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RICHNESS OF ZOOPLANKTON IN LENTIC ENVIRONMENTS IN THE STATE OF MORELOS

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Abstract: In the state of Morelos there are more than 164 temporary and permanent aquatic systems, as available water resources for carrying out different activities. For this reason, this work aims to identify the zooplankton species of the water resource, as food for extensive aquaculture activities. Zooplankton samples were taken in lentic aquatic systems from February 2000 to December 2010. 130 bodies of water were georeferenced, classified as permanent (76) and temporary (54), located between 891 to 2860 masl. The largest number of aquatic systems was located in the municipalities of Tetecala (17) and Tepalcingo (15). The recorded species corresponded to 144 rotifers, 35 to cladocerans and 13 to copepods. The most diverse and frequent rotifers were species in the genera *Brachionus, Lecane, Keratella, Trichocerca, and Cephalodella.* The dominant cladocerans were *Diaphanosoma* cf. *brachyurum and Moina* cf. *microra*. Regarding the copepods, *Leptodiaptomus cuauhtemoci* and *Hesperodiaptomus morelensis,* endemic species and from cyclopoids to *Thermocyclops tenuis and T. inversus, Eucyclops agilis.*
Keywords: biodiversity, live food, rotifers, cladocerans, copepods

INTRODUCTION

The state of Morelos has a number of reservoirs and their importance encompasses economic, social and environmental aspects; Until now, in the state of Morelos, there is a complete inventory of the availability of these temporary and permanent bodies of water of the entity; however, there is great potential for aquatic resources that require various studies to establish fluctuations in their abiotic and biotic conditions within the flood and dry season in order to develop use and management strategies (Granados et al., 2014; Gómez-Márquez, 2002; CONABIO, 2008). In the study of the epicontinental waters of the neotropical region, the planktonic community is the one that is most closely related to the physical and chemical characteristics of the bodies of water, both because of their condition as organisms without their own or limited locomotion, physiological requirements, as well as for their participation within the first links in the trophic web (Wetzel, 2001; Roldán and Ramírez, 2008).

Rotifers are a small group of microscopic (25-250 μm in length) aquatic and semi-aquatic invertebrates; They comprise approximately 120 genera and 2,100 species in the world, of which 1,600 belong to the subclass Monogononta and approximately 500 species to the subclass Bdelloidea (Nogrady and Segers, 2002). They inhabit practically any body of water, from small holes in the rocks to large rivers, swamps and brackish lakes, in ephemeral bodies of water and in the pelagic zones of large lakes, many species are found in the benthos and periphyton of lentic habitats. as lotics, even in floral urns in cemeteries (Sarma and Elías-Gutiérrez, 1999). The Suborder Cladocera is generally found in all freshwater habitats, they are found in abundance in lakes, dams, banks, and less abundantly in fast-flowing rivers. It has been considered that the distribution of cladocerans is very wide, however, several species have been found in limited spaces and some are totally endemic, for example: *Moina dumonti* identified in southeastern Mexico and Cuba (Kotov *et al.*, 2005); For this reason, the distribution of some organisms in this group is very inaccurately known (Thorp and Covich, 2001).

The populations of the Subclass Copepoda usually also occur in a great variety of epicontinental aquatic environments, mainly the Orders Calanoida, Cyclopoida, Harpacticoida and Gelyelloida; which in sum have generated a richness of 1200 species, with a highly varied diversity and abundance, in lakes, rivers, dams, reservoirs and ponds (Elías-Gutiérrez et al., 2008). Some species are considered to have a wide distribution, such as *Arctodiaptomus dorsalis* and *Mastigodiaptomus albuquerquensis* and others show a certain degree of endemism, such as *Mastigodiaptomus reidae* and *M. maya, organisms that are only found in* ephemeral water bodies of Campeche or the species *Hesperodiaptomus morelensis* recorded only in the state of Morelos within Lake Tequesquitengo, and some reservoirs in Tlayacapan and Tepoztlán (Suárez, 2000; Granados and Suárez, 2003; Martínez, 2007).

Thus, rotifers and microcrustaceans are the main components of freshwater zooplankton communities (Nogrady and Segers, 2002); and the importance of some of these organisms, from the ecological point of view, is that they are used as indicators of the conditions that prevail in bodies of water (Aguilar, 2003) and on the other hand they represent an important resource for various human activities, such as in aquaculture, because some species are widely used as live food Others are indicators of water quality or are also used in ecotoxicological tests ; as well as biological control agents when used as natural predators of the dengue mosquito larva, for example the *Macrocyclops species albidus and Mesocyclops thermocyclopoides* (Silva- Briano and Suárez-Morales, 1998; Parra *et al.,* 2006; Elías-Gutiérrez *et al.*, 2008). For this reason, in this work the purpose was to obtain the richness of zooplankton species in order to identify the zooplankton species present in the different lentic aquatic environments, which may be capable of being used as live food for fish.

STUDY AREA

The state of Morelos has a total territorial extension of 4,958,222 km$^{2.}$ It presents a pronounced altitudinal and climatic gradient in a north-south direction, a situation that benefits its privileged geographical location in the neotropical zone; In addition, it fosters a wide wealth of habitats and species gathered in diverse aquatic environments. In the northern portion there is a mountainous area, characterized by registering altitudes between 3000 and 4000 meters above sea level, with a semi-cold to temperate climate (Cw $_{2)}$, it is located in the border area with Mexico City, the States of Mexico and Puebla, Characterized by registering a temperate to semi-warm climate, at this level we locate the lakes of the Lagunas de Zempoala National Park, environments of volcanic/glacial origin that keep an endemic fauna and flora. Next we find the region of the intermountain valley as the southeastern region of the entity, where altitudes between 1000 and 2000 meters above sea level are recorded, with semi-warm climates (A) C (W 1)($_{w)}$, (A)C(W $_{2)}$(w) (Taboada *et al.*, 2009). Among the warmest of the temperates with an average annual temperature greater than 18°C; They are characterized by 60% of the territorial extension, space in which we locate the largest number of reservoirs. Finally, the southern mountainous region that is located in the southeast portion of the entity, presents altitudes lower than 1000 meters above sea level, with a warm climate (AW 0 (W), AW 1 (W) (Figure 1)$_{\text{, with}}$ average annual temperature between 22 and 26°C, in localities such as Puente de Ixtla, Tetecala, El Higuerón, Xicatlacotla, Cuautlita, Huajintlán and Tlaquiltenango; entities where the least amount of lentic water bodies was recorded (Figure 2).

The state of Morelos, included in the part of the hydrological region R-18 "Río Balsas" is located between 17° 00'and 20° 00'north latitude and 97° 27'and 103° 15'west longitude. The state is covered by three hydrological basins; Atoyac, Balsas-Mezcala and Río Grande de Amacuzac (INEGI, 2002).

MATERIALS AND METHODS

The study covered zooplankton collections from 130 reservoirs between February 2000 and December 2010. An average of 6 to 10 annual collections were taken for each system, covering dry and rainy periods to include permanent and temporary ecosystems.

The water samples and zooplankton collection were carried out at two stations, one in the coastal zone and the other in the gate area. Some physical-chemical parameters were determined *in situ* and others were analyzed in the laboratory. The collection was carried out with a conical net with a mesh opening of 50 µm, carrying out the trawls in the limnetic zone and in the coastal zone, the samples were preserved with 4% formalin in 250 ml bottles, thus they were transported to the laboratory for its subsequent analysis. Table 1 shows the physical-chemical parameters recorded and the methods used during the zooplankton collection periods in the different aquatic ecosystems.

Rotifers were identified with the help of keys from Ahlstrom (1940), Koste (1978) and Thorp and Covich (2001). For the recognition of the organisms of the cladocera and copepoda groups, dissections of the organisms were carried out and the permanent preparations were mounted in synthetic resin, labeled and a database was elaborated; For their identification, specialized keys were used, such as: Thorp and Covich (2001) and Elías-Gutiérrez *et al.*, (2008). For the relative and absolute abundance of copepods and cladocerans, it was obtained using a Sedgwick-Rafter camera, analyzing three aliquots per sample per reservoir; the values obtained were registered as org /m ^{3} (Wetzel and Likens, 2000).

RESULTS AND DISCUSSION

The analysis of zooplankton samples collected in 130 reservoirs distributed in 24 municipalities of the state (Figure 2a and 2b), allowed to recognize a total of 35 families, 67 genera and 192 species. A total of 25 families, 42 genera and 144 species of the Phyllum were identified. Rotifera. From the Cladocera Suborder, a total of 8 families, 14 genera and 35 species were identified, and from the Copepoda Subclass, 2 families, 11 genera and 13 species were recorded.

The biodiversity of the different families identified for the Phyllum Rotifera in the aquatic environments studied in the state of Morelos, were grouped in Lakes, Dams and Bordos or reservoirs, dominated by rotifers mainly by *Brachionus falcatus, B. angularis, B. quadridentatus, B. plicatilis, Keratella americana, K. cochlearis, K. quadrata, Platyas quadricornis, Lecane bulla* and *L. papuana*, which were species that were present in the three types of ecosystems (Table 2); other rotifer species found in all three types of environments were *Filinia longiseta, F. opoliensis, F. terminalis, Testudinella patina, Asplanchna priodonta, Conochilus unicorns* and *Ptygura* sp. and also *Macrotrachela* sp., *Trichocerca pusilla* and *T. porcellus.* Roldán and Ramírez (2008) recognize that within zooplankton, rotifers are one of the most diverse and widely distributed groups in the different water bodies studied, predominating and describing *Keratella, Polyarthra, Brachionus, Lecane, Euchlanis, Asplanchna, Platyias, Testudinella, Filinia, Adineta, Trichocerca, Rotaria,* and *Phylodina.* They also highlight that the genus *Brachionus* exhibits a wide distribution and varied abundance. Granados and Álvarez-Del Ángel (2003), Roldán and Ramírez (2008) and Gómez-Márquez *et al.* (2013), have recognized these species in temporary, shallow aquatic systems with high rates of eutrophication.

The calanoid copepods were limited to four species, observing a marked selection of environments, which are fully associated

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with the origin and climate in which they are located; for example, *Leptodiaptomus cuauhtemoci* is a species from the natural lakes of the Lagunas de Zempoala Park (Table 3), already described and noted by Trejo (2012) and Barragán (2016). The new species described by Granados and Suárez (2003) for Lake Tequesquitengo *Hesperodiaptomus morelensis,* has been recorded by Martínez (2007) in reservoirs in the temperate zone, where he cites the demands of the species and its limited population dynamics. *Mastigodiaptomus* species *alburquerquensis* Herrick, 1895 and *Arctodiaptomus dorsalis* Marsh, 1907; They are considered to have a wide distribution, since they have been recorded in Morelos by Gómez-Márquez *et al.* (2013) and in several states of the Mexican Republic (Suárez 2000). In this study it was recorded within the high and temperate zone, as well as in the central region at an altitude of 1445 and 2240 m. Suárez (2000) points out that its distribution seems to be limited, being found preferably in temperate environments. In this work its presence in the reservoirs of the municipalities of Zacualpan, Tetecala and Coatlán del Río is reported. In relation to the species of the Cyclopidae Family, most are considered to be widely distributed, with *Acanthocyclops standing out for its importance.* cf *robust* organisms that have been used to control the dengue mosquito; while most participate in the trophic dynamics of the ecosystems, according to Elías-Gutiérrez *et al.* (2008).

The total number of species of the Suborder Cladocera (Table 4) registered in the water bodies of this work, actively participate in the dynamics of secondary productivity, registering important abundances in the ecosystems, predominating and competing with the different rotifers in each environment (Elías-Gutiérrez *et al.*, 2008). The species of the Daphniidae family stand out in this work due to their abundance and frequency in water bodies, and in second place, the species of the Sididae family and, in less abundance and frequency, the Macrothricidae and Bosminidae families. Arroyo *et al.*, (2008), consider that there are totally endemic species of certain waters with very particular environmental conditions; however, most are easy to adapt to local conditions in temporary or permanent environments; Some of its species have been reported in ecosystems in the Nearctic region as well as in the Neotropical zone, indicating that their frequency and abundance is linked to the level of competition for food and space with the Phylum. Rotifera (Álvarez, 2006, Arroyo *et al.*, 2008; Elías-Gutiérrez *et al.*, 2008).

Given the amount of information generated, the variation presented by some of the species in the different bodies of water is globally described, noting that their presence was always associated with volume and temporality (Granados et al., 2014) ; for this reason we can see that during the dry season the following species stood out due to their frequency: *Keratella americana, Brachionus havanaensis, B. quadridentatus, B. caudatus, B. angularis, B. budapestinensis, Filinia longisete, Horaella thomassoni, Cephalodella* cf. *Tenuior, Asplachna sieboldi* and the cladoceran *Diaphanosome birgei* and less frequently we found *Lecane moon, Polyarthra dolichoptera, filinia opoliensis, keratella americana, euchlanis dilated, Ptygura* cf. *sweetheart, trichocerca dixon-nuttalli, Taphrocampa selenura and Anuraeopsis fissa,* so also the cladocerans *moina* cf. *micrura, Diaphanosoma birgei* and the copepod *thermocyclops inversus.* Santibañez (2008), Parra *et al.* (2006) Arroyo *et al.* (2008) and Gómez-Márquez *et al.* (2013), cite some of these species in their studies carried out in the reservoirs of the state of Mexico and the state of Morelos, considering that their abundances are governed by the amount of food and the temporality of each body of water.

In the rainy season they stand out for their frequency to *Brachionus caudatus, B. havanaensis, B. quadridentatus, B. angularis, B. budapestinensis, Synchaeta stylata, lecane quadridentata, Lecane hastata, Horaëlla thomassoni, Asplanchna sieboldi and Ptygura* cf. *furcillata,* as well as the *Arctodiaptomus copepods dorsalis* and *thermocyclops inversus.* The least frequent species in the reservoirs were *Brachionus budapestinensis, B. havanaensis, B. patulus, papuan lecane, keratella americana, K. tropica, Platyas quadricornis, Testudinella slips, lepadella patella, Asplanchna sielboldi and macrotracheal* sp., and the cladoceran *moina* cf. *microra.* Suárez (2000) and Álvarez (2006), consider that the primary colonization of rotifers in the different bodies of water makes them predominant and the other groups of zooplankton are adapted to the variations of the productive components, the physical-chemical dynamics and changes in the environment.

The abundances recorded in general of the recognized genera and species in the reservoirs throughout the three climatic regions were as follows: within the Copepoda subclass, maximum mean abundance values of 13,928 org /m ^{3} were obtained and the lowest abundances varied from 984 org /m ^{3} to 34 org /m $^{3.}$ In particular, the best abundance recorded was for the copepod *Mastigodiaptomus albuquerquensis* who recorded an average value of 4,685 org /m ^{3} in the "San Andrés" reservoir in the municipality of Zacualpan de Amilpas.

For the Superorder Cladocera the genus *Moina,* with the species *M.* cf. *micrura and M. wierzejskii* recorded average abundances of 11 org /m ^{3} to 9,336 org /m ^{3} in the reservoirs of the central-eastern part of the state. In particular, in the high zone of the state, the genus Daphnia *with* 3 recognized species (*D. parvula, D. pileata* and *D.cf. _ mendotae)* abounded with the highest number of average organisms of 5,111 org /m ^{3,} and the lowest record of their average abundances 57 org /m ^{3,} it is important to mention that for the species *D.* cf *mendotae* was only recognized in two reservoirs in the northern zone and two reservoirs in the eastern region.

of the genus *Ceriodaphnia* were identified: *Ceriodaphnia lacustris* who recorded maximum abundances of 1,542 org /m ^{3} and minimum abundances of 110 org /m ^{3} and *Ceriodaphnia dubia,* species only recorded in reservoirs in the warm zone of the eastern and western regions of the state with average abundances of 217 org /m ^{3} as maximum and minimum averages of 80 org /m $^{3.}$ The genus *Alona* was considered by its abundance and frequency as a sporadic group in the reservoirs.

Finally, within the genus *Diaphanosoma,* four species were identified; appearing with greater frequency and abundance in *Diaphanosoma* reservoirs *birgei* with average values that varied from 138 org /m ^{3} to 6,178 org /m ^{3}; the other three species were considered rare and abundant with average values from 110 org /m ^{3} to 217 org /m $^{3.}$ Martínez (2007), Parra *et al.* (2006), Santibañez (2008), Sinev and Silva (2012) and Gómez-Márquez *et al.* (2013) point out that it is striking to see that some of the aforementioned cladoceran species express certain preferences for some climatic and environmental conditions such as temperature, dissolved oxygen, available food (algae) and coastal vegetation that in most of often defines the community structure for these temporary or permanent ecosystems.

Inventories and faunal research on Monogonontos rotifers in Latin America are scarce; however, we can only cite Ferrando and Claps (2016), who report a richness of 351 monogonontous rotifers for Argentina; in Brazil, Garraffoni and Lourenço (2012), cite a richness of 84 genera with 625 species, covering only 58% of the territory. For Venezuela, Pardo and Zoppi (2014) only cite a richness of 50 rotifer species for three lagoons of the " Camaguan Reserve " of Guarico State ; and for the state of Morelos, 153 species of Monogonontos rotifers were identified, highlighting that the Brachinidae, Lecanidae, Trichocercidae, and Notommatidae Families are considered the most predominant in most of these works, emphasizing that the variations and abundances were always associated with the location, temporality, climate and physical-chemical factors. For example, in the reservoirs of the central-eastern region of the state, several aquatic systems maintained constant populations of rotifers throughout the dry season, as was the case of *Asplanchna. sieboldi, Brachionus caudatus, Philinia longiseta and Horaella thomassoni,* with populations ranging from 1000 org /m ^{3} to 143 800 org /m $^{3.}$ Serranía (2006), Martínez (2007), Granados and Álvarez-Del Ángel (2003) and Gómez-Márquez *et al.* (2013), consider that rotifer populations increase in abundance during the dry season and attribute these increases to the increase in phytoplankton biomass and seasonal change, which greatly favors them.

Regarding the *Brachionus rotifers bidentatus, B. calyciflorus, B. havanaensis, B. quadridentatus, B. urceolaris, Filinia opoliensis, Hexarthra mira, Keratella americana, K. tropica, Lecane luna, Polyarthra dolichoptera, Ptygura* sp., *Synchaeta bicornis, Testudinella patina* and *trichocerca* sp. They were genera and species that recorded abundances of less than 11,200 org /m ^{3,} even in the rainy months some of these organisms were not recorded. It is important to mention that for the reservoirs of the municipalities of Zacualpan, Axochiapan, Jonacatepec, Jantetelco, Tetecala and Coatlán del Río, the abundances of the identified rotifers (43 species) were less than 10 200 org / m ^{3}; but at the end of the rainy season, the species that increased their abundances were: *Asplanchna sieboldi, Brachionus calyciflorus, B. falcatus, B. quadridentatus, B. urceolaris, Filinia longiseta, F. opoliensis, Hexarthra intermedia, H. mira, Horaëlla thomassoni, Keratella americana, K. tropica, Lecane bulla, L. luna, Lepadella* sp., *Platyias quadricornis* and *Testudinella patina,* with average values ranging from 1020 org /m ^{3} to 50,200 org /m $^{3.}$ Sarma and Elías (1999), Álvarez (2006), Serranía (2006) and Muñoz (2014), cite that because they are a cosmopolitan group and thanks to the easy adaptation of these organisms, they generally prefer reservoirs with a certain degree of eutrophication, which which allows them to ensure their food and favorable environmental conditions for their reproductive dynamics.

Finally, the Principal Components Analysis (PCA) was applied to know the behavior of all system variables in relation to the diversity of reservoirs and collection times; appreciating the behavior of the variables obtained due to the reduction method. As can be seen in figure 6, six components were taken into account that together represent 76.13% of the variability within the original data. Components one and two are those that register the highest eigenvalue (affinity) with 2.53 and 2.02 respectively, with an accumulated percentage between the two of 35.07% of relationship. In component one, the variables that have the most weight are those that correspond to the edaphic factor (total hardness and conductivity with -0.435 and -0.464 respectively) and that includes shallow water bodies with a smaller surface (10 hectares, all banks); as well as the altitude (0.406) and the water temperature (-0.395). Within component two, the area (-0.598) and volume (-0.615) stand out as members of the morphometric factor, being the ones that represent the greatest importance, because the largest systems such as dams are located there (Figure 3). In component three, the variable with the greatest weight was the trophic state (0.506) of the body of water, which represents a direct relationship with the amount of nutrient available during its flood period (Figure 6). Gomez-Marquez (2002), Gomez-Marquez *et al.* (2013) and Muñoz (2014), carry out a component analysis of the results obtained in the aquatic environments studied and register as fundamental points the edaphic, climatic and physical-chemical factor of the water as the central variables of association to interpret the population dynamics. and zooplankton trophic of the water bodies of the central zone of the state of Morelos.

CONCLUSIONS

Morelos has 192 taxa, of which species such as *Brachionus were identified within the rotifers. plicatilis* which is the species most used as live food for fish, followed by *B. calyciflorus, B. rubens, B. urceolaris* and *B. falcatus* of ecological and nutritional importance. *In the same way, three species of Moina,* four species of *Diaphanosoma* and five species of *Daphnia* were recorded, which are organisms widely used in aquaculture and which, from the economic and social point of view, constitute an excellent source of food in the fish industry. The knowledge of these species and their potential as live food for all the benefits it provides, could help aquaculture achieve one of the main commitments: to become a truly sustainable activity. These zooplankton organisms, due to the fact that they inhabit a wide variety of niches in aquatic ecosystems, their abundances and frequencies of appearance, respond to the dry season and rainy seasons, as well as to the abundances of the different food components, which are a fundamental source of food. for the success of all living things. More studies and collections are needed in ecosystems such as rivers, springs, fish farming ponds and various wetlands in the state, which could very well add another number of taxa to the list. In addition, it is important to make society and the entire community aware of the importance of the water resource, in order to optimize its use and exploitation.

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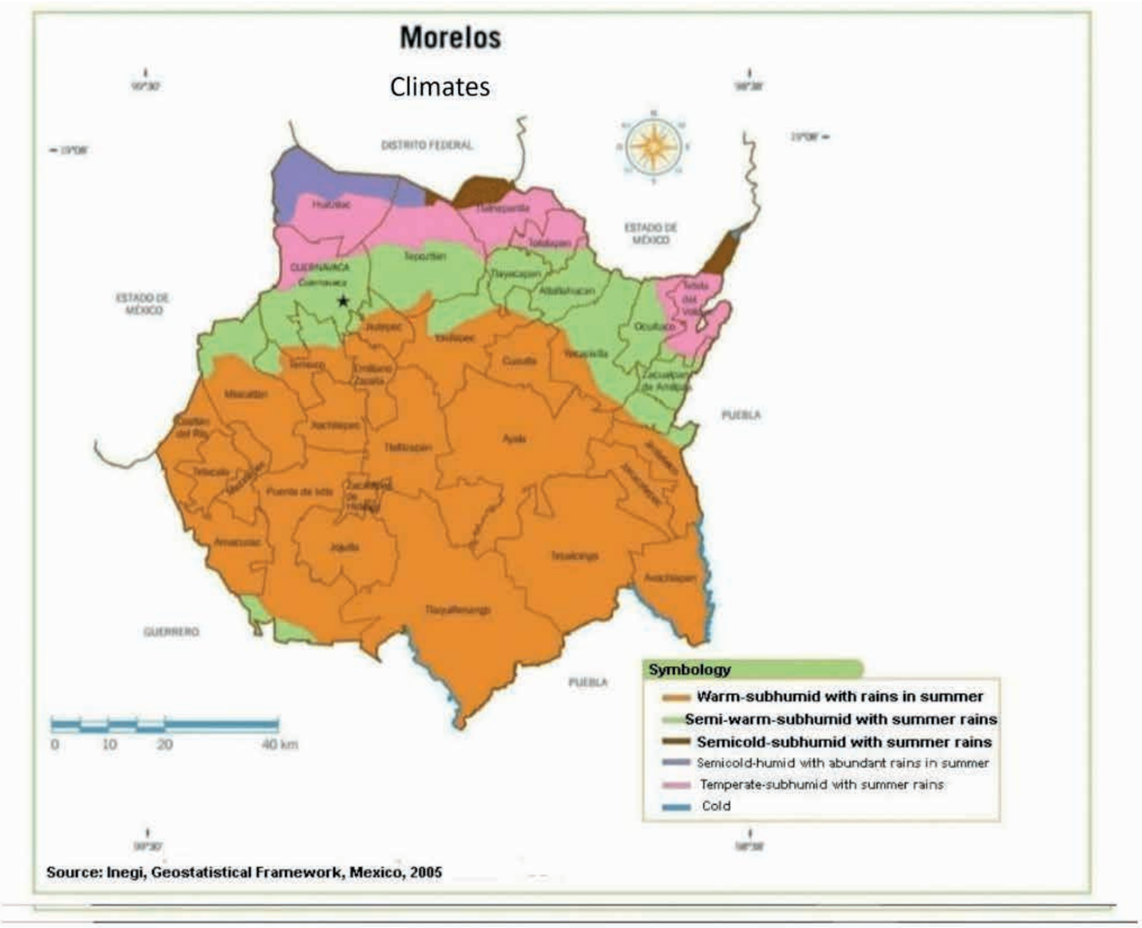
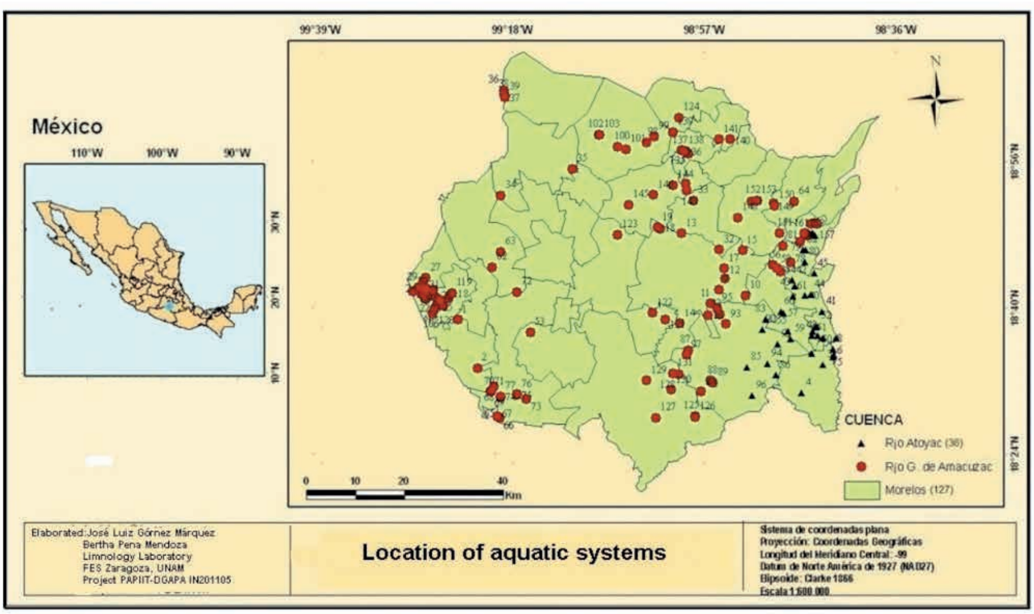
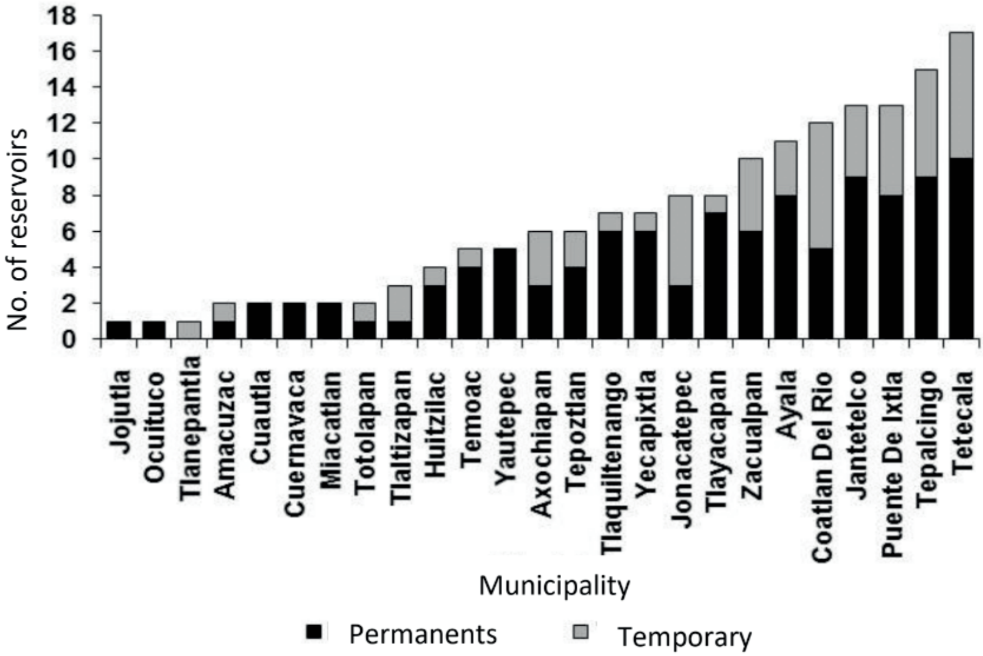


Figure 1. Climates of the state of Morelos, Mexico



a).



b).

Figure 2. a). Location of the reservoirs in the state of Morelos, b). Distribution of aquatic systems by municipality in Morelos

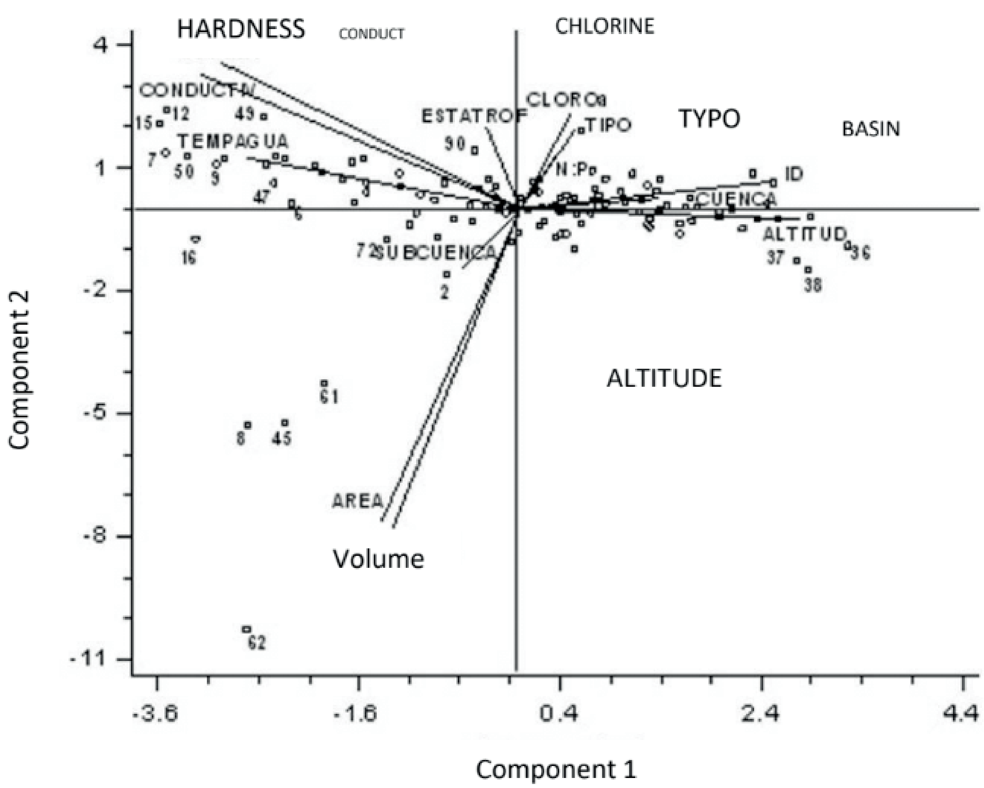


Figure 3. Analysis of principal components for the aquatic systems of Morelos

Parameter	Method
Water temperature (°C)	±1°C Digital Thermometer
Dissolved Oxygen (mg/L)	HANNA H19146 Oximeter
pH	HANNA parametric probe H1991300
Conductivity (µS/cm)	HANNA parametric probe H1991300
Total Dissolved Solids (ppm)	HANNA parametric probe H1991300
Total Alkalinity (mg/L $CaCO_{3)}$	APHA-AWWA-WPCF colorimetric method
Total Hardness (mg/L $CaCO_{3)}$	APHA-AWWA-WPCF colorimetric method

Table 1. Physical and chemical parameters registered in the bodies of water during the study period.

FAMILY	GENUS AND SPECIES	LAKE	PREY	BOARD
Brachionidae	*anuraeopsis fissa*	X	X	
	Brachionus calyciflorus		X	
	Brachionus falcatus	X	X	X
	Brachionus caudatus		X	X
	Brachionus havanaensis	X	X	X
	Brachionus angularis	X	x	X
	Brachionus forficula		X	
	B. quadridentatus	X	X	X
	B. urceolaris		X	X
	B. bidentatus		X	
	B. budapestinensis	X	X	
	B. plicatilis	X	X	X
	B.Rubens	X	X	
	happy meeting		X	
	Kellicotia bostoniensis	X	X	
	K. longispina		X	X
	american keratella	X	X	X
	K. cochlearis	X	X	X
	k.lenzi _	X		
	K.tropica _	x	x	
	K quadrata	X	X	X
	platyas quedricornis	X	X	X

Lecanidae	*lecane arcuate*			X
	L. bulla	X	X	X
	L. closterocerca	X		
	L. cornuta	X		
	L. curvicornis	X		X
	L. hamata	X		
	L. hastata	X	X	
	L. ludwigii	X	X	
	L. lunaris	X	X	
	L. nana	X		
	L. papuana	X	X	X
	L.dicipiens _		X	X
	L. hornemanni	X		
	L. luna	X	X	
	L. aculeata	X		
	L. flexilis	X		
	L. leontina	X		
	L. pyriformis	X		
	L. quadridentata	X	X	
	L. spinulifera		X	X
Trichocercidae	*trichocerca bidens*	X		
	T. pusilla	X	x	X
	T. similis	X	X	
	T. tenuior			
	T.iermis _			X
	T. cylindrica	X		
	T. elongata	X		X
	T. longiseta	X		
	T. mollis	X		
	T. porcellus	X	X	X
	T. rosea	X		
	T. dixon nuttalli		X	X
	T. stylata	X		
	T. bicristata			X
Hexarthridae	*hexarthra fennica*		X	X
	Intermediate H.	X	X	
	h look	X	X	
	H. vulgarica	X		
Filiniidae	*filinia longiseta*	X	X	X
	F. novaezealandiae	X		
	F. opoliensis	X	X	X
	f.terminalis _	x	x	X
	f. hofmanni	X		

Colorellidae	*colorella uncinata*		X	X
	C. obtuse		X	X
	lepadella ovalis	X		
	L. patella	X	X	
	L. rhomboids	X		
	L. acuminata	X		
	L. triptera	X		
	squatinella lamellaris	x		
Synchaetidae	*Synchaeta longipes*	X		
	S. pectinata	X	X	X
	S. stylata	X	X	
	Polyarthra dolichoptera	X	X	X
	P. tops off	X	X	X
	P vulgaris	X	X	X
testudinelledae	*testudinella slips*	X	X	X
	T. incised	X		
	T.emarginula _	X		
	T. caeca	x		
	T. mucronata	X		
	T. parva	X		
	Tetrasiphon hydrocore			X
Mytilinidae	*mytilina mucronata*	X		
	M. ventralis	X		
	Lophocaris salpina	X		
euchlanidae	*euchlanis dilated*	X	X	
	E. incised	X	X	
	tripleuchlanis plicate	X		
	Dipleuchlanis propatula	X		
notommatidea	*Cephalodella gibba*	X	X	
	C. hiulca	x		
	C. catellina	X		
	C. megalocephala	x		
	C. physalis	X		
	C. hallowdayi	X		
	C. tenuior			x
	Itura myersi		X	X
	Monommata phoxa		x	x
	M.dentata _	x		
	N. glyphura	X		
	N.pachyura _	x	x	
	Taphrocampa selenura		X	X
Trichotriidae	*Trichotria tetractis*	X		
	T. pocillum	X		
	macrochaetus subquadratus	X		

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Asplanhcnidae	*Asplanchna sieboldii*	X	x	X
	girodi	x		X
	priodonta	X	x	X
	A. brightwellii		X	
Dicranophoridae	*aspelta lestes*	X	|	
	Dicranophoroides caudatus	X	X	
	d grandis	X	X	
	D. secretus		X	
flosculariidae	*sinantherina spinosa*		X	X
	S. procera	X		
Conochilidae	*Conochilus dossuarius*	X		
	C. unicornis	X	X	X
	C. hippocrepis	X		X
	C. natans		X	
Trochosphaeridae	*horaella thomassoni*	X	X	
Collothecidae	*Collotheca ambiguous*	X	X	
floscelaridae	*Ptygura sweetheart*	X		
	P. furcillata	X		X
Proalidae	*fallocious proales*	X		
gastropodidae	*Ascomorpha ecaudis*	X		
	A. saltans	X		
	A. ovalis		X	X
	gastropus hyptopus		X	
Phillodinidae	*Dissotrocha macrostyla*		x	
	D. aculeata	X		
	macrotracheal sp.	X	X	X
Habrotrochidae	*Habrotrocha sp.*	X		
	rotary rotary		X	X
	R.neptunia _			X
	Social R.		X	X

Table 2. Species of rotifers that were recorded in the water bodies of the state of Morelos during the study period.

FAMILY	GENUS AND SPECIES	LAKE	PREY	BOARD
Chyrodidae	*Alonella sp.*	X		
	Alona Diaphana		x	X
	A. affinis		X	X
	A. guttate	X		
	chydorus reticulatus	X		
	C. eurynotus		X	X
	camptocercus dadayi	X		
	camptocercus sp.		X	
	Leydigia leydigi	X		
	L. striata		X	X
Bosminidae	*bosmina longiristris*	X		X

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Daphnidae	*Ceriodaphnia dubia*	X		
	C. dadayi		X	X
	C. lacustris	X		
	C. reticulata			X
	Daphnia parvula	X		
	D. pileata	X		
	D. _ cf. Mendotae	X		
	D.laevis _	X	X	
	simochephalus punctatus		X	X
	S. acutirostratus	X		
	S. serrulatus		X	
	S. exspinosus		X	X
sididae	*Diaphanosome birgei*	X	X	
	D. fluviatile	X		
	D. spinolosum		X	X
	D.cf. _ brachyrum	X		X
Moinidae	*Moina cf. microra*	X	X	X
	M.wierzejskii _	X	X	X
Ilyocryptidae	*Ilyocryptus agilis*			X
Macrothricidae	*macrotrix spinosa*			
	M. triserialis	X		
Polyphemidae	*Polyphemus sp.*			X

Table 3. Cladoceran species that were recorded in the water bodies of the state of Morelos during the study period.

FAMILY	GENUS AND SPECIES	LAKE	PREY	BOARD
Diaptomidae	*Leptodiaptomus cuauhtemoci*	X		
	Arctodiaptomus dorsalis	X	X	X
	mastigodiaptomus albuquerquensis	X		X
	Hesperodiaptomus morelensis	X	X	X
cyclopidae	*acanthocyclops robust*	X		
	Diacyclops bicuspidatus	X		
	eucyclops agilis		X	X
	macrocyclops albidus	X		
	tropocyclops prasinus	X		
	thermocyclops tennis	X	X	
	T. inversus	X	X	X
	Mesocyclops aspericornis	X		
	M.leuckarti _	X		

Table 4. Species of copepods that were recorded in the water bodies of the state of Morelos during the study period.