



Report

Wadsworth, Richard A.; Sundufu, Abu; Jalloh, Abdul. 2009 *Report on Inspection of Mangrove Forest Adjacent to Sierra Rutile Operational Areas 5th - 6th December 2007*. NERC/Centre for Ecology and Hydrology, 6pp. (CEH Project Number: C03141)

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Novel and Practical Conservation Strategies following
Mining in Sierra Leone

Report on Inspection of Mangrove Forest Adjacent to
Sierra Rutile Operational Areas
5th - 6th December 2007

To be Submitted to Darwin Initiative

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January 2009

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Executive Summary

The aim of this field work was:

- a. to conduct a visual inspection of the quality of the mangrove forest in the Bonthe Estuary,
- b. to collect GPS location data related to field notes and photographs of the state of the mangrove forest, to be used to relate the high resolution satellite images (of unknown date) that cover a proportion of the forest with the medium scale images (of known date) that cover the entire region,
- c. to perform a brief visual inspection of the coastal savannah of Turners Peninsular with particular emphasis on the tree and shrub species found.

Field work was undertaken by Dr's Richard Wadsworth and Jan Dick (CEH) and Kabbie Kanu (FBC) accompanied by Pat Hardcastle (reviewer of the project). Day 1 we proceeded from Nitti (the SRL wharf) to Turners Peninsular using the SRL security boat. Day 2 we proceeded from Bonthe to Freetown, using a speed boat hired from the Bonthe Holliday Village.

The mangrove forests in the eastern outlet of the estuary (from Nitti to Shabro bar) appear in very good condition, there are some small fishing villages and evidence of their use of the mangroves but this is not extensive and large areas of intact forest remain. The mangrove forests in the western outlet appear more disturbed and less impressive, this is possibly due to high levels of disturbance from people and possibly a slightly higher energy coastline.

1.0 BACKGROUND

After the project start-up meeting in November 2006 a discussion document was submitted to SRL on the concept of Conservation Offsets (Niesten & Wadsworth 2007). Five alternatives were offered, of which the one recommended to SRL was that they should, where possible, support the conservation of the mangrove swamps of the Sherbro River Estuary. Although these mangrove forests appeared to be intact from fairly recent satellite data (Landsat ETM+, February 2003) there was only a very little contemporary field data to confirm this. Assessing mangroves from the landward side is possible in only a few places and is liable to be biased to locations where access to the water is possible (crossing points, settlements etc.). A major purpose of the current field work was to visually assess the mangrove forest from the water side. The use of a boat allows far greater areas to be surveyed than is possible by land, although the interior of the forest is still inaccessible and depth of water can often limit how close the mangroves can be approached. As well as assessing the current state of the mangrove forests it is important to ascertain to what extent they can be reliably (consistently, accurately) be assessed using remote sensing or other techniques (given the difficulty of getting access to them and the large area they cover).

In the first year of the project the plants used in the experimental plots were those suggested by the local community, in general their suggestions were strongly influenced by species that they would like to see growing. In the second year we wished to try other species, this time with an emphasis on species adapted to harsh conditions. The vegetation on Turners Peninsular has been described as a "coastal savannah" and appeared from satellite images to be growing on a sequence of natural sand ridges. We wished to see which species were naturally occurring on these sand dunes to decide if they might be suitable for use in the experiments.

2.0 DATA COLLECTED

2.1 Mangrove forest condition

The approximate route taken on days one and two are shown on Figure 1. Figure 1 is a screen dump from Google Earth and shows the location of the high resolution imagery (which is of unknown but recent date). Figure 1a shows the location of the GPS points (the red dots) on the medium resolution satellite imagery (Landsat ETM+ acquired February 2003). Due to the distances involved, the time constraints we were under, the draft of the boats and the occurrence of mud and sand banks we were not always as close to the mangroves as would be considered desirable. Just over one hundred usable data points were collected.

The high resolution satellite images clearly show a number of different mangrove forest types (Figure 2) and these were also distinguishable from "ground" based observation and the contrast with the coastal savannah (Figure 3) is obvious.

In figure 2 the dark green "rough" patches are the tall forest mangroves, the other mangroves are lower sometimes through being cut (close to the villages) and sometimes because they are a different species. When the same area is examined in medium resolution (Figure 2a) less detail can be seen, in particular the difference between the tall and mid-sized mangroves is not clear (point "A" on the image).

In figure 3 the dark stripes are the dune "slacks" which in some cases are seasonally cultivated for rice; the pale areas are predominantly grass with scattered oil palm and fire resistant shrubs. Figure 3a shows a mix of coastal savannah and mangrove on the medium resolution imagery;

details of the inter-tidal areas (especially the sand banks) is lost but the ability to distinguish the different sort of vegetation is good.

Figure 4 shows an area of less than 10 hectares on the high resolution imagery. The imagery was obviously taken late in the dry season but the location of the seasonal swamp in the dune slack is clearly visible. In this area the large trees are mangos, but the various species of bushes are not distinguishable from the oil palms. Figure 4a shows the same area in the medium resolution imagery and clearly demonstrates the lack of detail. By comparing the two it should be possible to draw some conclusions about the density of shrubs necessary to cause a significant difference in the spectral response.

2.2 Woody species of Turners Peninsular

Having visited Turners Peninsular our supposition is that the savannah is anthropogenic in nature and that it is a fire-climax community. Kabbie Kanu identified 16(?) Species (appendix A) but these were all species common to the farm bush and secondary forests of Sierra Leone. It is possible that there are unusual species on the peninsular but time did not permit more than a cursory examination.

3.0 CONCLUSIONS

Detailed analysis will be carried out shortly but initial analysis suggests that the high resolution data can be used to augment the medium resolution imagery. It is possible that the tall and mid-sized species might not be interpretable on the Landsat imagery, but degradation will be identifiable. The "scale" of the landscape (heterogeneity / granularity) of the coastal savannah means that the medium resolution imagery will only be able to give a fairly crude representation of the landscape; but it might be possible to say something statistical about the density of woody vegetation in the savannah.

The coastal savannah appears to be strongly dominated by fire. The presence of old oil palms and the relatively low level of recruitment might indicate that the area was more woody in the last few decades. A longer and more detailed inspection would undoubtedly identify unusual species but the general character of the landscape is now much better understood.

References

Nielsen, E & Wadsworth R.A. 2007. A Biodiversity Offset Proposal for Sierra Rutile Ltd. Submitted February 2007

Appendix A

Woody species found on Turner's Peninsular

<to be supplied>