversal, and exploratory.

Sample

Deliberate sample selection based on the snowball technique among officials, merchants, and residents of the El Manto and Los Ángeles areas, Iztapalapa district, Mexico. The majority of participants were women, >30 years and <40 years, who had graduated from high school and had lived in one of the study areas for less than five years.

Procedure

From the selection of categories drawn from the literature review, their meanings were constructed using the Delphi technique, indicating that differences could be formed between respondents if the meaning of each

category was raised and respondents were asked if that was the case (Kvale & Brinkmann, 2014). Whether they agree with the new definition or if something is missing, this process involves building definitions until the respondent repeats an item or stops providing additional terms (Charmaz, 2014). For example, the document notes that scarcity is a condition identified internationally by the Earth Summit, with a focus on the availability of water per person. We live every day. Thus, scarcity is defined as "supplies less than 200 liters/day/person in urban and peri-urban areas". But for the next question:

Some officials indicate that the typical volume is 200 liters per person per day, although users say that the shortage depends on sales to merchants and, in the case of housewives, it depends on the day since children are not needed during the week. Bathing before going to school after respondents provided their comments, a new definition was created and we asked them if this new definition was more complete or if any additional comments were missing.

Once interviewees indicated that this definition was more complete or that they had no further comments, the stated definition was included in the final interview guide, noting that the terminology was modified and approved by participants if anyone expressed doubts or concerns (H. J. Rubin & I. S. Rubin, 2012). Interviews were conducted at the Iztapalapa mission headquarters and in the markets of the "Los Angeli" and "El Manto" settlements located within the study boundaries, with prior written consent and guarantees regarding security data, as well as answers to questions. In addition, it is suggested that the results of the research be disseminated via email to the informants.

Some respondents identified themselves only as civil servants and stated that their responses could not be recorded during working hours, as they were handling confidential or protected data, granting them the right to withhold such information (Brinkmann, 2014). Traders, on the other hand, were reserved and refrained from providing further details in their statements. In contrast, housewives interviewed agreed to be recorded. The discourse analysis matrix and the narrative semantic network were employed, emphasizing the relationship between the symbolic core and its peripheral meanings.

The discourse analysis matrix includes small life story columns related to the type of service, the quality of service, and the pricing system for local drinking water supply (Patton, 2015). In the case of narrative semantic networks, the central symbolic core and peripheral representations are included. After conducting interviews and processing information, narrative semantic networks are created, forming central expressive cores and peripheral meaning elements with the aim of identifying points of similarity and difference between actors.

Data collection process was carried out with interviews with three key groups (Witten, Frank, & Hall, 2016): users living in Iztapalapa who are directly affected by the scarcity and distribution of water; Breiman local government employees responsible for the management and distribution of water resources; Experts, professionals, and academics with knowledge in water management and related public policies.

The decision tree was based on the elements obtained from the interviews and addressed some key decisions that impact water management.

- Node 1: Availability of water resources (Sharda, Delen, & Turban, 2021):
  Decision A: Increase water infrastructure.
  Decision B: Promote the efficient and rational use of water.
- Node 2: Priority in water distribution (Hunt & Stearns, 2007):
  Decision A: Prioritize supply to highly vulnerable areas.
  Decision B: Establish an equitable rationing system among all sectors.

- Node 3: Communication strategies (Quinlan, 1993):
  Decision A: Strengthen citizen participation in decision-making.
  Decision B: Implement massive educational campaigns on water saving.

Results

The analysis of public water resources management includes four nodes: (1) availability of water resources as the root of the tree, on which initial decisions are made; (2) increasing water infrastructure and promoting efficient water use as two main options to address the water resources situation; (3) prioritizing supply to vulnerable areas and equitable rationing system as specific decisions derived from increasing water infrastructure; (4) strengthening citizen participation and implementing educational campaigns as options that arise from promoting efficient water use.

The selected categories and their definitions were created by merchant users based on the logic of rationality: the coincidence between state responsibility, scarcity, and shortage; sanitary conditions are not guaranteed and the costs of services are high. Thus, the categories are defined as follows:

Scarcity refers to the structural and socio-political limitations affecting water access and distribution, often driven by environmental degradation, pollution, corruption, and consumerism. For example, in urban areas with intermittent water supply, residents adapt by storing water, reusing it for non-essential tasks, or reducing consumption in daily activities. Similarly, market vendors facing shortages modify their cleaning practices, while fishing communities minimize water use for hygiene. These adaptive behaviors reflect how people navigate limited resources amid inefficient distribution systems and political interests that prioritize electoral gains over equitable access.

Risk, on the other hand, involves external shocks and environmental hazards that compromise water availability, such as droughts, floods, earthquakes, and infrastructure failures. For instance, a prolonged drought can lead to irrigation restrictions, threatening food security and increasing costs for users. Flooding may contaminate water sources, posing public health risks, while earthquakes can damage supply networks, causing severe leaks. Additionally, high evaporation rates—responsible for significant public and residential water losses—further exacerbate overexploitation. Unlike scarcity, which stems from systemic inefficiencies, risk requires mitigation strategies and policy interventions to prevent further crises.

Administration: Refers to the decision-making process undertaken by an official in response to requests from users or in the event of an unexpected event (an earthquake, drought, unemployment) in relation to water supply and the determination of tariffs, subsidies, or rebates for supplier countries.

Tandeo: They point to a system of corruption between authorities, politicians, officials, and plumbers, which involves excessive consumption of meters and an increase in sales tax disproportionate to the supply of water disinfected with chlorinated water and the transparency of life.

Unhealthiness: They face the consequences of corruption by politicians, officials, and authorities involved in the misappropriation of funds needed to maintain or install drinking water systems.

Rate: Refers to the payment for bottled or packaged water, the payment for pipes, or even the cost of water on the bill.

In the case of definitions made by authorities or officials, they are distinguished from user and trader definitions in that they refer to regulations, agreements, or treaties entered into by the local or regional government, in one way or another, with a foreign organization or body.

Authority: In this sense, the logic of verification prevails, including the opposition of internal directives to public policies and international agreements.

Shortage: Indicates the availability of 200 liters per person per day, and based on this standard it is assumed that there is a comfort zone if it exceeds 500 liters per day per person, or a test zone if it is less than 200 liters per day per user.

Corruption: Refers to the previous administration and they are allied with a different party than the current one, which would be an exchange of military aid for supplies through pipelines or oil tankers.

Risk: Refers to the international standards of civil protection or third-generation rights derived from the Earth Summit, with a special focus on evaporation leaks, which account for 40% of public supply and 60% of residential supply, as well as overexploitation.

Management: This refers to the relationship between the international agreements established by the Executive Committee during the Earth Summit on general policies for the integrated management of water resources, with special attention to setting a price that is adjusted to the availability of 200 liters per capita per day.

Committees: Refers to local water supply systems in communities or residential areas that do not have meters or receipts, as well as to drinking water supply systems.

Leaks: They point to a manifestation of corruption, focusing on the failure of previous governments to manage high-quality supply networks, maintain important watersheds, or raise public awareness.

Planning: Refers to a catalogue of ecovillage, ecoregion, or ecocity projects, involving the use of collection, reuse, recycling, and processing technologies.

Tariffs: This refers to an administrative tool based on per capita consumption and availability, as well as subsidies or incentives in disadvantaged or excluded areas. In the case of resident users, the central position rests on political corruption, which is generated by the apparatus.

The representations point to water scarcity and health risks as negative aspects, and social self-management and austerity as positive aspects. In contrast, officials, especially engineers responsible for aspects of the local water supply system, focus their representation on setting tariffs based on consumption volume and water availability; for example, the standard consumption is 200 liters per person. Around this central axis emerge the negative impacts of public and residential water leakage, as well as the risks posed by local government water supply policies.

On the other hand, positive trends emphasize public administration and austerity as an effect of the pricing system. It can be seen that the similarities between political and social actors lie on the positive side of austerity as a result of fundamental corruption in the case of those working in the field of commercial and consumer representation, since the product of the tariff system is adjusted according to water consumption

However, while users and traders interviewed saw water shortages and scarcity, as well as health risks as a result of the corrupt political system, officials believed that maintaining the system and preventing leaks would allow for further price reductions. This means pursuing a policy of supply, not demand, because if the state insists on encouraging waste rather than austerity, the system will collapse due to high costs, overexploitation, or groundwater contamination.

In the case of positive aspects, public administration and social self-management emerged as expressions, discourses, and narratives celebrated by employees and merchants. For citizens, the provision of public services is an extension of their social representation in relation to their government, power, and corruption. The truth is that the logic of rationality prevails among users and merchants.

Discussion

The contribution of this work to the state of the art lies in the establishment of a decision tree diagram that explains the social representations of public water resources management in the town of Iztapalapa, Mexico City. The results suggest that water management is centered on the participation of users, officials, and experts.

According to the Contingency Theory, the decisions taken will depend on specific factors such as the availability of resources, the needs of the population, and government policies (Hernández & Martínez, 2012). This approach highlights that there is no single solution to water governance problems, but that decisions must be adapted to the local conditions of Iztapalapa.

Knowledge Management Theory based on interviews with experts and officials suggests that decisions are influenced by the information available on the behavior of water resources and best management practices (Ostrom, 1990). The correct circulation of knowledge between the different actors (users, officials, experts) can improve decision making.

According to the Stakeholder Network Theory in public water administration, each stakeholder (user, official, expert) has its own set of interests, perspectives, and resources (Morgan, 2006). The decision tree shows how each stakeholder influences decisions and how interactions between stakeholders can modulate water policy outcomes.

Alcántara-Santuario and Marín-Fuentes (2020) mention that decisions on water governance must take into account the active participation of civil society. The proposed decision tree includes citizen participation as a strategic option.

Sánchez and López (2017) discuss how narratives and discourses on water management reflect political dynamics. The decision tree also incorporates the prioritization of vulnerable areas, an important aspect of water policy that reflects the political reality of Iztapalapa.

García and López (2021) advocate for a comprehensive approach that considers the different perspectives of the actors involved. The decision tree is an example of how different actors (users, officials, experts) interact and how their decisions impact water management strategies.

Decision tree analysis allows for a clear visualization of possible options and their consequences for water management (Aguilar, 2006). It also facilitates the understanding of decision-making dynamics between actors with different interests and perspectives. It provides a structured approach to the evaluation of public policies in the water field.

However, the decision tree is based on qualitative data, so its validity will depend on the depth and representativeness of the interviews (Scott & Davis, 2015). The decisions represented in the tree may simplify the complexities of water management by not considering all the possible variables involved, such as unforeseen socioeconomic or political factors. The recommendations derived from this analysis may not be applicable in other locations with different contexts.

It is recommended to expand the sample to obtain a more representative view of the population by including a greater number of users, officials, and experts from various sectors of Iztapalapa and other areas of Mexico City. Incorporating quantitative methods, such as structured surveys or statistical analyses, would provide more robust data on the decisions and preferences of key actors (Mintzberg, 1993). Additionally, conducting a long-term impact analysis would help assess how decisions evolve over time and their effects on sustainability and equitable water access. Comparing Iztapalapa's water management strategies with those of other areas in Mexico

City or different regions could highlight policy differences and best practices. This analysis offers a valuable framework for understanding critical decision-making processes in water management and can serve as a foundation for developing more effective public policies.

Conclusion

The objective of this work was to analyze the social representations of the public administration of water resources, considering interviews with users, experts, and officials from a town in Mexico City. The results suggest the analysis of discourses and narratives structured in four discussion axes related to availability, infrastructure, supply, and participation. In relation to the state of the art where the analysis of the differences between users and authorities is prioritized, this work suggests the inclusion of the three actors in order to be able to interpret water contingency scenarios and their impact on the relations between governors and governed. The inclusion of sociopolitical factors such as public policies is recognized in order to establish an analysis context that allows the interpretation of the results.

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Annex A

Interview Instrument

Instructions

This instrument is designed to gather information on the perception, experience and knowledge related to the public administration of water resources in Iztapalapa. Please respond clearly and accurately.

1. General Data (Sociodemographic)

1.1. Name (optional):

1.2. Age:

1.3. Gender:

- Male
- Female
- I prefer not to say

1.4. Marital status:

- Single
- Married
- Free union

- Other: _____

1.5. Place of residence:

1.6. Time living in Iztapalapa:

1.7. Number of people in your home:

2. Socioeconomic Questions

2.1. What is your approximate monthly income?

- Less than $5,000
- $5,001-$10,000
- $10,001-$20,000
- More than $20,000

2.2. How much do you spend monthly on water-related services (payment of supply, purchase of water tankers, etc.)?

2.3. Do you have regular access to drinking water?

- Yeah
- No
- Sometimes

2.4. Have you had to invest in additional infrastructure to access water (cisterns, tanks, pumps, etc.)?

3. Sociocultural Questions

3.1. How important do you consider water as a cultural resource in your community?

3.2. Do you participate in community activities or groups related to water management?

- Yeah
- No
- Sometimes

3.3. What do you think are the main cultural practices that influence water use in your community?

3.4. What role does environmental education play in your perception of water care?

4. Socio-laboral Questions

4.1. What is your main occupation?

4.2. Is your work related to water use, management or administration?

- Yeah
- No.

4.3. What labor challenges do you face in relation to water provision and management?

4.4. In your opinion, how effective is the current infrastructure in meeting water demand in Iztapalapa?

5. Socio-educational Questions

5.1. What is your highest level of education?

- Primary
- Secondary
- Preparatory
- Degree
- Postgraduate

5.2. Have you received specific training or education on water resources management?

- Yeah
- No

5.3. Do you think there is a need for more education on water management in your community?

5.4. What educational resources do you think would be useful to improve water management in Iztapalapa?

6. Specific Questions for Officials and Experts

6.1. What public strategies do you consider most effective for water management in Iztapalapa?

6.2. What legislative or regulatory changes would be necessary to improve access to water?

6.3. How do you evaluate the collaboration between citizens and the government on this issue?

6.4. What technology or innovation do you consider relevant to solve the water problems in the region?

Appendix B

```
# Matter libraries necessary
import pandas as pd
import numpy as np
from sklearn.feature_extraction.text import CountVectorizer
from sklearn.model_selection import train_test_split
from sklearn.tree import DecisionTreeClassifier
from sklearn import metrics
from sklearn.tree import export_text
import matplotlib.pyplot as plt

# Upload file with preprocessed data (CSV)
from google.colab import files
uploaded = files.upload ()

# Read CSV file with pandas
file_name = list (uploaded.keys ())[0]
data = pd.read_csv (file_name)

# Show first rows of the dataset
print (“First rows of dataset:”)
print (data.head ())

# Check available columns
print (“\nColumns in dataset:”)
print (data.columns)

# Make sure the file has the following columns:
# -‘narrative’: Text of the interviews
# -‘label’: Classification of the discourse (example: ‘expert’, ‘official’, ‘user’)

# Vectorization of text (Convert text to numeric matrix)
vectorizer = CountVectorizer (max_features = 500, stop_words = ‘english’)
```

```
# Adjust the language and features as needed
X = vectorizer.fit_transform (data[‘narrative’]). toarray ()

# Tags (Classes)
y = data [‘label’]

# Split data into training and test sets
X_train, X_test, y_train, y_test = train_test_split (X, y, test_size = 0.3, random_state = 42)

# Create and train the decision tree model
clf = DecisionTreeClassifier (random_state = 42)
clf.fit (X_train, y_train)

# Make predictions
y_pred = clf.predict (X_test)

# Evaluate the model
print (“\nEvaluation metrics:”)
print (“Accuracy:”, metrics.accuracy_score (y_test, y_pred))
print (“Classification report:\n”, metrics.classification_report (y_test, y_pred))

# Show the importance of words in the model
print (“\nFeature Importance:”)
feature_importances = pd.DataFrame ({‘Word’: vectorizer.get_feature_names_out (),
‘Importance’: clf.feature _ importants _})
print (feature_importances.sort_values (by = ‘Importances’, ascending = False). head (10))

# Export the decision tree as text
print (“\nDecision tree representation:”)
tree_rules = export_text (clf, feature_names = vectorizer.get_feature_names_out ())
print (tree_rules)

# Basic tree display
from sklearn.tree import plot_tree
plt.figure (figsize = (15, 10))
plot_tree (clf, feature_names = vectorizer.get_feature_names_out (), class_names = clf.classes_, filled = True, rounded = True)
plt.show ()
```