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REPUBLIC OF NAMIBIA  
DEPARTMENT OF WATER AFFAIRS  
MINISTRY OF AGRICULTURE, WATER AND RURAL DEVELOPMENT

MEMORANDUM

THE DISTRIBUTION OF FRESHWATER SNAILS IN THE OMUSATI REGION OF  
NAMIBIA WITH SPECIAL REFERENCE TO DISEASE CARRYING SPECIES;  
SURVEY REPORT.

Deputy Permanent Secretary  
Department of Water Affairs

Private Bag 13193  
Windhoek

Compiled by: N. V. Clarke  
Ecological Research Section

Water Environment Division

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# THE DISTRIBUTION OF FRESHWATER SNAILS IN THE OMUSATI REGION OF NAMIBIA WITH SPECIAL REFERENCE TO DISEASE CARRYING SPECIES; SURVEY REPORT.

## 1 Introduction

Recent reports by Curtis (1995, 1996) document the distribution of freshwater snails which act as intermediate hosts to trematode parasites of man and livestock in the Omusati region (see figure 1 for a map of the area). The snails of importance are *Bulinus globosus* (Bilharzia vector) and *Lymnaea natalensis* (livestock liverfluke vector). Surveys of school children living near Olushandja Dam conducted by the Ministry of Health and Social Services found a high incidence of urinary bilharzia. Ombalantu hospital statistics reveal an increase in the number of confirmed cases, from 54 in 1994, 107 in 1995, to 166 in 1996. Control measures recommended included a co-ordinated programme between Ministries to restrict access to high risk areas, clear vegetation and snails from designated access points and to continue monitoring snails populations. Ombalantu regional health sub-committee have also recommended the spread of information in the community as well as clean drinking water and toilet facilities (26 Feb 1997).

## 2 Aims

This memorandum presents the results of follow-up surveys to monitor snail populations at Olushandja Dam, associated canals and reservoirs, and other water bodies in the locality as part of the recommendations by Curtis (1996). Records of all snail species found and notes on vegetation provide habitat information that may influence snail distribution.

## 3 Fieldwork

Olushandja Dam was visited on several occasions and the snail fauna sampled using a large pool net. The associated canals (Olushandja-Ogongo-Oshakati, Etaka) and reservoirs (Ogongo) were also sampled. About half an hour was spent at each site to provide semi-quantitative data and numbers have been doubled to give snails per man-hour as in Curtis (1995). The results are shown in Table 1. Disease carrying species are printed in bold.

**Table 1**

Date	Site	Snail species	No.	Vegetation, % cover
29.09.96	Etaka canal - Okahau	<i>Bulinus depressus</i>	2	little vegetation
19.11.96	Etaka canal - Okahau	<i>Bulinus depressus</i>	2	little vegetation
04.02.97	Etaka canal - Okahau	NO SNAILS		little vegetation
11.03.97	Ogongo Sump Dam	<i>Bulinus depressus</i>	2	<i>Lagarosiphon</i> 40%
11.03.97	Ogongo Emergency Dam	NO SNAILS		little vegetation
11.03.97	Ogongo concrete canal	NO SNAILS		
11.03.97	Ogongo earth canal	<i>Pila occidentalis</i>	20	grass & sedge 30%
		<i>Bulinus scalaris</i>	8	
		<i>Bulinus depressus</i>	8	
23.11.96	Olushandja, NE	NO SNAILS		no fringing plants
17.01.97	Olushandja	no samples taken		no fringing plants
12.03.97	Olushandja, NE corner	<i>Pila occidentalis</i>	2	<i>C. imbricatus</i> 60%
		<i>Bellamyia monardi</i>	2	<i>C. articulatus</i> 10%
		<i>Bulinus globosus</i>	4	<i>L. stolonifera</i> 15%
		<i>Bulinus depressus</i>	12	
12.03.97	Olushandja, N pumps	NO SNAILS		rocks only
12.03.97	Olushandja, N inflow	<i>Bellamyia monardi</i>	2	<i>C. imbricatus</i> 15%
		<i>Bulinus globosus</i>	6	<i>C. corymbosa</i> 5%
		<i>Bulinus depressus</i>	20	<i>L. stolonifera</i> 15%
				<i>P. pectinatus</i> 10%
12.03.97	Olushandja, NW,300 m S	<i>Pila occidentalis</i>	2	<i>C. imbricatus</i> 50%
		<i>Lymnaea natalensis</i>	16	<i>L. stolonifera</i> 40%
		<i>Bulinus globosus</i>	4	Composite 7 10%
		<i>Bulinus depressus</i>	10	
12.03.97	Olushandja, W Eunda	<i>Lymnaea natalensis</i>	4	<i>L. stolonifera</i> 70%
		<i>Bulinus depressus</i>	2	<i>C. imbricatus</i> 20%
				other sedges 10%
12.03.97	Olushandja, SW	NO SNAILS		flooded grass 70%
				<i>L. stolonifera</i> 10%
12.03.97	Olushandja, S outflow	<i>Bulinus depressus</i>	2	<i>T. capensis</i> 50%
12.03.97	Etaka canal, below dam	<i>Bulinus depressus</i>	34	<i>Lagarosiphon</i> 30%
		<i>Bulinus tropicus</i>	10	<i>L. stolonifera</i> 5%
				sedge 16 5%

The Principal Medical Officer of Ombalantu region, Dr Amutenya, stated that Mahanene clinic has recorded the greatest number of cases of Bilharzia. It was therefore decided to survey this area in more detail. This was done on 6 May 1997 with Dr Amutenya and Mr P. J. Naholo from the Health Inspectorate, Oshakati. Further surveys of Mahanene Experimental Farm dams and oshanas were continued on 19 May 1997. Results are given in Table 2. Vector species are printed in bold.

**Table 2**

Date	Site	Snail species	Vegetation
06.05.97	<b>1.</b> west of Olupaka S 17 28 29/E 14 50 29		
	(a) concrete canal	no snails	<i>Lagarosiphon</i>
	(b) culvert pool	<i>Pila occidentalis</i> <i>Bulinus depressus</i> <i>Bulinus scalaris</i>	<i>Ottelia exserta</i> <i>Utricularia</i> grasses
	<b>2.</b> west of Mahanene, canal S 17 26 39/E 14 43 17	no snails	<i>Lagarosiphon</i> <i>Potamogeton pectinatus</i>
	<b>3.</b> Omindaba, near Olushangja S 17 26 31/E 14 39 43		
	(a) oshana pool	no snails	grasses, few <i>Ludwigia</i>
	(b) omdombe (deeper pool)	<i>Pila occidentalis</i> <i>Bulinus scalaris</i>	sedges <i>Nymphaea capensis</i>
	<b>4.</b> Olushandja Dam, north wall		
	(a) exit canal	no snails	no weed
	(b) north east corner	<b><i>Bulinus globosus</i></b> <b><i>Lymnaea natalensis</i></b>	<i>Ludwigia</i> sedges
	(c) inflow	<b><i>Bulinus globosus</i></b>	<i>Ludwigia</i> , sedges
	<b>5.</b> Olushandja Dam, south wall south east corner	<b><i>Lymnaea natalensis</i></b>	<i>Ludwigia</i> , sedges
19.05.97	<b>1.</b> Mahanene Experimental Farm, S 17 26 51/E 14 47 07		
	(a) concrete canal	no snails	<i>Lagarosiphon</i> <i>Potamogeton pectinatus</i>
	(b) storage dam	no snails	no weed
	(c) fish ponds	<i>Bulinus depressus</i> <i>Bulinus scalaris</i>	<i>Ludwigia</i> sedges
	<b>2.</b> oshana pool S 17 24 54/E 14 47 35	<i>Pila occidentalis</i>	sedges, grasses
	<b>3.</b> oshana pool S 17 23 41/E 14 47 57	<i>Pila occidentalis</i> <i>Bulinus depressus</i>	sedges, grasses <i>Nymphaea capensis</i>

#### 4 Discussion

The results for Olushandja Dam show a similar distribution of snails to that of March 1995 (Curtis 1995). However snail numbers are generally lower. This may be due to the less developed growth of the floating weed *Ludwigia stolonifera*, which is the favoured snail habitat, especially for the vector species *Bulinus globosus* and *Lymnaea natalensis*. It is interesting that in the dry season there is a die back of fringing vegetation perhaps due to lower water levels and increased grazing and trampling by livestock. This results in very low numbers of snails which then gradually build up as the vegetation regenerates. The north wall of the dam was still clear of *Ludwigia* on 12 March 1997 while the margins had vigorous new growth of this plant. The optimum time for vegetation clearance at designated access points may therefore be in March after regeneration has started but before peak biomass is reached.

Large specimens of the snail *Bellamya monardi* were found at two sites in the northern end of Olushandja Dam. This species was not reported in the dam by Curtis in 1995, only in the Calueque-Olushandja canal. The presence of this Kunene River species in the dam demonstrates how molluscs can spread between connected water bodies.

None of the associated water systems (canals, and reservoirs at Ogongo and Mahanene) were found to contain vector snail species. None of the pools or oshanas studied in the Cuvelai have been found to contain vector snails.

The fact that Bilharzia is on the increase suggests that the new water infrastructure is spreading infection as traditionally the parasite was unknown in the region. It is recognised that Olushandja Dam contains the vector snail for Bilharzia and mitigating measures have been recommended (Curtis 1996). However Mahanene clinic (15 km east of Olushandja) reports the largest numbers of Bilharzia cases and the patients say that they take their water directly from the concrete canal and do not visit Olushandja Dam. This implies that Bilharzia cercaria occur in the canal water.

The water in the canal comes directly from Calueque, with some water removed and purified at Olushandja to be piped to Tsandi, and some allowed to overflow into Olushandja Dam. This means the water going past Mahanene has travelled for 39 km (Calueque-Olushandja 24km, Olushandja-Mahanene 15 km) with an average speed of 1 km/hour. The maximum life span of the cercaria is 48 hours (Curtis 1996), so there is a possibility of them reaching Mahanene. This is an unusual situation as Bilharzia infection is normally associated with slow moving polluted water containing vector snails and further investigation is required.

Memorandum compiled by: Dr. N.V. Clarke

## 5 Recommendations

5.1 Investigate a practical method of testing for cercaria in water and this should be carried out at intervals along the Calueque-Oshakati canal. **Water Environment**

5.2 A survey of snails at the water intake area for the canal at Calueque should be made and the current status of Bilharzia around Calueque assessed if possible (also recommended in Curtis 1996). May and June would be the optimum survey months when snails are abundant. **Water Environment**

5.3 Careful clinical records are needed to confirm cases of Bilharzia (eggs present in urine samples) and information is needed about which water sources Bilharzia patients have used and when. A questionnaire should be prepared for use by the medical staff and clinics in the area. **Water Environment**

5.4 The mitigation measures recommended for Olushandja Dam (Curtis 1996), should be implemented. These included restricting access to the north section, weed clearance at access points, and an alternative clean water supply to people in the area. As a starting point, signs explaining the health hazard should be posted at the north wall. **Namwater**

## 6 Approval of Recommendations

**This report is recommended for submission to the Director: Resource Management.**

  
**DEPUTY DIRECTOR: WATER ENVIRONMENT**

**DATE: 22/7/97**

**This report is approved/~~not approved~~.**

  
**DIRECTOR: ~~RESOURCE~~ MANAGEMENT**

**DATE: 27/7/97**

## 7 References

Curtis, B. A. (1995) Investigation into the distribution of freshwater snails and snail-borne diseases associated with the Calueque-Olushandja Water Supply Network in the Omusati and Oshana regions of Namibia. Part of the Socio-ecological survey of Calueque-Olushandja Water Supply Network. Water Affairs report, file 20/4/1/7/2.

Curtis, B. A. (1996) Assessment of the extent of Bilharzia infection in the Omusati region of Namibia and suggestions on what measures the Department of Water Affairs can take to control this disease. Water Affairs report RR/96/3.

Clarke, N. V. (1996) Environmental Research Proposals for the Cuvelai Drainage Basin. Water Affairs Memo No RM/96/9.

