Governance of water resources in the Highlands of de Jalisco, Mexico: the case of the microwatershed of Jihuite in the municipality of Tepatitlán de Morelos.

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SUMMARY

Through the cultural ecology approach and the methodology of the Gobernance Analytical Framework, including interviews, surveys and field trips, the present research was developed with the purpose of analyzing the local management of water by users of the microwatershed "Jihuite", under the pressure of the city of Tepatitlan, in the last 25 years. The results show: strategic actors with sufficient resources and power to influence decision-making, few management spaces, variability in water tariffs, social perceptions express concern about the quality and supply of drinking water, as well as the risks to human health from discharges of untreated wastewater, both domestic and livestock grains and industries to the sources of supply of the microwatershed

INTRODUCTION

In the world, more than 1.1 billion people do not have direct and constant access to water. Similarly, more than 2.6 billion people lack basic sanitation facilities. Most of these people are in China and India. Dramatic failures in water management and governance processes at the global level

At the third World Forum (2003) by the Global Water Partnership (GWP), the need to incorporate effective governance models in water management was emphasized, as the institutional failures of governments current water deterioration (UNESCO, 2009). In addition, the United Nations Environment Program (UNEP) has designed water governance models in Latin American countries with institutional problems, including economic support (Mayorga et al., 2007).

In Latin America and the Caribbean, public policies aimed at coordinating actions for the development of mankind, using a river basin as a base of management, have had different approaches, as well as unequal evolution. Since 1990, however the issue has regained its validity once the countries of the region have formally focused on achieving sustainable development by reconciling economic growth, equity and environmental sustainability.

Watershed management is the basis for adequate environmental management in countries (ECLAC, 1994). In the current times, the themes of opening up to the outside world, such as the globalization of markets, open regionalism, international insertion, foreign investment and free trade agreements, tariff reforms and export promotion, among others It is of the utmost importance that each country consolidates management systems for its natural resources, as well as to specify clear treaties and avoid counterproductive interventions, due to lack of management or lack of knowledge.

Openness to the outside will only be positive to the extent that each country knows exactly the consequences both in its environment, in its society as in its current and future economy. Knowing how to manage and control undesirable aspects at the watershed level is a way to acquire solid negotiating elements.
The management of natural resources at the level of watersheds requires local participation, which can also give space to deal with social aspects, seeking to consolidate a true democracy with class consciousness, to carry out actions of major collective interest, achieving equity among its components. Those who know their environment and only they will know how far it can be intervened without causing damages that lead to an irreversible collapse (Domínguez, 2012).
Contemporary social movements (Genoa 2001, Argentina 2001, water war in Bolivia 2000, Zapatismo in Mexico 1994, Seattle 1999, landless rural workers of Brazil 1985), as well as the terrorist attacks of September 11, the destructuring and restructuring of global capitalism, the spatial reorganization of production, and the diminishing power of trade unions, have shown the evident contradiction between transnational capitalism and territorial forms of government, marketizing the spheres of social life (Sader, 2008). In general, there is a general rejection of this "commodification of the world", in favor of the radical democratization of power in the global space, as opposed to the escalation of repression in defense of human rights, from a multicultural perspective, freedoms democracy and democracy itself (Gómez, 2004).
Similarly, and considering the gas war in Bolivia (2003), the social movements for water in Cochabamba (2000), the privatization of water in Uruguay (1992), among other events, it can be assumed that the "next world war will be for water, "as Ismael Serageldin (vice president of the World Bank) (Seoane, 2006). Where the most unprotected communities, especially the indigenous ones (Ecuador, Bolivia, Brazil and Mexico, for example), are increasingly affected by the mismanagement and contamination of this "blue gold", which is water, as well as with dams construction and aquifers overexploitation.
Central themes in both the fourth world water forum held in Mexico and in the world social forum on the human right to access to water (2006), which support a logic outside the market and profit. In itself, it is clear that neoliberalism confronts the environmental rationality internalized by the new social actors who seek new configurations of alternatives (Castro, 2006).
During the last few years, environmental degradation in Mexico has become a major issue in the national debate, taking on connotations that affect the governance and sustainability of society as a whole. The problems of soil degradation, deforestation, overexploitation and deterioration of water resources and loss of biodiversity, were no longer considered as mere statistical data, to constitute the cause of numerous social conflicts. This scenario led to issues on water and forest management issues being raised as national security issues in the current agenda (Cotler, 2004).
To explain analytically and methodologically the processes of water governance, some models, mainly European and North American, provide angular elements of analysis such as, (Ostrom, 1990), the water governance model in Spanish watersheds (Arrojo, 2006) and watershed management and governance.
In recent years, Latin American countries such as Mexico and Brazil have begun to integrate governance models into their water policies for their basin

councils (Aguilar, 2009). Also, some authors believe that there is an incipient development of effective mechanisms to promote social participation and citizen empowerment in our country (Colter, 2004, Musseta, 2009, and Castro, 2006, among others).
Nevertheless, barriers such as the self-management associations of irrigation users (Palerm, 2005) and urban water management models through the operators (Barkin, 2006) still prevail in general terms.
The Altos-Sur region has an aquifer defined in the Acatic-Tepatitlán-Arandas area, with an approximate surface area of 6,000 km², which is widely exploited, especially by the municipalities of Tepatitlan and Arandas, due to their geo-hydrological characteristics, the depths of the wells in the area vary between 200 and 500 meters. The sources of water pollution in these regions are directly related to the socio-economic activities in each area. In general, livestock farms (porcine, poultry and livestock), temporary agriculture and a growing processing industry (Inlay, dairy, tequila, among others), in reference to the livestock inventory in Jalisco and the study area (table 1), for the year 2014 the following is reported:

Species livestock	Jalisco	Altos	Tepatitlán
Cattle for milk	995,298	541,650	56,014
Beef Cattle	2,413,874	630,763	103,300
Porcine	6,830,868	3,598,103	533,312
Egg poultry	80,352,803	56,430,282	17,059,746
Meat poultry	22,042,833	10,259,502	2,341,942
Goat	200,358	92,672	6,080

Table 1: Livestock inventory 2014 in number of heads (Source: OEIDRUS Jalisco with information from of SAGARPA).

This reflects the importance of the Highlands area, both in the national livestock production, as well as in the generation of organic waste and wastewater. A high degree of eutrophication of the water of borders that serves as watering points for regional livestock and in reservoirs of dams, whose waters are used as a supply of drinking water for municipalities such as Tepatitlan, where contamination problems have already been identified and eutrophication (Ramirez et al., 1997). According to the secretary of the environment and social development of the state of Jalisco (SEMADES, 2006), all municipalities in the Highlands of Jalisco present problems of surface water contamination, by pouring untreated wastewater into the river network and In addition, agricultural production systems have also been identified as sources of non-point pollution for the bodies of surface water (Flores et al., 2009).
More dramatic is the situation because these contaminated water resources of the Highlands region are planned to be used in cities such as Guadalajara in Jalisco or León in Guanajuato. Problems of overexploitation of aquifers (CONAGUA, 2006), accentuated by the extraction of deep groundwater with a high content of fluorides and arsenic (Hurtado and Gardea, 2005), with the consequent negative effect on the health of the population and the reduction of water for human consumption.

Some factors that are related to pollution in these regions are the following:
1) Excess nutrients contained in food consumed and excreta.
2) The exit of nutrients and suspended solids via surface runoff.
3) Physicochemical soil processes associated with phosphorus and nitrogen nutrients.
4) The management of manures and organic wastes.
5) Water erosion of grazing areas.
6) The long-term residual effect of constant manure application.
7) The intensity of grazing or overgrazing.
8) The proximity of grazing animals to water currents, among others.
The dramatic perspective of water in The Highlands of Jalisco region makes it imperative to implement actions for the conservation of natural resources. Likewise, according to data published by CONAGUA (2007), of the 59 aquifers identified in the state of Jalisco, eight are not available and are overexploited.

METHODOLOGY

Governance in general refers to the processes of interaction between the actors involved in a public matter, leading to decision making or the formulation of social norms, thus it is assumed that there are processes of governance present in any society, which can be observed and analyzed from a non-prescriptive and / or normative perspective.
Using the approach of Cultural Ecology, since it analyzes the relations between a certain society and its environment, that is to say, it studies the "ways by which a cultural change is introduced to adapt to the environment", since in the present investigation it is of Interest the processes by which social systems (population) adapt to their environment (availability / quality of water resources). Through the analytical units contained mainly in the Gobernance Analytical Framework (GAF), the work is carried out in the Microwatershed of Jihuite (MJ) in the municipality of Tepatitlan Jalisco.
This strategy of analysis is based on social disciplines that serves to diagnose collective processes, supported by analytical units that seek to constitute a logical and coherent methodology, its main analytical units are:
1) Contextual definition of the problem; From the GAF a problem is established at the time that a conflict concerning public affairs is detected, which must be addressed. In particular, the use of this method is oriented towards issues related to governance, such as water pollution in a watershed for example (Hufty, 2010).
2) Standards; A central dimension of governance is, the construction of the rules of the game. The arrangements between the actors explain the institutionality determined, conformed by different norms (formal and informal) that guide the decisions and / or the behavior of its actors. The norms assume a double role in the analysis of the governance, they orient the behavior of the actors and they are modified by the collective action.
3) Actors involved; by dynamically analyzing governance, norms guide the behavior of actors and are modified by collective action, social norms are intimately linked to actors, their behaviors and interactions and conditioned by their nature, power, interests, ideas and its history. In order to characterize the interrelations between actors, it is possible to design a "map of strategic actors", to recognize the complexity and nature of the actors involved, their

expectations, values and strategies, as constitutive factors of the mechanisms (explicit or implicit) of interaction.
In this approach it is necessary to consider: the characterization of the actors of interest, all those affected or likely to be affected by the activities of an initiative, the strategic actors, and the resources used by them, and the nature of the transactions involved in them relations. GAF proposes a situational analysis of the relative power of the actors and requires a map that considers the relational situation

Group	Controlled resources	Will	Resource mobilization	Impact on decision making
Strategic	High	High	High	High
Relevant	High	Low	Low	Low
Secondary	Low	Low	Low	Low

Table 2: Classification of actors according to the results of the analysis of actors (Hufty, 2010).

In order to identify, classify and access the required information, semi-structured interviews were applied to all the actors involved. In addition, surveys were carried out in different residences (houses) without gender differentiation, both in the microcatchment itself and in the population of Tepatitlan, randomly covering a predetermined sample size. It should be mentioned that the surveys were structured to describe different issues such as: a) location b) personal data, c) special knowledge of the micro watershed, 4) perception of water resources and perceived changes in urbanization, 5) about uses and water management, and 6) perception and knowledge about water management in the micro watershed.4) nodal points; basically they are the "social interfaces" defined in physical or virtual spaces (for example, a negotiating table, the communal council, the neighborhood committee), where several processes, actors and norms converge, producing effects, in isolation or in interaction withothers, on which they are part of the network of spaces for decision-making. 5) Processes; they are continuations of states by which a system evolves. Thus, for a given object (or a nodal point), it is possible to identify sequences that allow to evaluate the direction by which those processes are transformed and to locate the factors favorable to the change. The analysis of the processes of change seeks to identify the evolutionary patterns of nodal points, the network of interactions between actors and their relation to changes in the rules of the game (norms) (Hufty, 2010).

RESULTS

According to the methodology used (GAF) the main results obtained are: 20 actors involved in the MJ can be classified in; 8 strategic, 8 relevant and 5 secondary. Strategists are: Consejo De Cuenca Del Río Santiago (COCURS), Comisión Estatal del Agua (CEA Jalisco), Comisión de Derechos Humanos Jalisco (CDHJ), Secretaria de salud Jalisco (SSJ), Ayuntamiento de Tepatitlan (AT), Agua y Saneamiento de Tepatitlan (ASTEPA), Dirección Ecología de Tepatitlan (DETEPA) and University de Guadalajara (UG). The strategic actors are those with sufficient resources to prevent or disrupt the operation of the rules or procedures for decision-making and collective dispute resolution for the management and governance of the water resources of the MJ. Interviews were conducted with incumbents and representatives of identified actors.

Nodal points (management spaces): The progressive deterioration of the water quality contained in the Jihuite dam has mobilized various sectors of society, interacting in different locations, some of these spaces can be considered as nodal points (table) in water management Of the MJ and the population of Tepatitlán (PT). The main managed management spaces are: COCURS Secretaría de Medio Ambiente y Desarrollo Territorial (SEMADET), ASTEPA, UG and Instituto Nacional de Investigaciones Forestales, Agrícolas y Pecuarias (INIFAP).

In the MJ the following processes of change in water management have been identified and grouped: a) Administrative; Which include actions such as; Feasibility of drinking water for developers (technical feasibility committee), fixation / modification of tariffs (tariff committee, state government, neighborhood committees) and requests for wastewater discharges (CONAGUA). B) Operational / technical; Such as the purification of surface water (Jihuite dam / Carretas dam), extraction of groundwater (wells), distribution of drinking water (leaks), collection of domestic wastewater (sewage) and wastewater treatment. C) Strategic; Mainly in policies for; New sources of water supply (projects), reuse of treated water, sanctions for water wastage, water and legal training and culture; Such as the legal basis for the provision of the service and the rights and obligations of users.
In reference to water quality in the MJ, the following points are highlighted:
- A high degree of eutrophication of the water of the reservoir was observed, with an inorganic nitrogen content during the rainy season from 3.67 milligram/liter (mg/l) to 6.8 mg/l, fecal coliform bacteria and total from 1.9 to 17.000 Number Most Probable / 100 milliliters (NMP/100 ml), causing water to be in some periods of time, not recommended for human, agricultural or recreational use.
-Residues of herbicides and insecticides; among pesticides with high levels was found; Lindane with less than 2 microgram/liter (µg/l), methoxychlor with less than 20 µg/l and 2-4 DDT with less than 30 µg/l
-High content of organic matter; its origin is attributed to pig farms located in the basin, as well as to the surface runoff of agricultural and cattle graze areas, from where sediment is carried to the vessel of the dam. (INIFAP, 1996)
-Deforestation of land for livestock or agricultural purposes; which together with the practices of grazing and conventional tillage have caused that 99% of the surface of the basin present some degree of erosion, in this respect 30.7% of the surface of the basin have erosion smaller than 2.2 tons per hectare per year, 58% of the area has soil losses of 2.2 to 10 tons and 7.54% of the area has erosion with more than 10 tons with an allowable limit of 6.7 tons (Flores, 2007).
In the same sense, several physicochemical analyzes of the National Water Commission have reported that the water of the Jihuite dam has a quality far below what is allowed for human consumption, being mainly contaminants of the type pesticides and insecticides, which are dragged By the rains, also eroding the adjacent land, as well as by animal excreta from the farms (CNA, 1996).

On the other hand and in several occasions, great mortality of fish in the vessel of the Jihuite dam, such as that of august 27, 2009 (figure 1), have been

detected, when they hawk floating more than 7 tons, the causes of this event According to the authorities could be contamination by discharges of farms and industries, or by the excessive application of herbicides and/or fertilizers in the crops of the zone that the rains dragged until the reservoir.

Figure1: Images of the fish mortality in the Jihuite dam (2009).

Management Indicators (ASTEPA).

Table 24 presents the main management indicators for the years 2013, 2014 and 2015 of ASTEPA, compared to the national average of 2013, where positive progress can be observed in some of the indicators, it should be mentioned that in In the same year 2015, a change of municipal president was made in Tepatitlan and consequently change of the directive of the operator organism.

Indicator	ASTEPA			National Average *
	2013	2014	2015	2013
Coverage of drinking water (%)	97.3	98.5	97.61(a)	95.1
Sewer cover (%)	97.3	98.5	98.78	86.8
Sanitation coverage (%)	40	40	58.07(b)	50.7
Coverage of macromediation (%)	83.21	92.7	73.33(c)	87.6
Micromedition coverage (%)	95.2	98.1	98.67	54.2
Physical Efficiency (%)	54.9	54.1	37.34(d)	57.9
Commercial Efficiency (%)	80.2	96.4	81.15(e)	72.7
Overall Efficiency (%)	44.03	52.14	30.30(f)	45.7
Labor Index (employee / 1000 CH)	4.9	5.1	5.21	5.2

The contrasts between the periods 2014 and 2015 can be attributed to the following possible reasons:

A) Increase of irregular housing in the municipality.

B) The treatment plant of the town of Capilla de Guadalupe (20 l/s) was received.

C) The macro meter register was updated resulting in a considerable amount of equipment out of operation and / or in poor condition.

D) Interference with the updating of the macro meter pattern in the sources of uptake.
Likewise, the financial results of the organization, that is to say the amounts of cash collected and operating expenses carried out from 2011 to 2015, can be seen in figure 2.

Figure 2: Economic efficiency (Blue line = income.
Orange line = spending)

It should be mentioned that, in 2014, he relocated to the municipality of Tepatitlan, placing it at a higher contribution rate on the concessionaire scale within the National Water Commission (CONAGUA) user pattern, which led to a substantial increase in the payment of fees of wells utilization, together with increases in the costs of electric energy and other inputs, causing a current expenditure higher than the budgeted income.
In reference to social participation in the governing body of the operator, that is, members with a voice and vote that do not belong to any level of government, it has fluctuated between 18 and 22%. There are proposals to increase this percentage, either by allowing the participation of more representatives of organized society, or by reducing government representation.
Social participation increases when there is some conflict over water, since when the different actors feel affected, they act collectively.
Both residents within the microbasin and in the city of Tepatitlan (CT) have experienced, as pollution of water resources has increased substantially in recent years, which directly or indirectly has impacted on their lifestyle, That it is very important to consider the way in which they perceive the particular problems of the study area, as well as the analysis of the ways of social participation to face the challenge of water sustainability in the region.
In order to evaluate the perception of social actors, as well as the systems and mechanisms for their participation in the current problems of the water resources of the study area, surveys were carried out both in the MJ and in the municipal head of Tepatitlan, by means of a random stratified sampling, the most outstanding results are as follows;
Pollution and the low level of supply are the main problems that are perceived in the applied surveys; High percentages; 78 (CT) and 66% (MJ) of the respondents recognized a certain degree of contamination in the water bodies, for more than 5 years, being the cause of this contamination: peasants and farmers (37%, MJ, 21% CT), industries (32% MJ, 42% CT) and discharges from the population drains (25%, MJ and 34% CT).
In terms of which institution or organization should be the main responsible for solving the pollution problem in water bodies in the region, the results were: municipal government (31% CT, 45% MJ), state government (25% CT, 36% MJ) and the federal government (40% CT, 15% MJ).
In reference to the quality of drinking water service, it was found that in the MJ the majority of the inhabitants consider it regular (49%), while in the CT it is considered acceptable (65%),
The tariff for monthly drinking water in the housing scale of 13 to 20 cubic meters (m^3) in the CT (2015) was 9.04 pesos/m^3. The cost in the MJ is variable since the service is administered by different neighborhood committees, prices for residential service range from 6.60 to 10.4 pesos per m^3.
In the PT the drainage service is considered as good, it is recognized the existence of at least one wastewater treatment plant (43%), while there are

serious deficiencies in the MJ, since in its entirety there is no sewage system , As well as wastewater treatment systems, mostly use septic tanks.
The results on the perception of the authorities acting in reference to the water resources management indicate that 67% of the respondents of the PT comment as regular, while 48% of the MJ says that it is acceptable
Regarding questions about whether the authorities should modify some aspect of their behavior, the preferences in the PT were that (71%) and should be: 37% improve service (mainly leaks), 22% Drainage system, and 15% optimize the distribution network. In the MJ, 42% believe that the authorities should change their actions, mainly in: better distribution of water 26%, drainage coverage 21% and water costs 15%.
Regarding the participation in events of water culture this is relatively limited, however in the CT it is reported an availability to participate in 65%

CONCLUSIONS

In the case of MJ and CT, the processes of water governance found were:
1) Problem: Ensure water sustainability in quantity and quality
2) Strategic actors: 8 actors with low coordination among them. Polarized into two groups: 1) those supporting conservation projects and 2) those who exploit resources for food production.
3) Nodal points: 5 with low participation of all the actors.
4) Standards: With errors in its application at state and municipal level.
5) Social participation: Limited in some nodal points (at local and municipal level) and absent in others mainly at state and federal level.
6) Water culture: There are basic principles and strategies mainly focused on children
It highlights the absence of most basic governance processes at the micro-watershed level, as well as a poor water culture at all jurisdictional levels. In addition, there is a need for greater social participation at the national, state and micro-watershed levels, as well as an effective application of current regulations. For water management to be sustainable in the micro-watershed through the processes of governance, it is necessary to integrate each and every one of its stages and elements into its different levels of action.
The management of the water service for the communities within the micro-watershed is through neighborhood committees, which operate 5 deep wells (150-300 m deep), with flow rates of 4 to 15 l/s
The regulation of ASTEPA considers aspects for the use and use and distribution of drinking water. However, it lacks well-defined mechanisms and strategies to promote such issues as social participation (since its formation, non-governmental social representation on its board has averaged 20 per cent), education and the right to information.
Likewise, it can be stated that the operator and the municipality of Tepatitlan do not fully comply with Article 115 of the Mexican Constitution in relation to the sanitation of urban waste water, which are not treated as total waters Domestic residues generated in the municipality.
The actual cost of producing drinking water for the operating agency in 2015 was approximately 12 pesos per m³. This cost includes water treatment, piping, sewerage, sanitation and final disposal, in the same year, the monthly housing rate on the scale Of 13 to 20 m³ was of 9.04 pesos / m³, to the monthly consumption is added to it; 30% for sanitation, 5% for infrastructure

(maintenance) and 16% of VAT (only from the sum of sanitation and infrastructure)

It is evident that in the MJ there are relationships in the basic processes of unfinished water governance (Aguilar, 2006), which generally hinders the full integration of effective and efficient governance schemes designed for sustainable water management. Likewise, as stated by Peniche and Guzmán (2012), "the absence or malfunctioning of these principles explains the problems related to water supply and quality, and makes it impossible to exploit them". Water goes beyond the technical, it is a crisis of governance (Barkin, 2006)

It is possible to appreciate different ways in which the local population adapts to the environmental changes (borders, deep wells, stronger crops and of less water consumption, water in the dam for exclusive use of the municipal head, among others), affecting the Reform of microregions. There is also the technical and legal feasibility for the installation of devices and mechanisms for the management of payment for environmental services in; Areas for water recharge, environmental damage and environmental contingency caused by third parties, these resources should be used in pollution mitigation plans, recovery of water bodies in the micro-watershed and promotion of water culture.

REFERENCES

Aguilar, L. (2006). “Gobernanza y la gestión pública”. Primera edición. Ed. Fondo de Cultura Económica. México.

Arrojo, P. (2006).”El reto ético de la nueva cultura del agua, funciones, valores y derechos en juego”. Ediciones Paidós. Barcelona, España.

Ayuntamiento de Tepatitlán (2014). Consultado en Septiembre del 2014. http://www.tepatitlan.gob.mx/astepa/transparencia

Barkin, D. (2006). “Water managment strategies in urban Mexico: limitations of the privatization debate”. Patel Center for Global Solutions. University of Southern Florida, USA.

Castro, G. (2006) “El movimiento social en Mesoamérica por la defensa de los recursos naturales” OSAL, Buenos Aires. Argentina.

ECLAC (Comisión Económica para América Latina y el Caribe (CEPAL) (1994). “Panorama social de América Latina”. Informe anual.

Comisión Nacional del Agua. CNA. (1996). Estadísticas del agua en México. Sistema Unificado de Información Básica del Agua (SUIB). Capítulos 1 y 3.

Comisión Nacional del Agua. CONAGIA. (2006). Estadísticas del agua en México, Sistema Nacional de Información sobre cantidad, calidad, usos y conservación del agua (SINA) Capitulo 5.

Cotler, H (compilador) (2004) “El manejo integral de cuencas en México: estudios y reflexiones para orientar la política ambiental”. Secretaría de Medio Ambiente y Recursos Naturales e Instituto Nacional de Ecología. México

Domínguez, J. (2012). “Gobernanza urbana del agua: los problemas por resolver en las ciudades latinoamericanas”. En Gobernanza del agua: un desafío actual. Hacia una mirada crítica del concepto y de su aplicación, editado por D. Murillo Licea, 255-296. Jiutepec: IMTA.

Flores, H. *et al.,* (2009). “Aportes de nitrógeno y fósforo de tres sistemas agrícolas de la cuenca hidrográfica del Jihuite", en Jalisco, México. Revista Agrociencia Núm. 43 México.

Gómez, J. (2004). “América latina y el (des)orden global neoliberal hegemonía, contrahegemonía, perspectivas (partes I y III). CLASCO. Buenos Aires, Argentina.

Hufty, M. (2010). “Governance in Public Health: Towards an Analytical Framework”. Revista de Salud Pública. Instituto de Salud Pública, Facultad de Medicina. Universidad Nacional de Colombia

Mayorga, F. y Córdova, E. (2007). “Gobernabilidad y Gobernanza en América Latina”, Working Paper NCCR Norte-Sur IP8, Ginebra.

Mussetta, P. (2009). “Participación y gobernanza. El modelo de gobierno del agua en México”. Espacios Públicos, Vol. 12, Núm. 25, Universidad Autónoma del Estado de México. México

Ostrom, E. (1990). “Governing the Commons. The Evolution of Institutions for Collective Action”. Ed. Cambridge University Press. Londres.

Palerm, J. (2005) “Gobierno y administración de sistemas de riego”. En revista Región y Sociedad, vol. XVII, núm. 34. El Colegio de Sonora. Hermosillo, México.

Ramírez, A., *et al*. (1997). “Cuatro índices de contaminación para caracterización de aguas continentales”. Formulaciones y aplicación. *C.T.F.* Cienc. Tecnol. Futuro. Vol.1, Núm. 3, México.

Sader, E. (2008). “la crisis hegemónica en América latina”. CLASCO. Argentina

Seoane, J. (2006). Movimientos sociales y recursos naturales en América Latina: resistencias al neoliberalismo, configuración de alternativas. En Sociedad y Estado, Brasilia Brasil.