water & forestry

Department:
Water Affairs and Forestry
REPUBLIC OF SOUTH AFRICA

Summer 2009 – Tyolomnqa River Assessment

Prepared for
Department of Water Affairs and Forestry
Resource Protection
East London Region

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23 April 2009

INTRODUCTION AND BACKGROUND

This was the completion of the season cycle of the monitoring of the Tyolomnqa River System. After this report, the seasonal trends of this system will be compiled. The team that conducted biomonitoring from 19-21 January 2009 (together with Gonubie) was composed of L. Gaulana, M. Rubuxa, U. Tshayingca, E. Weni and the late X. Gwadana

The Tyolomnqa drainage basin is one of the smallest catchments located along the eastern coast of South Africa. It has only one Level I Ecoregion; the Eastern Coastal Belt and only two major Quaternary catchments: R40B and R40C (information adapted from GIS coverage: Resource Quality Services). The Tyolomnqa River starts from an altitude of approximately 500 meters above sea level (see figure 1 below). Using 1:50 000 topographic maps and 1: 250 000 topocadastrial maps it can be estimated that the Tyolomnqa River catchment has the area less than 640 square kilometers The mainstem of the drainage basin originates as two branches; the Qugwala River in the West and the Mtyolo River in the East and it becomes the Tyolomnqa River at the confluence. Major tributaries of the Tyolomnqa River are the Nyatyora, Nxwashu, Rode, Twecu and Quru, Tsaba and Mpintso rivers. The Tyolomnqa River is one of the shortest rivers along the eastern coast of South Africa and is located in the former Ciskei political region. The figure below shows the terrain of the Tyolomnqa River Basin from source to mouth.

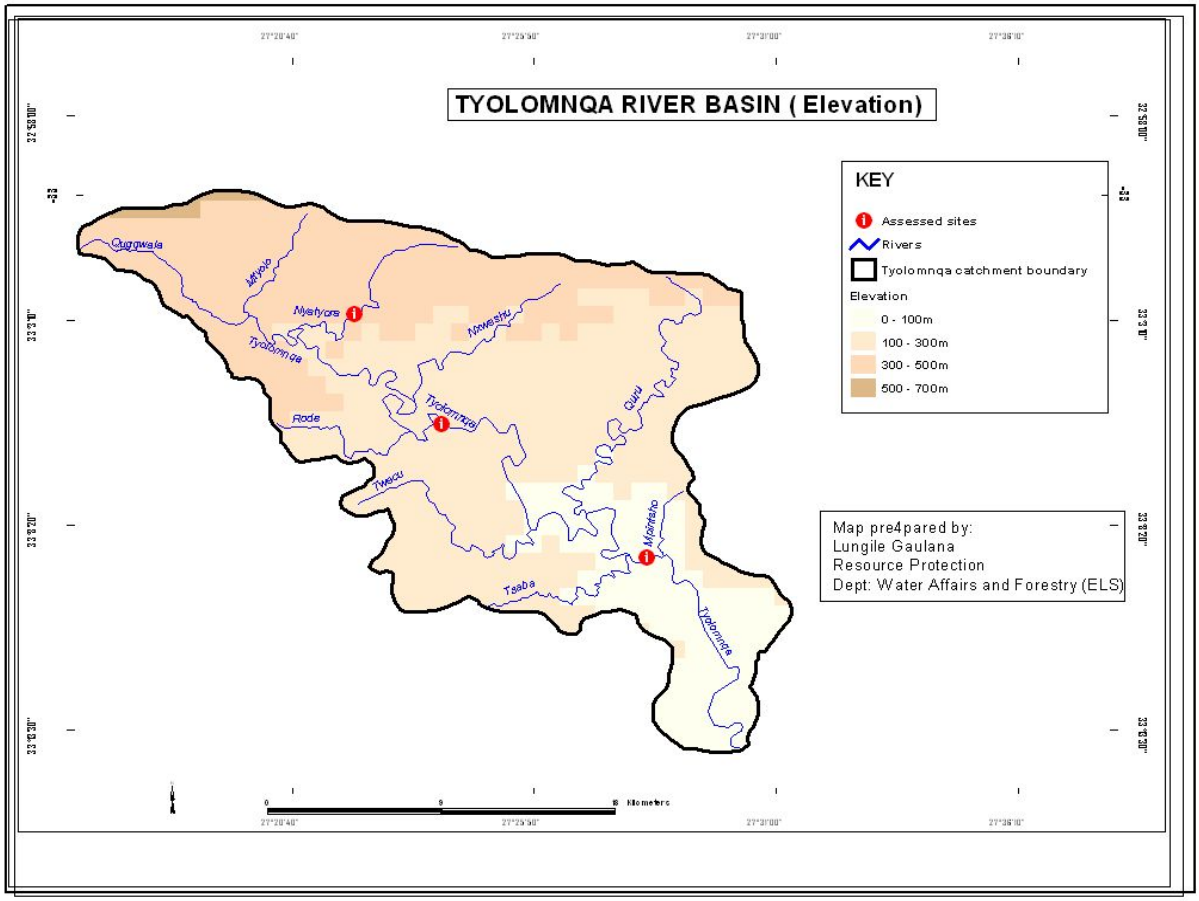

Figure 1: Elevation of the Tyolomnqa River system (GIS coverage: RQS, DWAF).

Climate

As it is affected by the warm Mozambique Current of the Indian Ocean, the Tyolomnqa River Basin is characterized by mean annual temperature of about 16 to 20°C (GIS coverage, DWAF: RQS). The Tyolomnqa River catchment receives its rainfall mainly in the late summer (around February: see figure below).

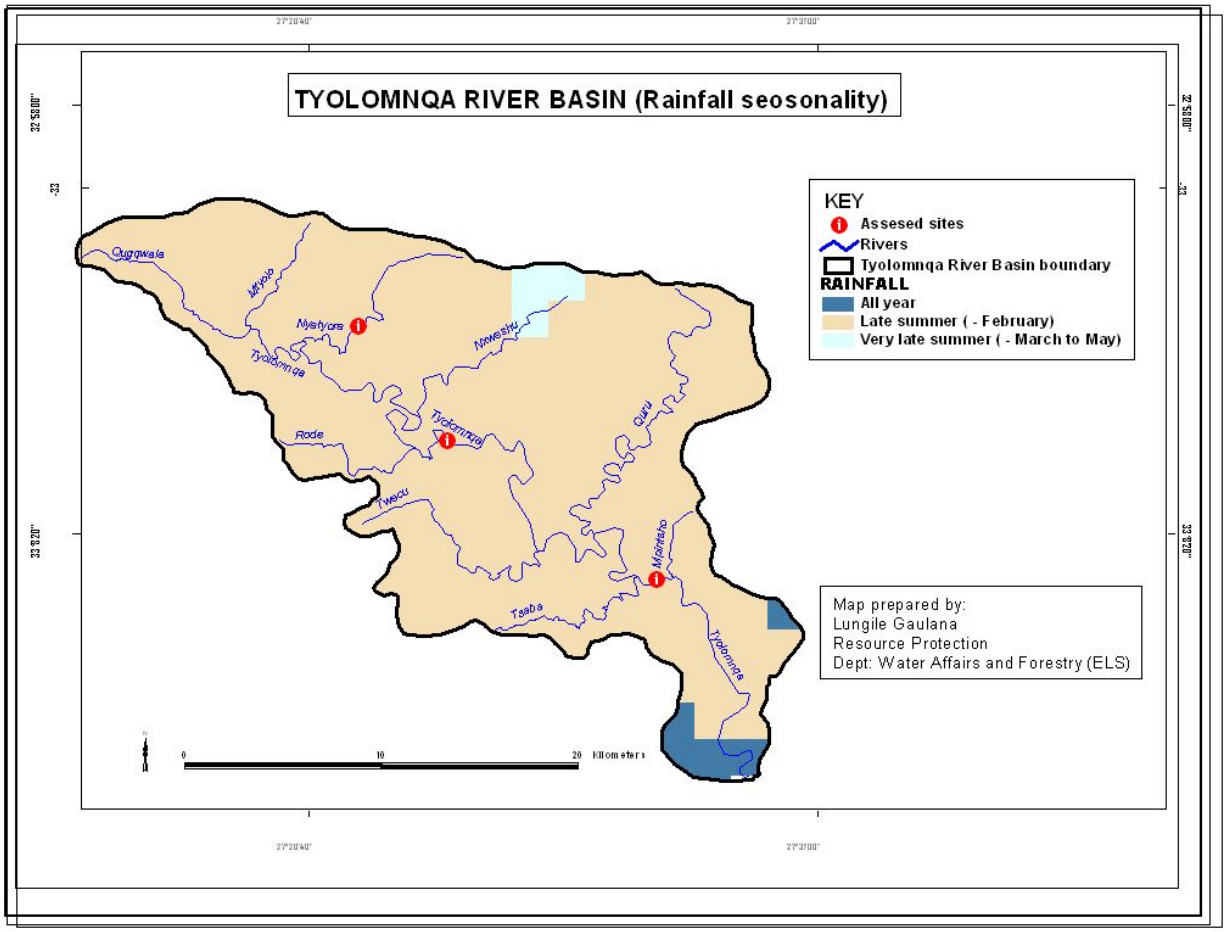

Figure 2. Rainfall seasons of Tyolomnqa River Basin (After GIS coverage: RQS, DWAF).

Geology and Soils

Properties of the Tyolomnqa River catchment (geology and soils) consists of sandstones and mudstones, that is, both the Adelaide and the Tarkastad Formations consist of sandstones and mudstones. However, the Adelaide Supergroup comprises of mostly of lithofeldspathic sandstones while the Tarkastard has sandstone and red colored sandstone (www.waterinformation.co.za). This means that the latter is rich in iron cations in the form of iron oxide.

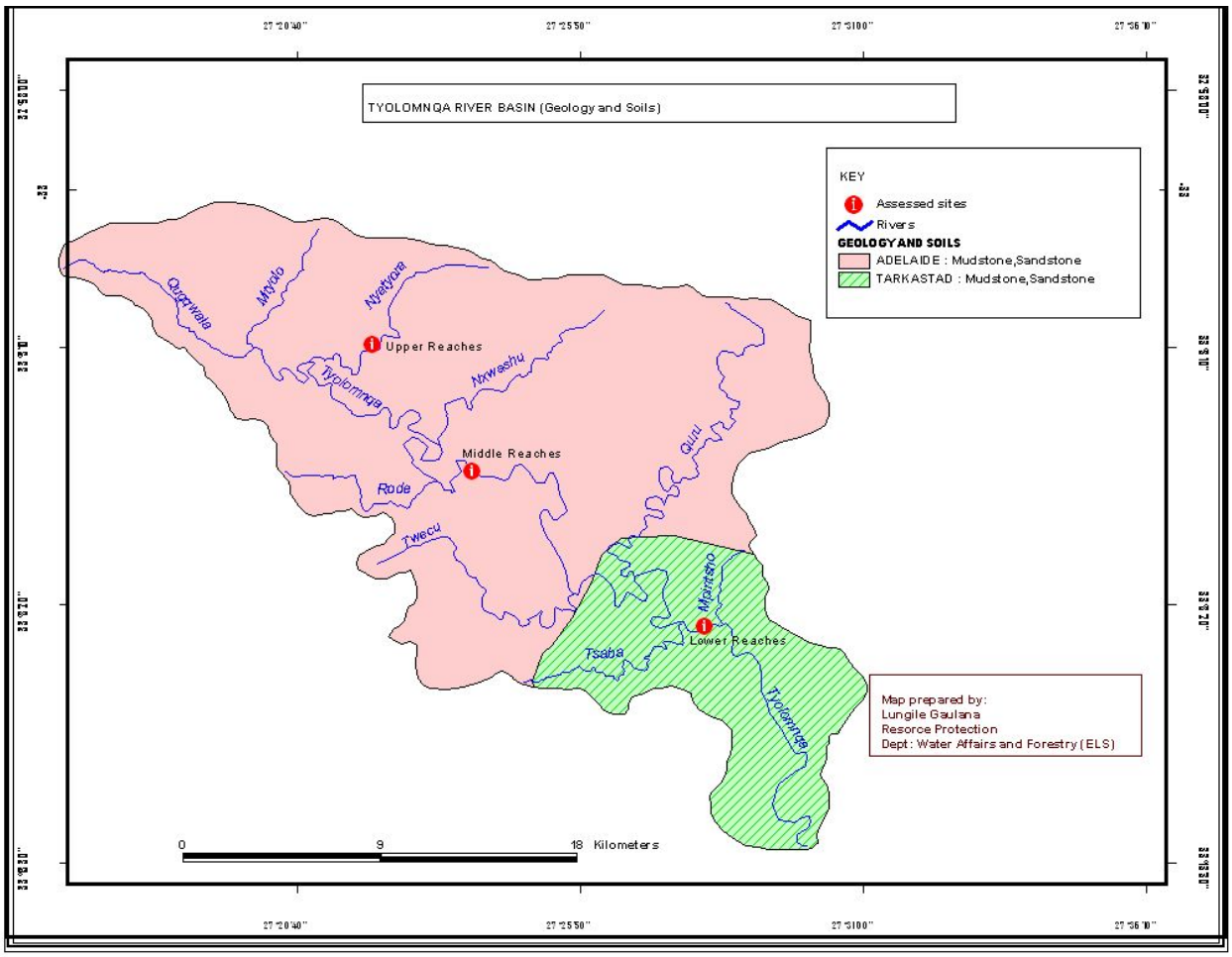

Figure 3. Geology and soils of the Tyolomnqa River Basin

The Natural Vegetation.

The vegetation of any drainage region is basically determined by two major physical properties: climate and soil type. Therefore the geology and soils (above) together with the vicinity of the Tyolomnqa drainage basin closer to the sea in the Southern Hemisphere determines the vegetation types of that region. As a result about 65 percent of the Tyolomnqa River catchment consists of coastal grasslands and coastal forests.

The rest of the area has valley thicket, Eastern Thorn Bushveld, Afromontane Forest and some Dune Thicket along the coast (see figure 4 below).

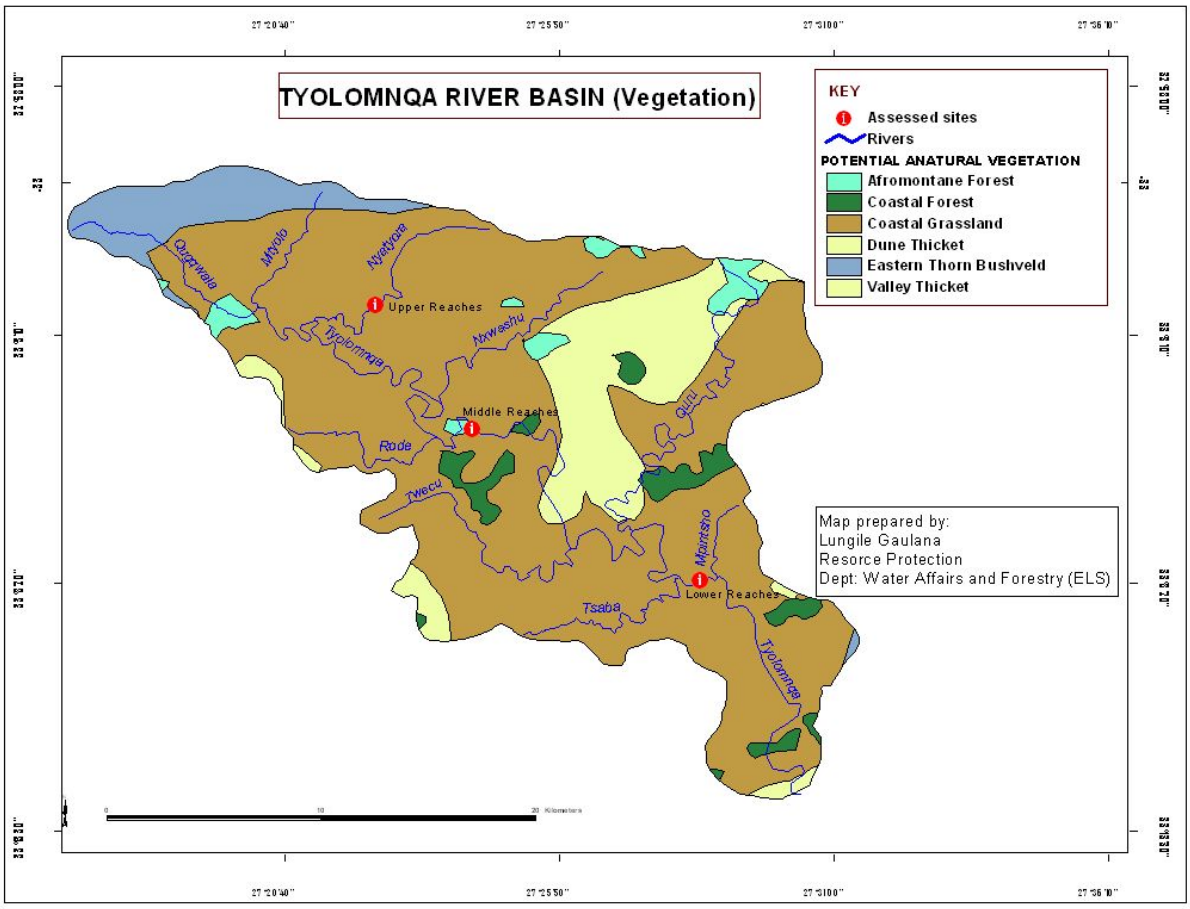

Figure 4: Vegetation of the Tyolomnqa River Basin (After Louw and Rebelo 1998).

Major Land Use Activities

Evidence of landuse activities observed (and 1: 50 000) in the Tyolomnqa River Basin include the following:

- Subsistence farming, though most the fields were no longer under cultivation.
- Different settlement patterns, both rural and urban.
- It could be noticed that most of the land in the catchment is unimproved and degraded grassland. The figure below demonstrates the landuse map of the Tyolomnqa River Basin.

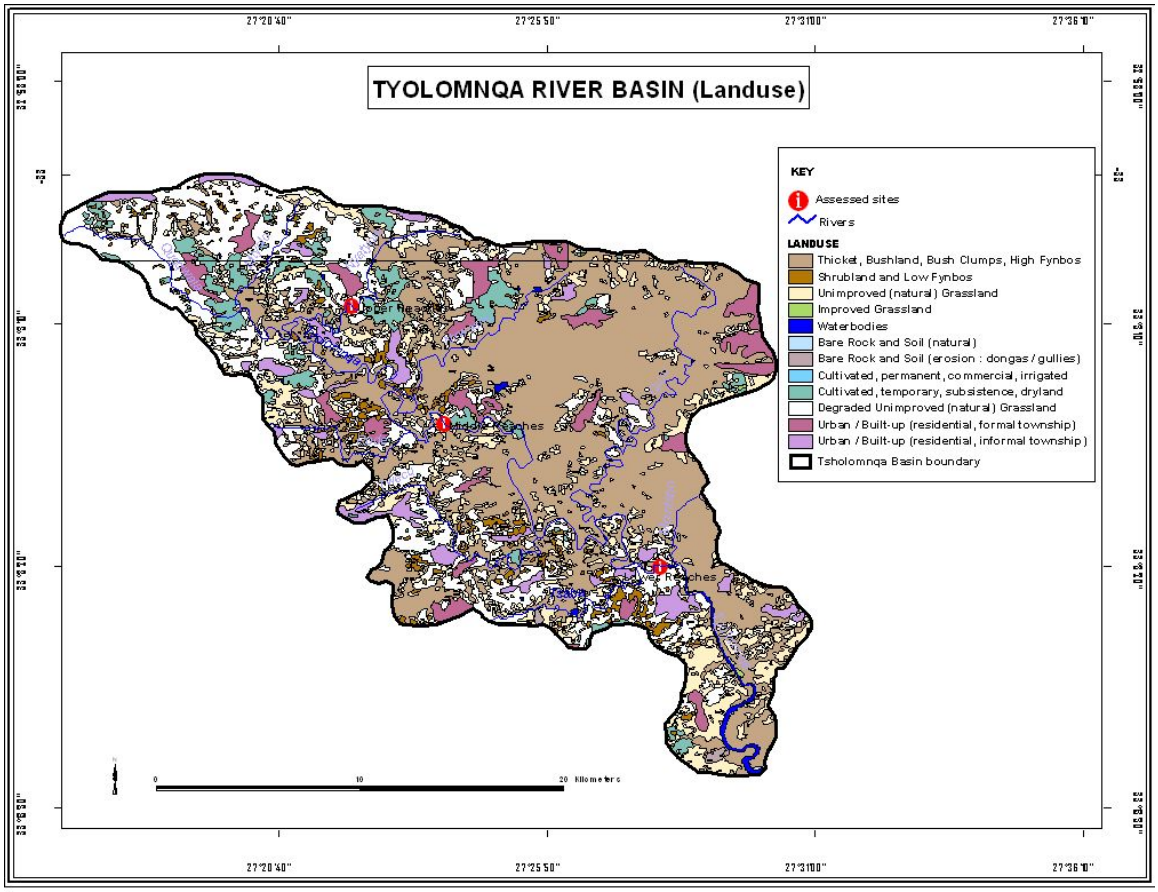

Figure 5 Landuse of the Tyolomnqa River Basin (Adapted from Nlc2000 GIS Coverage: RQS).

COURSE OF THE SURVEY

Tyolomnqa Upper Reaches

The site is located at an incised channel with flood benches. Therefore beside the sediment from upstream, the sediment from the hillslope can be trapped only on flood benches before it reaches the river channel. The river at a reach is a single thread, straight, pool-rapid and a mixed channel dominated by bedrock and boulders. Step pools were evident of which those could be considered as refugia for aquatic flora and fauna during times of stress (mainly drought). It has about 54% of morphological units described on the Geomorphological Assessment Index (After Du Preez and Rowntree, in press). The Geomorphological Assessment Index (GAI) model shows that the site is at D class in terms of its present geomorphological state. Sediment sampling could not be

done due to the site's fluvial morphological state of fixed boulder and bedrock material as well as no flows.

Tyolomnqa Middle Reaches

The flood plain is confined on one side in the river reach at a site. Therefore the sediment from hillslope in the form of colluvium can be trapped alternatively on both the left and right river banks. The river at a reach is a single thread, straight, pool-riffle. The dominant floor type at a reach scale is sand. Only 29% of morphological units could be observed. Shallow pools were the only refugia for aquatic biota.

The Geomorphological Assessment Index (GAI) model shows that the site is at C/D class in terms of its present geomorphological state. Sediment sampling was done at a site. The results are shown in the figure below.

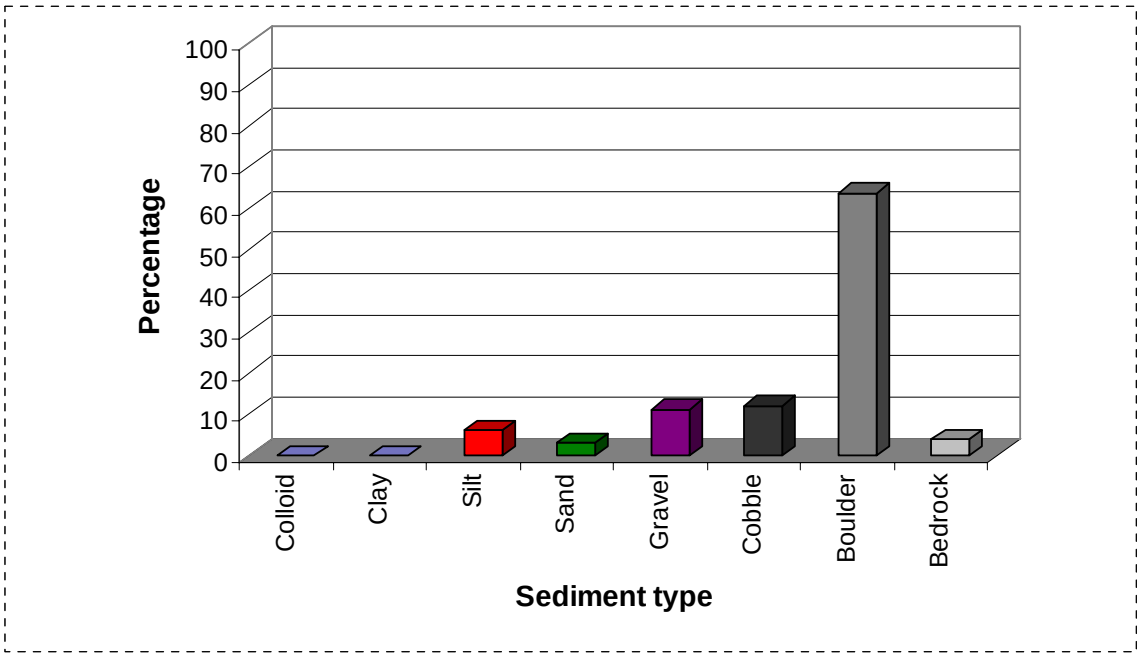

Figure 6 :Showing the sediment distribution across the river at middle reaches.

Tyolomnqa Lower Reaches

The site is located in an incised channel with flood benches. The river at a reach is a single thread, straight, pool-riffle system. This means that no alternate erosion and deposition can be expected on river banks. In other words, deposition could occur on the river bed. It is a mixed channel with fixed boulders and cobbles. About 38% of

morphological units could be observed. Deep pools, backwaters and shallow pools could serve as refugia for aquatic biota, as well domestic water supply to the adjacent settlements. Two dams upstream of a site could have a tremendous impact on a river system in terms of environmental flows. These dams are in the Tyolomnqa River and its tributatry; the Tsaba River.

The Geomorphological Assessment Index (GAI) model shows that the site is at A/B class in terms of its present geomorphological state. No sediment sampling was done at a site due to its fixed boulder and bedrock nature.

SASS – INVERTEBRATES

Sampling of the invertebrates was not conducted due to the absence of flows, let alone the water at the middle reaches

FISH

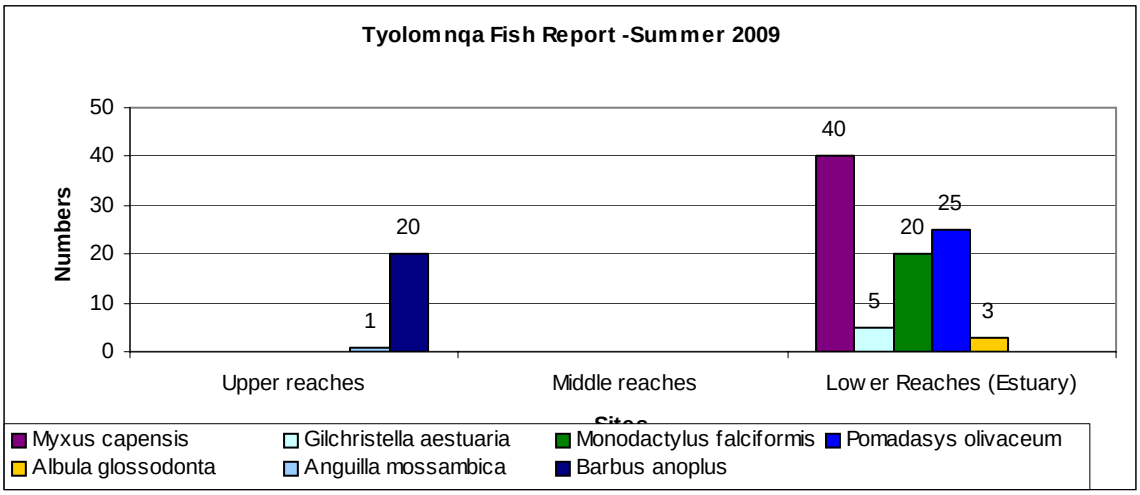

Fig 7: Illustrating fish distribution within the Chalumna system in Summer 2009.

Site 1: Tyolomnga upper reaches

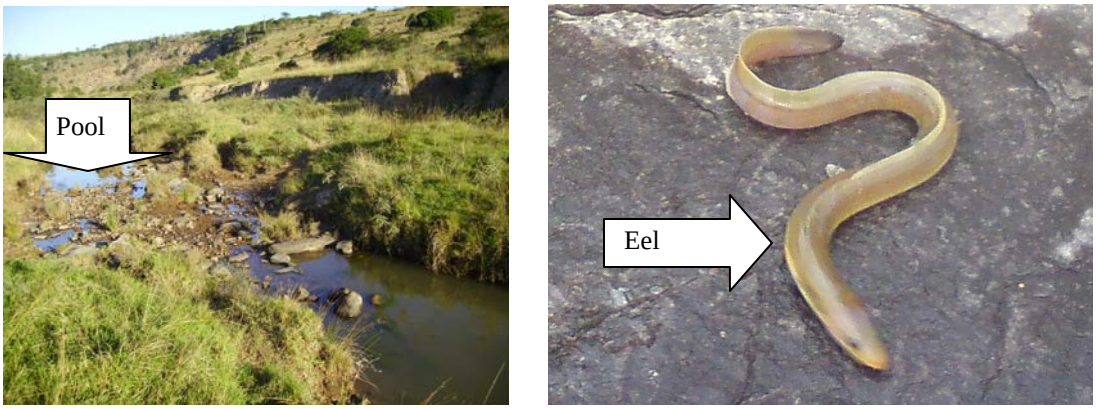

Plate 1:Upper reaches of the (a) and an eel (*Anguilla mossambica*) (b) caught from this site.

During the time of site visit, there was no flow of the river, only three significant pools upstream of where we usually sample the fish. The absence of flows was a result of dry season. From these pools we caught the indigenous fish, *Barbus anoplus* and *Anguilla mossambica* (eel). The FFI indicates that the site is in **C** class, implying a modified habitat.

Site 2: Tyolomnga middle reaches

During the time of site assessment the river was completely dry (see plate 2), due to the absence of rain. That implies that there was no sampling in this site.

Plate 2: Dry riverbed in middle reaches of the river in Summer 2009.

Site 3: Tyolomnqa lower reaches (estuary)

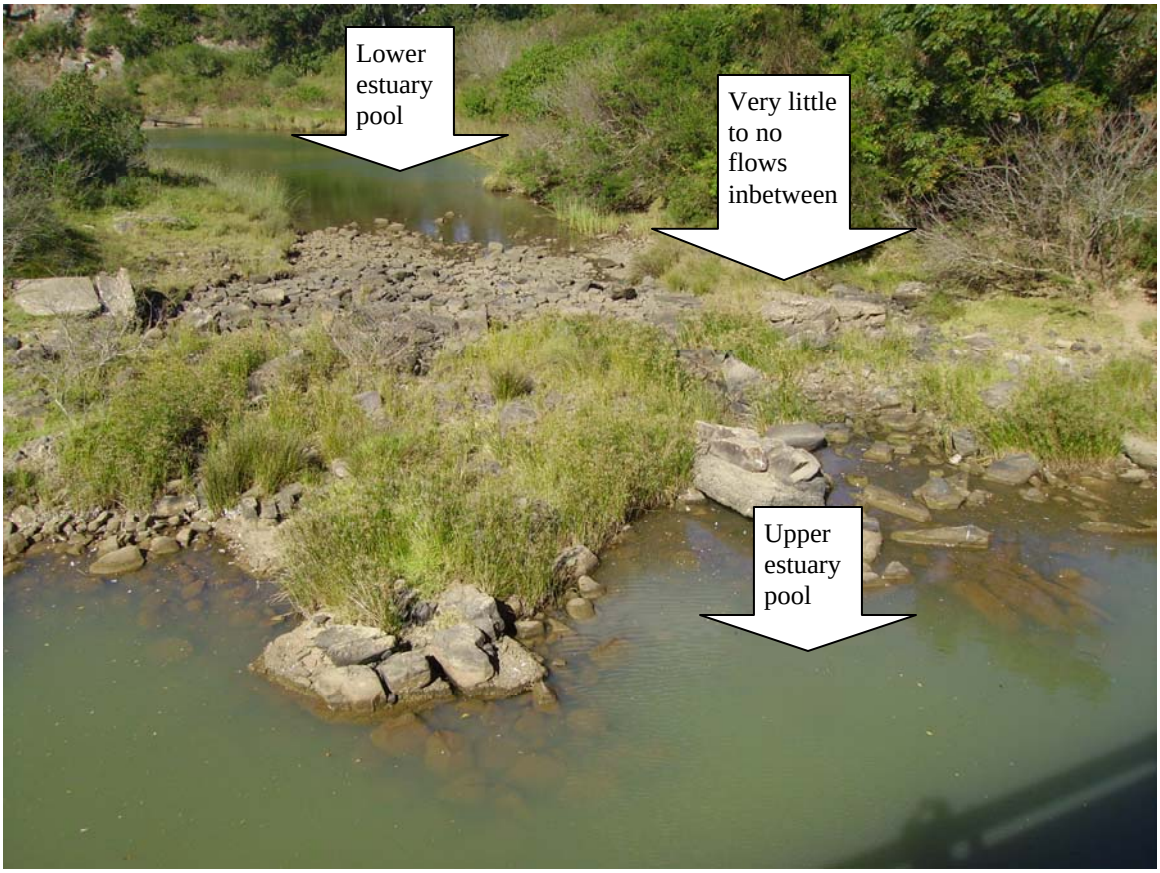

Plate 3: Features of Chalumna lower reaches estuarine site

There were no flows in the river during the time of site assessment. A big abstraction weir is constructed just 100 m upstream of where we sample and this blocks the natural flows. Fish caught here were the estuarine fish (see the histogram in figure 7). This is the estuarine site and there was a large biodiversity of species caught in it, compared to the freshwater The FFI indicates that the site is in **B** class, implying that there is little or no modification on the site.

DISCUSSION AND RECOMMENDATION

GIS information indicates that this system is a perennial river, implying that there are flows throughout the year. However, it was not the case in this catchment as there were no flows, let alone water in some sites.

It can be recommended that the biomonitoring of the Tyolomnqa River be conducted a week after a significant rainfall in this catchment. This period cannot be predicted during the year because of the global warming factor. Tyolomnqa River, if it can flow throughout the year, can make a very good system, as this was evidenced by indigenous fish caught in this system.

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