

MONITORING OF THE GONUBIE RIVER

SUMMER 2009



water & forestry

Department:
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INTRODUCTION AND BACKGROUND

Monitoring was conducted by U. Tshayingca, M. Rubuxa, X. Gwadana, L. Gaulana and E. Weni, between the 19th and 21st of January 2009. The Gqunube River catchment is located in the Eastern Cape, starting at an altitude of about 700-900 meters above sea level (masl). It consists of the South Eastern Uplands Level I Ecoregion in the north-west and the Eastern Coastal Belt Level I Ecoregion starting from the north-east towards the sea. Only two Quaternary catchments comprise the entire catchment: R30C on the upper reaches and R30D on the lower reaches (information adapted from GIS coverage: Resource Quality Services). Using 1:50 000 topographic maps and XDN50 GIS coverage, it can be estimated that the Gqunube River catchment has the area of approximately 665 square kilometers. Major tributaries are the Ngculu and the Tanga streams of which both of them are considered as perennial rivers. The figure below shows the Level I and II Ecoregions and the Quaternary catchments of the Gqunube River Basin.

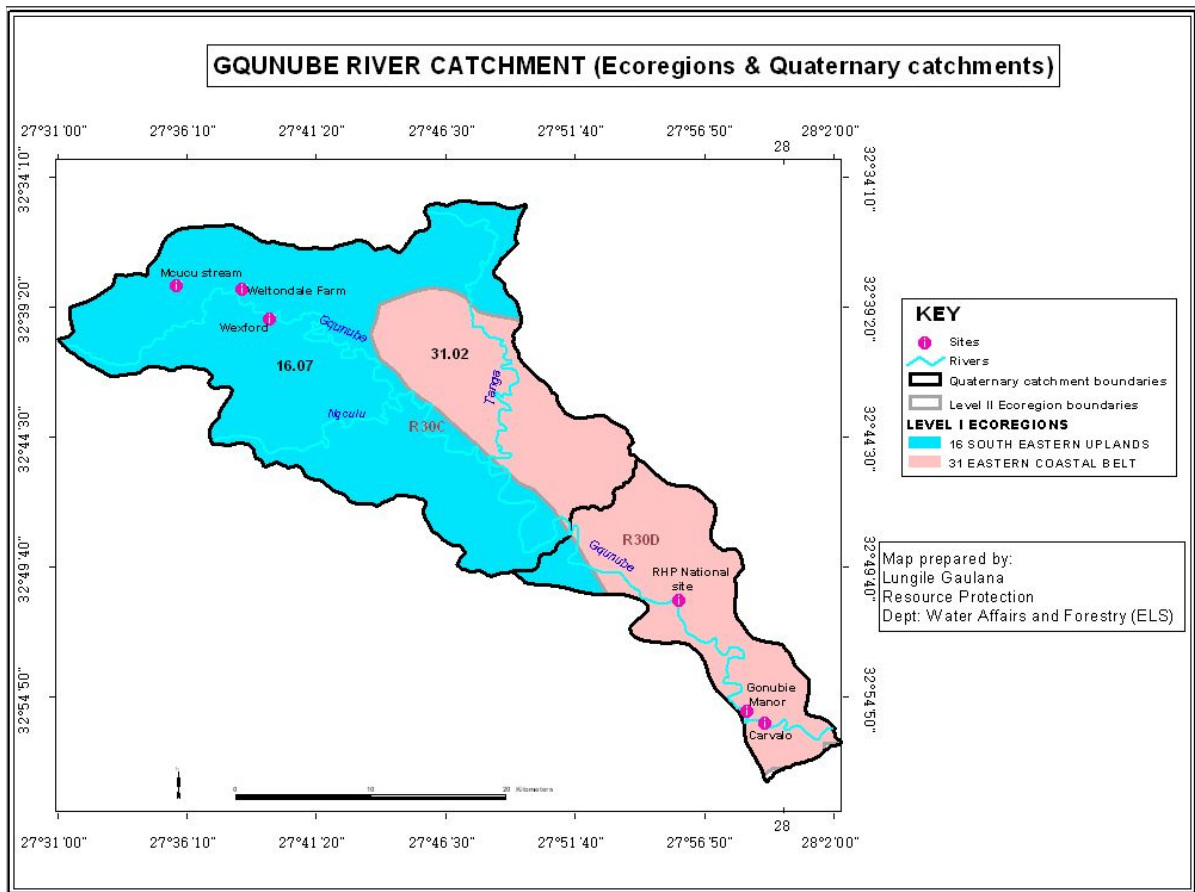


Figure 1. Ecoregions and Quaternary catchments of the Gqunube River Basin

Climate

Generally, the east coast of Southern Africa lies in the sub-tropical conditions and receives its rain in summer. The Gqunube catchment therefore enjoys a moderate climate, with few extremes in temperature. Interestingly, rainfall in the Gqunube River basin occurs in late summer in the upper reaches and early summer in the lower reaches (see figure 2 below). Due to this it can be considered that a lot of evaporation (and therefore rainfall) occurs in the sea, hence immediate rainfall in the lower reaches.

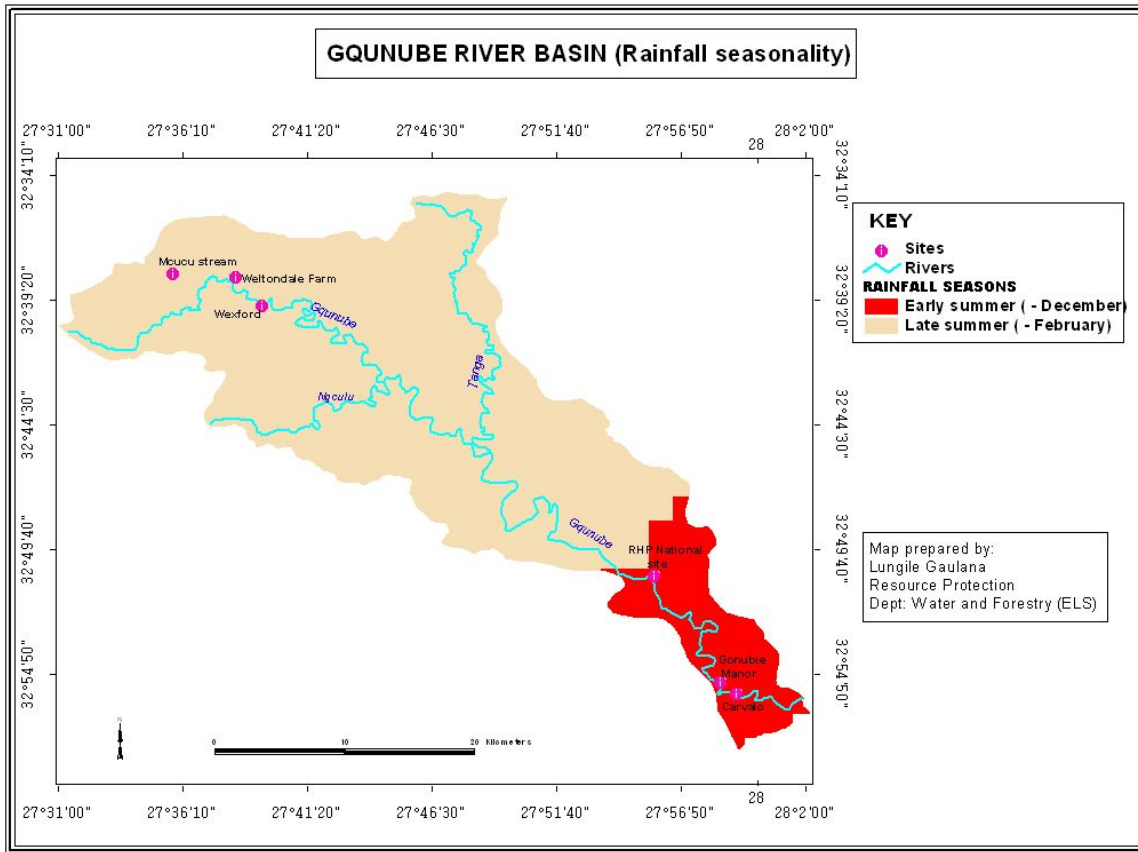


Figure 2. Rainfall seasons of Gqunube River Basin (After GIS coverage: RQS, DWAF).

Geology and Soils

Geological formation of the Gqunube River catchment comprises mainly by the Adelaide Formation of the Karoo sequence though about 12% of the total area consists of the Suurberg Supergroup. Dark soils derived from the parent material of sandstones and mudstones which are mainly of fluvial origin (CES, 2008). Accordingly, the river valleys in the area have alluvial soils valuable for intensive agricultural purposes. The Aeolian soils are mainly found along the

coast (mainly sand dunes). The Zuurburg Supergroup of the catchment is composed of hard rock derived from the basaltic material. Figure 3 below shows the geology of the Gqunube River basin.

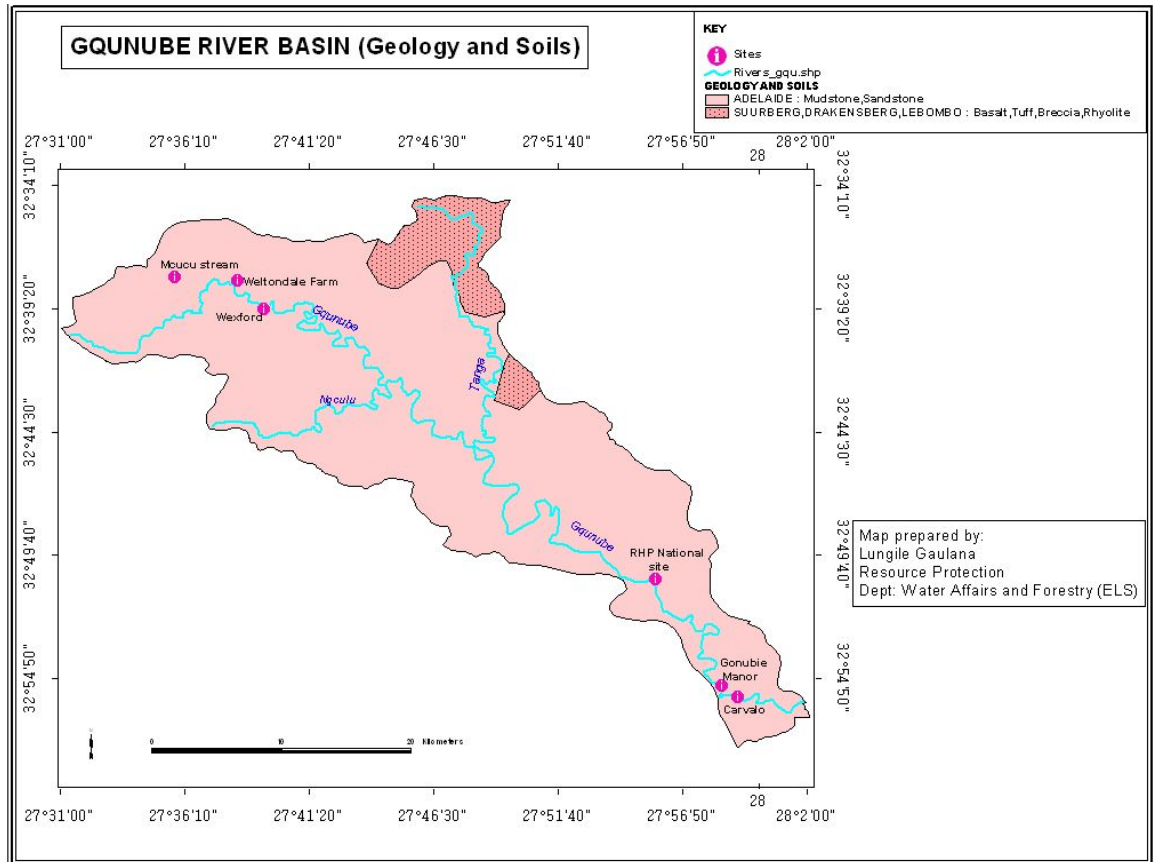


Figure 3. Geology and soils of the Gqunube River Basin

The Natural Vegetation.

The Gqunube River drainage region is dominated by the Eastern Thorn Bushveld on its plains and the Valley Thicket on its valley. Some patches of vegetation types present include the Afromontane Forests, the Coastal Forest, Coastal Grasslands and the Dune Thicket found along the coast. (See figure 4 below).

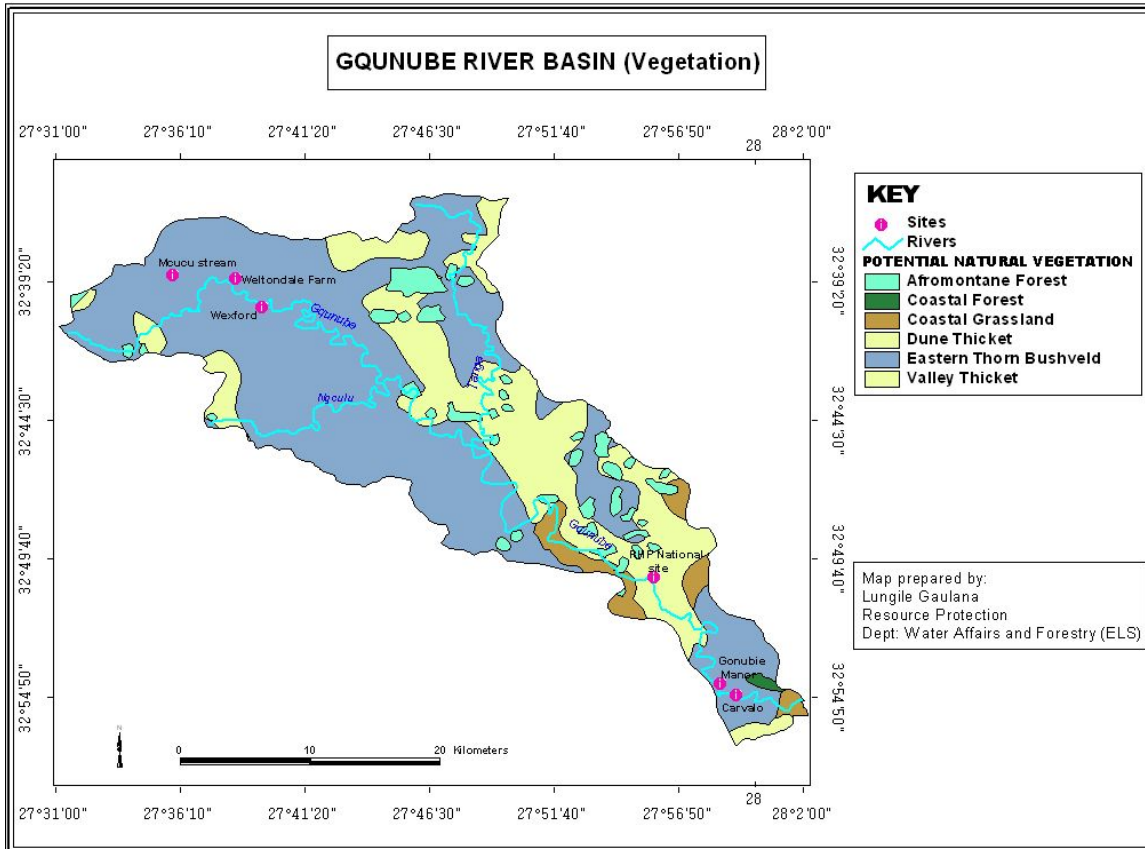


Figure 4: Vegetation of the Gqunube River Basin (After Louw and Rebelo, 1996).

Major Land Use Activities

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

- Forests (indigenous and plantations).
- Agriculture (both commercial and subsistence)
- Settlements (both rural and urban)
- Excavations.
- Roads and rail

The recent national landuse coverage (2000) reveals that the Gqunube River catchment consists mainly of Thicket, Bushland, Bush Clumps, High Fynbos while most of the areas in the upper reaches are Unimproved (natural) Grasslands.

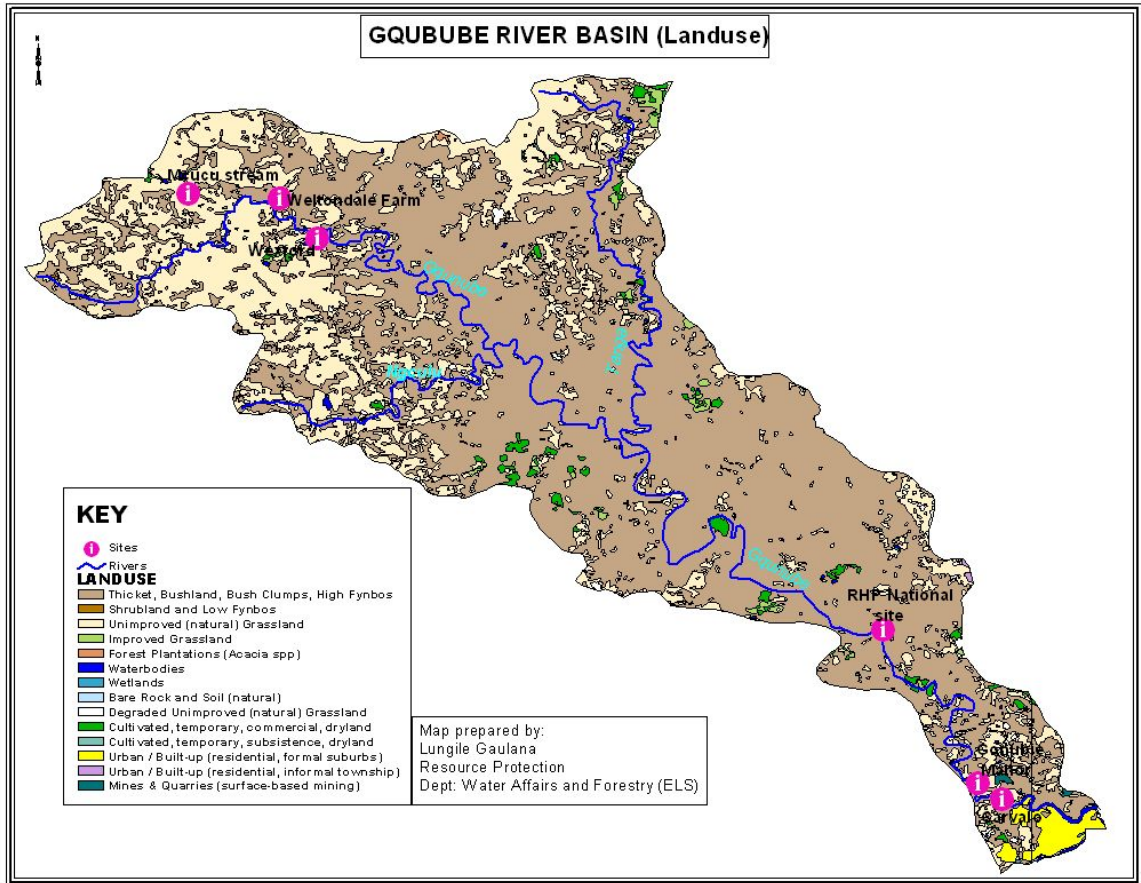


Figure 5. Landuse of the Gqunube River Basin (Adapted from Nic2000 GIS Coverage: RQS).

COURSE OF THE SURVEY

Gqunube RHP National site.

The site is located in a V-shaped valley. This means that any kind of sediment from the hillslope can be directly deposited to the river channel without any obstruction whenever the vegetation cover is lost or destroyed. The river at a reach is a single thread, straight, pool-riffle, anastomosing and a mixed channel with bedrock and boulders as co-dominant features. Much water could be observed downstream while upstream of the site it was wetland-like. Bars on a reach scale had vegetation (sedges, grasses and shrubs) which means that due to low or no flows, the vegetation had enough chance to grow on the sediments deposited on the channel bed and banks. The morphological units at a site were about 42%, probably reduced due to low flows. A lot of irrigated fields could be observed on a reach, suggesting a lot of water abstraction on the catchment.

The Geomorphological Assessment Index reveals that the river at a reach is at B/C class, meaning that the reach is moderately modified (geomorphology). Therefore the environmental flows (Reserve) should be set to meet the Recommended Management Class for the aquatic ecosystem, mainly increase in base flows.

Gonubie Minor (before estuary)

The Gonubie Minor site is located in an incised channel with flood benches, that is, areas along the river channel often inundated by annual floods. Thus beside the sediment from upstream, the sediments from the hillslope in the form of colluviums can be trapped on negligible basis on flood benches before they can be easily eroded downstream during annual floods. The river at a site is a single thread, straight, pool-riffle arrangement, with boulders and cobbles as pre-dominant attributes. Morphological units observed comprise about 42%, that is, the biotopes for the aquatic flora and fauna. A broken weir at a site was observed, which would contribute to increased sediment transport towards downstream to the Ocean. Sediment sampling, though in poor conditions upstream and downstream of the weir, was done at a site. It could be found that the major features were the boulders and cobbles (with boulders gaining the highest percentage). The figure below shows the result of sediment sampling in the Gonubie Minor site of the Gqunube River.

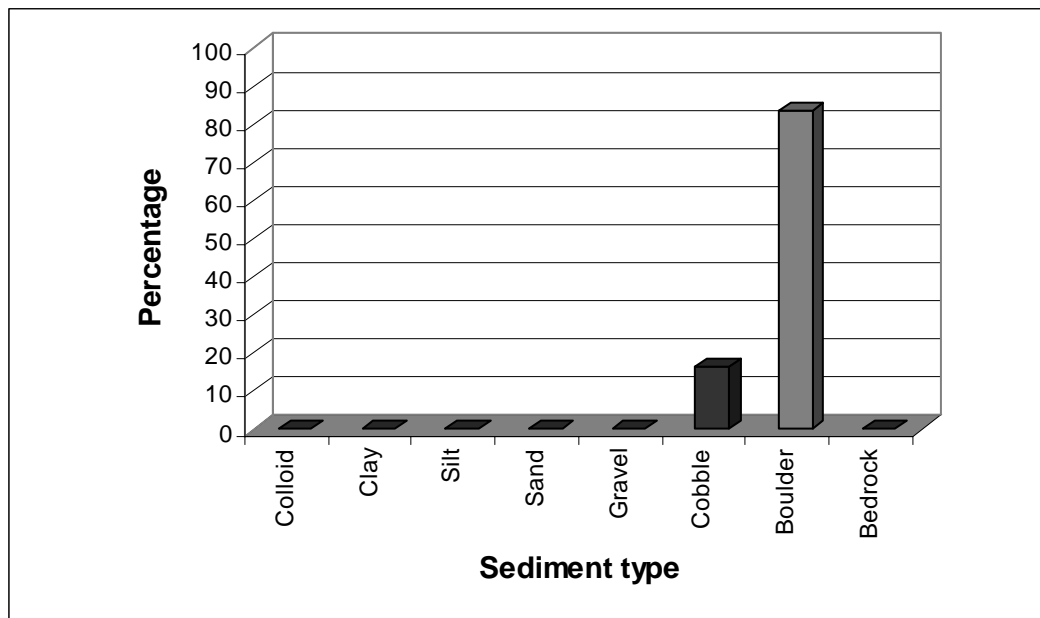


Figure 6. Distribution of sediments in the Gonubie Minor site. Note the unavailability of fines.

The Geomorphological Assessment Index reveals that the river at a reach is at C class, meaning that the reach is moderately to highly modified (geomorphology).

INVERTEBRATES

Due to the absence of flows in the river, invertebrates sampling was not undertaken during this season.

FISH

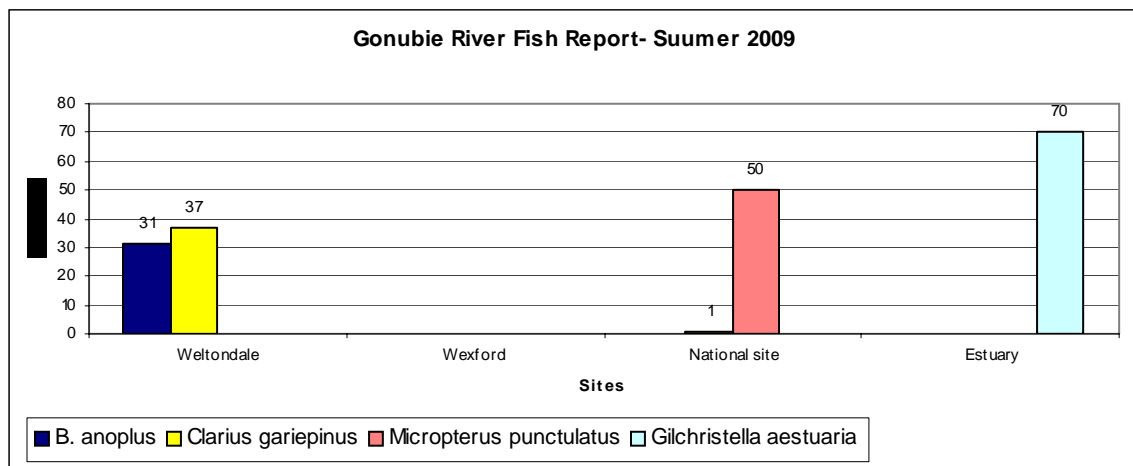


Fig 7: Illustrating fish species distribution within the Gonubie Catchment in Summer 2009.

Weltondale

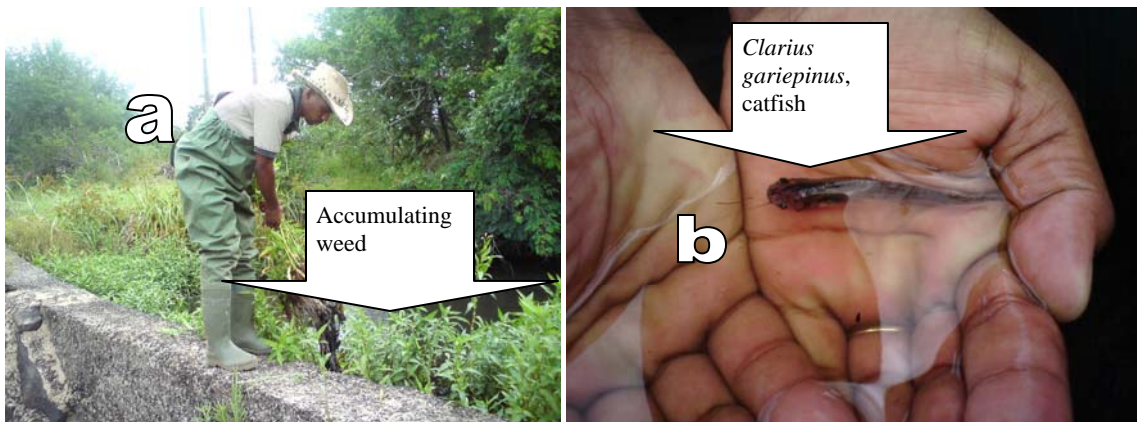


Plate 1: Showing the accumulating weed (a) and the catfish (b) at Weltondale Farm site.

This site is at the low water bridge at E.V. Krull Farm or Weltondale, along R63 Komga Road which connects N2 and Bisho. During the monitoring, there were no flows. Just below the weir/bridge, the water was turbid and we spotted a water skink. Also in this site, there was an accumulating waterweed at the weir wall. A shoal of predacious alien catfish larvae were noted in this site, habiting under this weed. The Fish Fuzzy Index (FFI) for this site was **D**, indicating a largely modified site.

Wexford

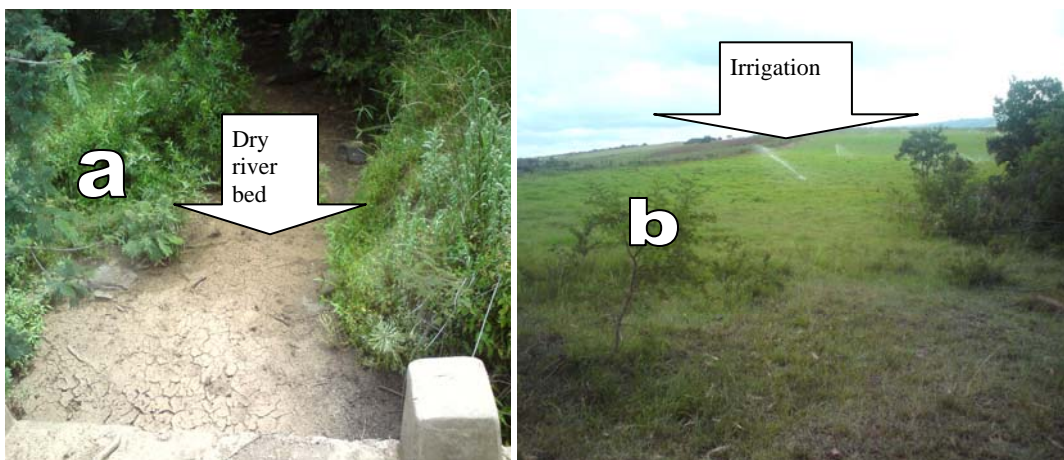


Plate 2: Showing the dry riverbed (a) and irrigation (b) at Wexford site.

There was no fish sampling in this site due to the absence of natural flows (see fig 3). Just above this sampling site are two consecutive instream abstraction weirs for both irrigation and livestock drinking.

RP National site

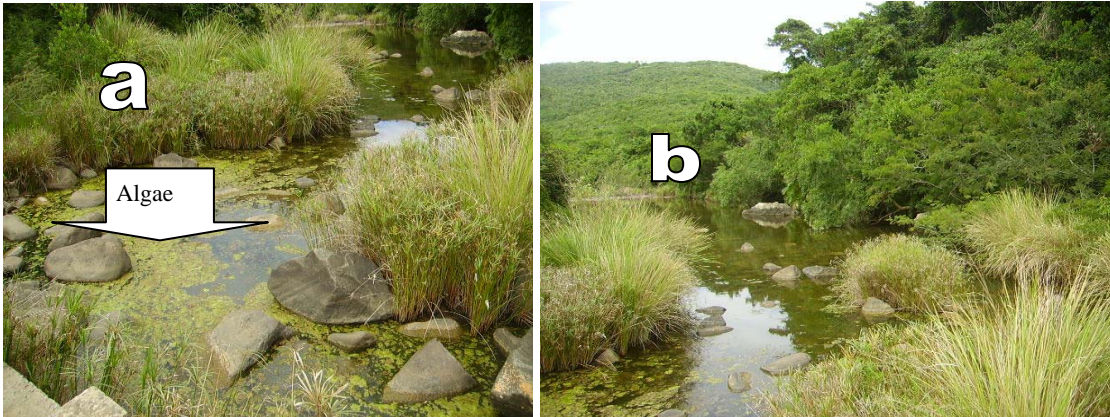


Plate 3: Showing the algae at the Resource Protection National site.

This site was dominated only by the predacious alien *Micropterus punctulatus* (bass, 50) and *Clarius gariepinus* (catfish, 1). No indigenous fish were caught in this site. Also noted in this site was an alga covering the water surface. The FFI for this site was **E**, indicating a seriously modified site.

Before the estuary



Plate 4: Showing the estuarine site of Gonubie catchment.

Estuarine round herring, *Gilchristella aestuaria*, was the only caught fish in this site. There was no flow of freshwater into the estuary, due to non-raining season. The FFI for this site was a low **C**, indicating a modified site.

FISH DISCUSSION AND RECOMMENDATIONS

There was a general decrease in indigenous fish caught throughout the catchment in this summer season. The factors (main driver) that can be attributed to this are absence of the natural environmental base flows. The response to this was evidenced by the poor stagnant water quality, low FFI's, accumulating aquatic weed and the covering algae on the water surface. The latter response was as a result of the nearby farms that use fertilizers, which are eventually washed into the river during the rain. The skink may have preyed on the indigenous fish.

Working for Water (WfW) needs to be informed about the aquatic weed, to both identify and eradicate it. Resource Protection officials need to do “operation clean-up” in their next biomonitoring, to remove the catfish larvae which will pose a serious threat to the indigenous fish.

If the release of water from the Wriggleswade dam, using the Gonubie catchment as a channel, is taken as an option to mimic the environmental flows, the following caution may be noted: Indeed the algae will be flushed down and the salinity at the estuary site will be lower. However, the water lettuce and the predacious alien fish, which exist in the source dam, will eventually be in the Gonubie system. This will pose a serious threat to the habitat, water quality and the aquatic biota as a whole.

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