

# Meiofaunal Life of Man-Made Wastewater Ponds in Qatar

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## الحياة الدفينة في برك الصرف الصحي بقطر

الحاج أبو جبر الحاج - قسم علوم البحار

حسين أبو الفتح ، روضة آل ثاني ، محمود كردوشة - قسم العلوم البيولوجية

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في الفترة من أكتوبر ٢٠٠٠ وإلى أكتوبر ٢٠٠١ درست الحياة الدفينة (المايوفونا) القاطنة في بركتين ناتجتين عن مياه الصرف الصحي لمدينة الدوحة، وبالرغم من أن طبيعة قاع البركتين وجدت متشابهة في متوسط حجم حبيبات الرمل، إلا أن كثافة تواجد المايوفونا اختلفت. رصدت ست شعب حيوانية هي الديدان المفلطحة، الديدان الخيطية، شوكيات البطن، الدواميات، الديدان الحلقية والقشريات من مفصليات الأرجل، وعموماً كانت بركة أبو نخلة (ذات المياه المعالجة) أغنى بالمايوفونا من بركة أبو هامور (ذات المياه غير المعالجة)، وكانت نسب تواجد الديدان الخيطية لمجدافية الأقدام مختلفة مع اختلاف منسوب المياه في البركتين.

**Key Words:** *Meiofauna, Wastewater Ponds, Qatar.*

### ABSTRACT

The meiofaunal life of two wastewater ponds around Doha City was studied for the period October 2000-October 2001. The substrate nature of the two ponds was found to be similar in mean particle sizes but the densities of occurrence of the different species were variable. Six phyla were encountered. Namely Platyhelminthes, Nematoda, gastrotricha, Rotifera, Annelida and Crustacea of Arthropoda. Generally, the meiofaunal life was richer in Abu-Nakhla pond (treated wastewater) than in Abu-Hamour pond (untreated wastewater). The ratio of occurrence of Nematode / Copepod fluctuated in no particular manner depending on the state of water level in the two ponds.

## Introduction

Invertebrates are one of the most important components in the ecology of ponds, as they support the secondary production and interlink the different pathways of food webs. Nevertheless, the meiofauna of ponds not only an important food sources for higher trophic levels, but play an important role in bioturbation and stimulation of bacterial metabolism (3).

Thus the study of interstitial fauna yields information about the state of the health of the habitat. This is mainly because the substrate is the ultimate receiver of the end - products of the dynamic processes occurring in the overlying column.

It is was intended in this present study to evaluate the occurrence of meiofauna in two wastewater ponds, one of treated water and the other untreated water. It is the first time to study the meiofauna in such ponds in the State of Qatar and it is hoped to contribute substantially to the understanding of pond ecology and conservation.

## Materials and Methods

This study was conducted on monthly bases, as part of a comprehensive study dealing with the ecology of wastewater ponds, during the period October 2000 - October 2001. The study covered two wastewater ponds. The first one is Abu-Nakhla, 7km southwest of the industrial area of Doha City. It receives treated wastewater from two treatment plants located south and west of Doha City. The second pond, Abu-Hamour, is on the southwest outskirts of Doha City and it receives various types of the city untreated wastes.

In Abu-Nakhla pond, four samples were taken monthly from four locations, northeast, east, south and west of the pond (KN, KE, KS, and KW respectively). A 5<sup>th</sup> sample site (KNP) was chosen at the inlet of discharge. Similarly, four sites were chosen for sampling in Abu-Hamour (H1, H2, H3 and H4) where H1 is the unloading site of wastes and H4 is the farther site from the discharge area.

A scoop of a tin with a long handle was taken from the first 3cm layer of the sediment of each site. The sediment samples were taken in plastic jars and preserved in 5% formalin solution. One aliquot of sediment mixture taken from the four sites of each pond was taken in plastic bags and dried in the laboratory for granulometry studies. The mean particle sizes were determined using stack of sieves, sieve shaker and analysis graph sheets following the method of Morgans (4).

Preserved sediment samples were treated in the laboratory using the anaesthetization technique of Hulings and Gray (3) to extract the meiofauna and then identified under research microscope using keys and other publications (1, 2, 3).

The occurrence of the meiofaunal species in each site was recorded in tables (1-13). Special attention was given to the ratio of occurrence of Nematodes/Copepods in order to see if this ratio could be of use as an index to the state of pollution of the ponds.

## Results and Discussion

The median grain sizes (M D Ø) of the sediment of the two ponds were found both to be 125µm, which indicate just fine sediment type in Wentworth grade. The phi quartile deviations (Q D Ø) approached zero and indicated the efficiency of sorting.

Six phyla were encountered during this study. They are namely Platyhelminthes, Nematoda, Gastrotricha, Rortifera, Annelida and Arthropoda (Crustacea). The different species recorded are shown in Tables 1-13.

Throughout this study, the inlet of discharge at pond Abu-Nakhla was found to be very poor in meiofauna species and similar to site H1 in pond Abu-Hamour which is also the unloading site of wastes. However, the meiofauna life was flourishing in Abu-Nakhla pond when compared with the poor faunal densities in Abu-Hamour pond. The decline in numbers during the hottest month (July to September) was probably of behavioral origin; the animals hiding or burrowing deeper in the substrate. This is in addition to the periodical drying up of some parts of the ponds during summer.

Nematodes appeared in all the - year-round samples of the two ponds. The peak of occurrence in Abu-Hamour was in location H2 in February 2001 and at Abu-Nakhla pond in (JE) the eastern location in May 2001.

Copepods, on the other hand, were sampled in varying densities for the two ponds. They did not appear in Abu-Nakhla pond samples in April and May 2001.

However, Copepods flourished in samples of October 2000, February, April and October 2001 in Abu-Hamour pond. Whereas in Abu-Nakhla pond they only dominate in December 2000.

In Abu-Hamour pond the ratio of occurrence of Nematodes/Copepods in October 2000, February, April, and October 2001 samples was 1:2. Whereas in Abu-Nakhla pond this ratio was only encountered in December 2000 samples. During the rest of the sampling period, the ratio fluctuated in no particular manner probably depending on the fluctuation of the water level especially in Abu-Nakhla pond.

The change in that ratio is probably because copepods are more sensitive to environment stresses than nematodes. Raffaelli and Mason (5) have suggested so in marine environment and that the Nematodes/Copepods ratio might serve as an index of pollution.

In conclusion, Abu-Nakhla pond was much richer in meiofauna than Abu-Hamour pond because of the oil pollution and other possible pollutants discharged in the pond.

**Table 1. Occurrence of Meiofauna species at Abu-Nakhla and Abu-Hamour ponds during October 2000.**

	Abu-Nakhla Pond					Abu-Hamour Pond			
	KNP	KN	KE	KS	KW	H1	H2	H3	H4
<b>PHYLUM Platyhelminthes:</b>									
<b>CLASS Turbellaria</b>									
<b>Rhabdocoela: Catenula sp.</b>									
<b>Tricladida: Planaria sp.</b>									
<b>PHYLUM Nematoda:</b>									
<b>Phasmodia: Phasmod sp.</b>		*	*	*	*		*	*	
<b>PHYLUM Gastrotricha:</b>									
<b>Chaetonotida: Chaetonotid sp.</b>			*	*					
<b>PHYLUM Rotifera:</b>									
<b>Monogonta sp.</b>				*	*				
<b>PHYLUM Annelida:</b>									
<b>CLASS Oligochaeta:</b>									
<b>Haplotaxida:</b>									
<b>Enchytreus sp., Tubifex sp.</b>		*			*				
<b>PHYLUM Arthropoda:</b>									
<b>Crustacea:</b>									
<b>Ostracoda: Podocopa sp.</b>			*						
<b>Copepoda:</b>									
<b>Harpacticoid sp.</b>				*				**	**
<b>Cyclopoid sp.</b>									
<b>Cyclops sp.</b>									
<b>Branchiopoda</b>									
<b>Diplostraca: Daphnia sp.</b>									

KNP, KN, KE, KS and KW respectively represent the northeastern wastewater discharge pipeline, north-eastern, eastern, southern and western shores. H1, H2, H3 and H4 respectively represent the northeastern wastewater discharge shore, southeast, southwest and northwest shores.

\*present,

\*\*prominently present.

**Table 2. Occurrence of Meiofauna species at Abu-Nakhla and Abu-Hamour ponds during November 2000.**

	Abu-Nakhla Pond					Abu-Hamour Pond			
	KNP	KN	KE	KS	KW	H1	H2	H3	H4
<b>PHYLUM Platyhelminthes:</b>									
<b>CLASS Turbellaria</b>									
<b>Rhabdocoela: Catenula sp.</b>				*					
<b>Tricladida: Planaria sp.</b>									
<b>PHYLUM Nematoda:</b>									
<b>Phasmidia: Phasmid sp.</b>			*	*	*		*	*	
<b>PHYLUM Gastrotricha:</b>									
<b>Chaetonotida: Chaetonotid sp.</b>			*	*					
<b>PHYLUM Rotifera:</b>									
<b>Monogonta sp.</b>				*	*				
<b>PHYLUM Annelida:</b>									
<b>CLASS Oligochaeta:</b>									
<b>Haplotaxida:</b>									
<b>Enchytreus sp., Tubifex sp.</b>	*	*	*						
<b>PHYLUM Arthropoda:</b>									
<b>Crustacea:</b>									
<b>Ostracoda: Podocopa sp.</b>					*		*		
<b>Copepoda:</b>									
<b>Harpacticoid sp.</b>			*						*
<b>Cyclopoid sp.</b>			*		*				
<b>Cyclops sp.</b>			*		*				
<b>Branchiopoda</b>									
<b>Diplostraca: Daphnia sp.</b>									

KNP, KN, KE, KS and KW respectively represent the northeastern wastewater discharge pipeline, north-eastern, eastern, southern and western shores. H1, H2, H3 and H4 respectively represent the northeastern wastewater discharge shore, southeast, southwest and northwest shores.

\*present,

\*\*prominently present.

**Table 3. Occurrence of Meiofauna species at Abu-Nakhla and Abu-Hamour ponds during December 2000.**

	Abu-Nakhla Pond					Abu-Hamour Pond			
	KNP	KN	KE	KS	KW	H1	H2	H3	H4
<b>PHYLUM Platyhelminthes:</b>									
<b>CLASS Turbellaria</b>									
<b>Rhabdocoela: Catenula sp.</b>					*				
<b>Tricladida: Planaria sp.</b>		*		*					
<b>PHYLUM Nematoda:</b>									
<b>Phasmidia: Phasmid sp.</b>		*		*			*	*	
<b>PHYLUM Gastrotricha:</b>									
<b>Chaetonotida: Chaetonotid sp.</b>			*	*	*				
<b>PHYLUM Rotifera:</b>									
<b>Monogonta sp.</b>				*					
<b>PHYLUM Annelida:</b>									
<b>CLASS Oligochaeta:</b>									
<b>Haplotaxida:</b>									
<b>Enchytreus sp., Tubifex sp.</b>				*	*				
<b>PHYLUM Arthropoda:</b>									
<b>Crustacea:</b>									
<b>Ostracoda: Podocopa sp.</b>					*				
<b>Copepoda:</b>									
<b>Harpacticoid sp.</b>			**		*			*	*
<b>Cyclopoid sp.</b>			**		*				
<b>Cyclops sp.</b>			*	*	*				
<b>Branchiopoda</b>									
<b>Diplostraca: Daphnia sp.</b>									

KNP, KN, KE, KS and KW respectively represent the northeastern wastewater discharge pipeline, north-eastern, eastern, southern and western shores. H1, H2, H3 and H4 respectively represent the northeastern wastewater discharge shore, southeast, southwest and northwest shores.

\*present,

\*\*prominently present.

**Table 4. Occurrence of Meiofauna species at Abu-Nakhla and Abu-Hamour ponds during January 2001.**

	Abu-Nakhla Pond					Abu-Hamour Pond			
	KNP	KN	KE	KS	KW	H1	H2	H3	H4
<b>PHYLUM Platyhelminthes:</b>									
<b>CLASS Turbellaria</b>									
<b>Rhabdocoela: Catenula sp.</b>									
<b>Tricladida: Planaria sp.</b>									
<b>PHYLUM Nematoda:</b>									
<b>Phasmodia: Phasmod sp.</b>			*	*	*			*	*
<b>PHYLUM Gastrotricha:</b>									
<b>Chaetonotida: Chaetonotid sp.</b>				*					
<b>PHYLUM Rotifera:</b>									
<b>Monogonta sp.</b>					*				
<b>PHYLUM Annelida:</b>									
<b>CLASS Oligochaeta:</b>									
<b>Haplotaxida:</b>									
<b>Enchytreus sp., Tubifex sp.</b>		*							*
<b>PHYLUM Arthropoda:</b>									
<b>Crustacea:</b>									
<b>Ostracoda: Podocopa sp.</b>				*					
<b>Copepoda:</b>									
<b>Harpacticoid sp.</b>	*				*			*	
<b>Cyclopoid sp.</b>	*								
<b>Cyclops sp.</b>									
<b>Branchiopoda</b>									
<b>Diplostraca: Daphnia sp.</b>									

KNP, KN, KE, KS and KW respectively represent the northeastern wastewater discharge pipeline, north-eastern, eastern, southern and western shores. H1, H2, H3 and H4 respectively represent the northeastern wastewater discharge shore, southeast, southwest and northwest shores.

\*present,

\*\*prominently present.

**Table 5. Occurrence of Meiofauna species at Abu-Nakhla and Abu-Hamour ponds during February 2001.**

	Abu-Nakhla Pond					Abu-Hamour Pond			
	KNP	KN	KE	KS	KW	H1	H2	H3	H4
<b>PHYLUM Platyhelminthes:</b>									
<b>CLASS Turbellaria</b>									
<b>Rhabdocoela: Catenula sp.</b>		**							
<b>Tricladida: Planaria sp.</b>									
<b>PHYLUM Nematoda:</b>									
<b>Phasmidia: Phasmid sp.</b>			*				**	*	*
<b>PHYLUM Gastrotricha:</b>									
<b>Chaetonotida: Chaetonotid sp.</b>									
<b>PHYLUM Rotifera:</b>									
<b>Monogonta sp.</b>					*				
<b>PHYLUM Annelida:</b>									
<b>CLASS Oligochaeta:</b>									
<b>Haplotaxida:</b>									
<b>Enchytreus sp., Tubifex sp.</b>		**	*		*			*	
<b>PHYLUM Arthropoda:</b>									
<b>Crustacea:</b>									
<b>Ostracoda: Podocopa sp.</b>			*				*		*
<b>Copepoda:</b>									
<b>Harpacticoid sp.</b>			*					**	**
<b>Cyclopoid sp.</b>			*					**	
<b>Cyclops sp.</b>				*	*				
<b>Branchiopoda</b>									
<b>Diplostraca: Daphnia sp.</b>									

KNP, KN, KE, KS and KW respectively represent the northeastern wastewater discharge pipeline, north-eastern, eastern, southern and western shores. H1, H2, H3 and H4 respectively represent the northeastern wastewater discharge shore, southeast, southwest and northwest shores.

\*present,

\*\*prominently present.



**Table 6. Occurrence of Meiofauna species at Abu-Nakhla and Abu-Hamour ponds during March 2001.**

	Abu-Nakhla Pond					Abu-Hamour Pond			
	KNP	KN	KE	KS	KW	H1	H2	H3	H4
<b>PHYLUM Platyhelminthes:</b>									
<b>CLASS Turbellaria</b>									
<b>Rhabdocoela: Catenula sp.</b>		*		*	*				
<b>Tricladida: Planaria sp.</b>									
<b>PHYLUM Nematoda:</b>									
<b>Phasmodia: Phasmod sp.</b>		*		*				*	*
<b>PHYLUM Gastrotricha:</b>									
<b>Chaetonotida: Chaetonotid sp.</b>									
<b>PHYLUM Rotifera:</b>									
<b>Monogonta sp.</b>			*	*					
<b>PHYLUM Annelida:</b>									
<b>CLASS Oligochaeta:</b>									
<b>Haplotaxida:</b>									
<b>Enchytreus sp., Tubifex sp.</b>		*	*	*	*				
<b>PHYLUM Arthropoda:</b>									
<b>Crustacea:</b>									
<b>Ostracoda: Podocopa sp.</b>			*	*	*				
<b>Copepoda:</b>									
<b>Harpacticoid sp.</b>				*	*			*	*
<b>Cyclopoid sp.</b>									
<b>Cyclops sp.</b>			*		*				
<b>Branchiopoda</b>									
<b>Diplostraca: Daphnia sp.</b>									

KNP, KN, KE, KS and KW respectively represent the northeastern wastewater discharge pipeline, north-eastern, eastern, southern and western shores. H1, H2, H3 and H4 respectively represent the northeastern wastewater discharge shore, southeast, southwest and northwest shores.

\*present,

\*\*prominently present.

**Table 7. Occurrence of Meiofauna species at Abu-Nakhla and Abu-Hamour ponds during April 2001.**

	Abu-Nakhla Pond					Abu-Hamour Pond			
	KNP	KN	KE	KS	KW	H1	H2	H3	H4
<b>PHYLUM Platyhelminthes:</b>									
<b>CLASS Turbellaria</b>									
<b>Rhabdocoela: Catenula sp.</b>									
<b>Tricladida: Planaria sp.</b>									
<b>PHYLUM Nematoda:</b>									
<b>Phasmidia: Phasmid sp.</b>			*	*	*			*	*
<b>PHYLUM Gastrotricha:</b>									
<b>Chaetonotida: Chaetonotid sp.</b>				*					
<b>PHYLUM Rotifera:</b>									
<b>Monogonta sp.</b>			*	*	*				
<b>PHYLUM Annelida:</b>									
<b>CLASS Oligochaeta:</b>									
<b>Haplotaxida:</b>									
<b>Enchytreus sp., Tubifex sp.</b>		*			*				
<b>PHYLUM Arthropoda:</b>									
<b>Crustacea:</b>									
<b>Ostracoda: Podocopa sp.</b>		*						*	
<b>Copepoda:</b>									
<b>Harpacticoid sp.</b>								**	**
<b>Cyclopoid sp.</b>									
<b>Cyclops sp.</b>				*	*				
<b>Branchiopoda</b>									
<b>Diplostraca: Daphnia sp.</b>									

KNP, KN, KE, KS and KW respectively represent the northeastern wastewater discharge pipeline, north-eastern, eastern, southern and western shores. H1, H2, H3 and H4 respectively represent the northeastern wastewater discharge shore, southeast, southwest and northwest shores.

\*present,

\*\*prominently present.

**Table 8. Occurrence of Meiofauna species at Abu-Nakhla and Abu-Hamour ponds during May 2001.**

	Abu-Nakhla Pond					Abu-Hamour Pond			
	KNP	KN	KE	KS	KW	H1	H2	H3	H4
<b>PHYLUM Platyhelminthes:</b>									
<b>CLASS Turbellaria</b>									
<b>Rhabdocoela: Catenula sp.</b>			*						
<b>Tricladida: Planaria sp.</b>			*						
<b>PHYLUM Nematoda:</b>									
<b>Phasmidia: Phasmid sp.</b>			**					*	*
<b>PHYLUM Gastrotricha:</b>									
<b>Chaetonotida: Chaetonotid sp.</b>									
<b>PHYLUM Rotifera:</b>									
<b>Monogonta sp.</b>				*					
<b>PHYLUM Annelida:</b>									
<b>CLASS Oligochaeta:</b>									
<b>Haplotaxida:</b>									
<b>Enchytreus sp., Tubifex sp.</b>			*	*	*			*	*
<b>PHYLUM Arthropoda:</b>									
<b>Crustacea:</b>									
<b>Ostracoda: Podocopa sp.</b>			*	*	*			*	
<b>Copepoda:</b>									
<b>Harpacticoid sp.</b>								*	*
<b>Cyclopoid sp.</b>									
<b>Cyclops sp.</b>				*	*				
<b>Branchiopoda</b>									
<b>Diplostraca: Daphnia sp.</b>									

KNP, KN, KE, KS and KW respectively represent the northeastern wastewater discharge pipeline, north-eastern, eastern, southern and western shores. H1, H2, H3 and H4 respectively represent the northeastern wastewater discharge shore, southeast, southwest and northwest shores.

\*present,

\*\*prominently present.

**Table 9. Occurrence of Meiofauna species at Abu-Nakhla and Abu-Hamour ponds during June 2001.**

	Abu-Nakhla Pond					Abu-Hamour Pond			
	KNP	KN	KE	KS	KW	H1	H2	H3	H4
<b>PHYLUM Platyhelminthes:</b>									
<b>CLASS Turbellaria</b>									
<b>Rhabdocoela: Catenula sp.</b>		*						*	*
<b>Tricladida: Planaria sp.</b>		*							
<b>PHYLUM Nematoda:</b>									
<b>Phasmodia: Phasmod sp.</b>				*	*			*	*
<b>PHYLUM Gastrotricha:</b>									
<b>Chaetonotida: Chaetonotid sp.</b>									
<b>PHYLUM Rotifera:</b>									
<b>Monogonta sp.</b>				*	*				
<b>PHYLUM Annelida:</b>									
<b>CLASS Oligochaeta:</b>									
<b>Haplotaxida:</b>									
<b>Enchytreus sp., Tubifex sp.</b>				*	*				
<b>PHYLUM Arthropoda:</b>									
<b>Crustacea:</b>									
<b>Ostracoda: Podocopa sp.</b>			*		*			*	
<b>Copepoda:</b>									
<b>Harpacticoid sp.</b>			*					*	*
<b>Cyclopoid sp.</b>			*	*					*
<b>Cyclops sp.</b>									
<b>Branchiopoda</b>									
<b>Diplostraca: Daphnia sp.</b>									

KNP, KN, KE, KS and KW respectively represent the northeastern wastewater discharge pipeline, north-eastern, eastern, southern and western shores. H1, H2, H3 and H4 respectively represent the northeastern wastewater discharge shore, southeast, southwest and northwest shores.

\*present,

\*\*prominently present.

**Table 10. Occurrence of Meiofauna species at Abu-Nakhla and Abu-Hamour ponds during July 2001.**

	Abu-Nakhla Pond					Abu-Hamour Pond			
	KNP	KN	KE	KS	KW	H1	H2	H3	H4
<b>PHYLUM Platyhelminthes:</b>									
<b>CLASS Turbellaria</b>									
<b>Rhabdocoela: Catenula sp.</b>									
<b>Tricladida: Planaria sp.</b>				*	*				
<b>PHYLUM Nematoda:</b>									
<b>Phasmodia: Phasmod sp.</b>		*	*		*			*	*
<b>PHYLUM Gastrotricha:</b>									
<b>Chaetonotida: Chaetonotid sp.</b>									
<b>PHYLUM Rotifera:</b>									
<b>Monogonta sp.</b>									
<b>PHYLUM Annelida:</b>									
<b>CLASS Oligochaeta:</b>									
<b>Haplotaxida:</b>									
<b>Enchytreus sp., Tubifex sp.</b>									
<b>PHYLUM Arthropoda:</b>									
<b>Crustacea:</b>									
<b>Ostracoda: Podocopa sp.</b>									
<b>Copepoda:</b>									
<b>Harpacticoid sp.</b>			*					*	
<b>Cyclopoid sp.</b>			*	*					*
<b>Cyclops sp.</b>									
<b>Branchiopoda</b>									
<b>Diplostraca: Daphnia sp.</b>									

KNP, KN, KE, KS and KW respectively represent the northeastern wastewater discharge pipeline, north-eastern, eastern, southern and western shores. H1, H2, H3 and H4 respectively represent the northeastern wastewater discharge shore, southeast, southwest and northwest shores.

\*present,

\*\*prominently present.

**Table 11. Occurrence of Meiofauna species at Abu-Nakhla and Abu-Hamour ponds during August 2001.**

	Abu-Nakhla Pond					Abu-Hamour Pond			
	KNP	KN	KE	KS	KW	H1	H2	H3	H4
<b>PHYLUM Platyhelminthes:</b>									
<b>CLASS Turbellaria</b>									
<b>Rhabdozoela: Catenula sp.</b>									
<b>Tricladida: Planaria sp.</b>									
<b>PHYLUM Nematoda:</b>									
<b>Phasmidia: Phasmid sp.</b>				*	*			*	*
<b>PHYLUM Gastrotricha:</b>									
<b>Chaetonotida: Chaetonotid sp.</b>									
<b>PHYLUM Rotifera:</b>									
<b>Monogonta sp.</b>									
<b>PHYLUM Annelida:</b>									
<b>CLASS Oligochaeta:</b>									
<b>Haplotaxida:</b>									
<b>Enchytreus sp., Tubifex sp.</b>									
<b>PHYLUM Arthropoda:</b>									
<b>Crustacea:</b>									
<b>Ostracoda: Podocopa sp.</b>									
<b>Copepoda:</b>									
<b>Harpacticoid sp.</b>			*		*				*
<b>Cyclopoid sp.</b>									
<b>Cyclops sp.</b>									
<b>Branchiopoda</b>									
<b>Diplostraca: Daphnia sp.</b>									

KNP, KN, KE, KS and KW respectively represent the northeastern wastewater discharge pipeline, north-eastern, eastern, southern and western shores. H1, H2, H3 and H4 respectively represent the northeastern wastewater discharge shore, southeast, southwest and northwest shores.

\*present,

\*\*prominently present.

**Table 12. Occurrence of Meiofauna species at Abu-Nakhla and Abu-Hamour ponds during September 2001.**

	Abu-Nakhla Pond					Abu-Hamour Pond			
	KNP	KN	KE	KS	KW	H1	H2	H3	H4
<b>PHYLUM Platyhelminthes:</b>									
<b>CLASS Turbellaria</b>									
<b>Rhabdocoela: Catenula sp.</b>		*							
<b>Tricladida: Planaria sp.</b>									
<b>PHYLUM Nematoda:</b>									
<b>Phasmidia: Phasmid sp.</b>			*		*			*	*
<b>PHYLUM Gastrotricha:</b>									
<b>Chaetonotida: Chaetonotid sp.</b>		*		*					
<b>PHYLUM Rotifera:</b>									
<b>Monogonta sp.</b>									
<b>PHYLUM Annelida:</b>									
<b>CLASS Oligochaeta</b>									
<b>Haplotaxida:</b>		*		*					
<b>Enchytreus sp., Tubifex sp.</b>		*			*				
<b>PHYLUM Arthropoda:</b>									
<b>Crustacea:</b>									
<b>Ostracoda: Podocopa sp.</b>									
<b>Copepoda:</b>									
<b>Harpacticoid sp.</b>				*	*			*	*
<b>Cyclopoid sp.</b>									
<b>Cyclops sp.</b>									
<b>Branchiopoda</b>									
<b>Diplostraca: Daphnia sp.</b>									

KNP, KN, KE, KS and KW respectively represent the northeastern wastewater discharge pipeline, north-eastern, eastern, southern and western shores. H1, H2, H3 and H4 respectively represent the northeastern wastewater discharge shore, southeast, southwest and northwest shores.

\*present,

\*\*prominently present.

**Table 13. Occurrence of Meiofauna species at Abu-Nakhla and Abu-Hamour ponds during October 2001.**

	Abu-Nakhla Pond					Abu-Hamour Pond			
	KNP	KN	KE	KS	KW	H1	H2	H3	H4
<b>PHYLUM Platyhelminthes:</b>									
<b>CLASS Turbellaria</b>									
<b>Rhabdozoela: Catenula sp.</b>		*							
<b>Tricladida: Planaria sp.</b>									
<b>PHYLUM Nematoda:</b>									
<b>Phasmodia: Phasmod sp.</b>		*		*	*			*	
<b>PHYLUM Gastrotricha:</b>									
<b>Chaetonotida: Chaetonotid sp.</b>									
<b>PHYLUM Rotifera:</b>									
<b>Monogonta sp.</b>									
<b>PHYLUM Annelida:</b>									
<b>CLASS Oligochaeta:</b>									
<b>Haplotaxida:</b>		*		*					
<b>Enchytreus sp., Tubifex sp.</b>		*			*				
<b>PHYLUM Arthropoda:</b>									
<b>Crustacea:</b>									
<b>Ostracoda: Podocopa sp.</b>									
<b>Copepoda:</b>									
<b>Harpacticoid sp.</b>			*		*			**	**
<b>Cyclopoid sp.</b>									
<b>Cyclops sp.</b>									
<b>Branchiopoda</b>									
<b>Diplostraca: Daphnia sp.</b>									

KNP, KN, KE, KS and KW respectively represent the northeastern wastewater discharge pipeline, northeastern, eastern, southern and western shores. H1, H2, H3 and H4 respectively represent the northeastern wastewater discharge shore, southeast, southwest and northwest shores.

\*present,

\*\*prominently present.



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