

# SEDIMENTOLOGY ON BUNCE RIVER

by

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## 1 - Timing

1 May : General reconnaissance.

2 May : Sampling on the mouth of the Bunce River.

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4 May : Sampling in upstream (above Juitown).

Participants : J.L. SAOS - O. RUE - FOFANA.

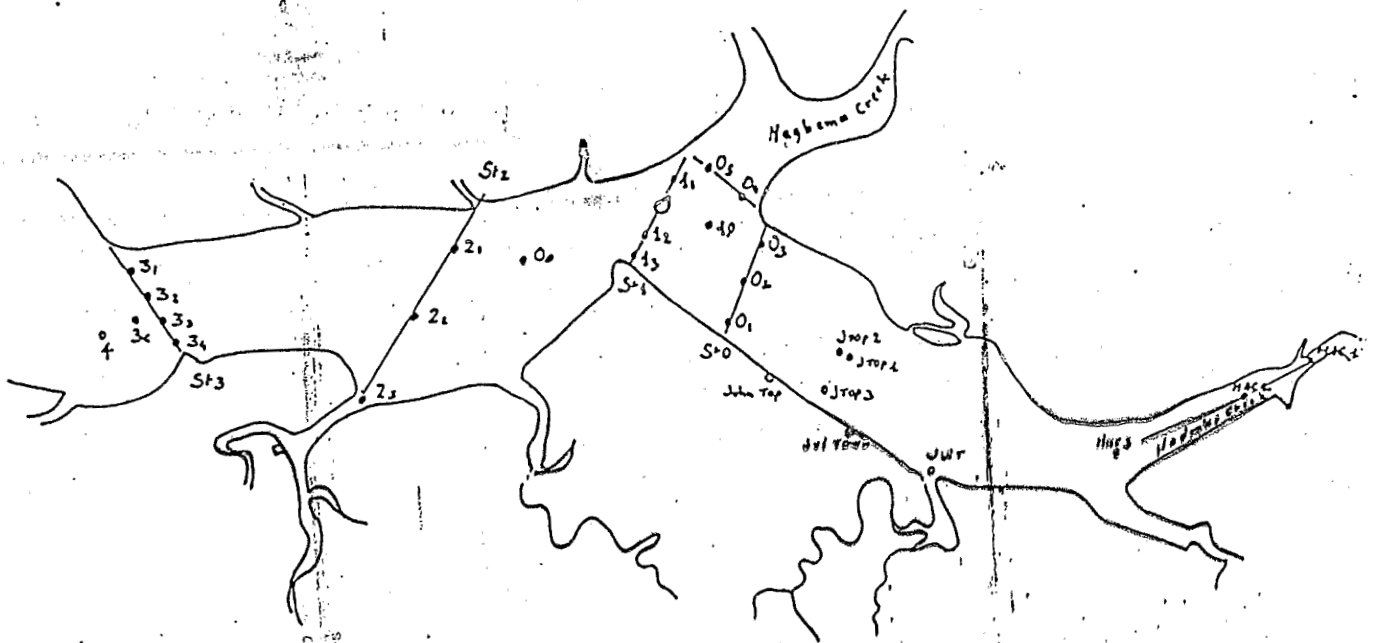
## 2 - Methodology and sampling network

25 samples have been collected with a "Cône Berthois".

The sampling network has been based on :

- five cross sections through the Bunce River from mouth to Juitown village ;
- one cross section through Magbema Creek near the mouth ;
- in profile along the Madonke Creek ;
- four stations points between cross sections.

Sampling on Bunce River



Characteristics of samples collections are included in the table above :

| N° Sample | Time              | Depth m | Nature       |
|-----------|-------------------|---------|--------------|
| Mac 1     | 4/5/90<br>13 h 15 | 3.6     | Rock         |
| Mac 2     | 13 h 35           | 3.0     | sand         |
| Mac 3     | 13 h 50           | 3.5     | Sand         |
| Juit      | 14 h 15           | 3.2     | Fin sand     |
| J Top 1   | 4/5/90<br>12 h 00 | 0.5     | Sand         |
| J Top 2   | 12 h 15           | 1.5     | Sand         |
| J Top 3   | 12 h 30           | 3.5     | Sand         |
| St 0.1    | 4/5/90<br>14 h 30 | 2       | Sand         |
| St 0.2    | 14 h 40           | 3       | Fin sand     |
| St 0.3    | 14 h 50           | 5.5     | Sandymud     |
| St 0.4    | 15 h              | 2       | Mud          |
| St 0.5    | 15 h 10           | 3.7     | Sand         |
| St 1.0    | 1/5/90<br>14 h 10 | 12      | Mud and sand |
| St 1.1    | 4/5/90<br>15 h 30 | 5       | Sand         |
| St 1.2    | 15 h 40           |         | Sand         |
| St 1.3    | 15 h 50           | 10.5    | Sand and mud |
| St 0.0    | 1/5/90<br>13 h 50 | 13.5    | Sand         |
| St 2.1    | 4/5/90<br>16 h 10 | 7.1     | Sand         |
| St 2.2    | 16 h 30           | 6.7     | Mud          |
| St 2.3    | 16 h 50           | 11      | Mud          |
| St 3.1    | 2/5/90<br>12 h 00 | 9       | Mud          |
| St 3.2    | 12 h 20           | 9.5     | Mud          |
| St 3.3    | 12 h 30           | 11.7    | Liquid mud   |
| St 3.4    | 12 h 35           | 12      | Mud          |
| 3 C       | 1/5/90<br>15 h 35 | 12.5    | Sand         |
| 4         | 2/5/90<br>13h     | 12      | Mud          |

Sampling characteristics

### 3 - Sampling conditions

The samples have been taken during near tide, at the end of the dry season, and the energetic conditions were thus of low currents.

The 4th of May, the wind was North-West 18 to 20 knots, with break waves of 0.4 m.

### 4 - Geomorphological conditions

The Freetown peninsula is situated at North of Bunce River. The river is protected from the direct waves of sea and S. and S.W winds but it is very exposed to the N. western winds and waves. This river is wide and its width is in contrast with the reduced size of its affluents (creeks).

Creeks are very short; especially on the left shore due to the peninsula mountains, very close.

The narrowness of coastal plain only permits a small mangrove extension. Since the water volume oscillation is very low, these creeks at the west of the river show almost no evolution.

Eastern creeks however are more wider and more structured ; they drain largest area.

There, it does not seem to be any hydraulic relation between the side of creeks and that of the river.

During dry season, the nearest of peninsula mountains favors flush effect, which limits estuary sedimentation.

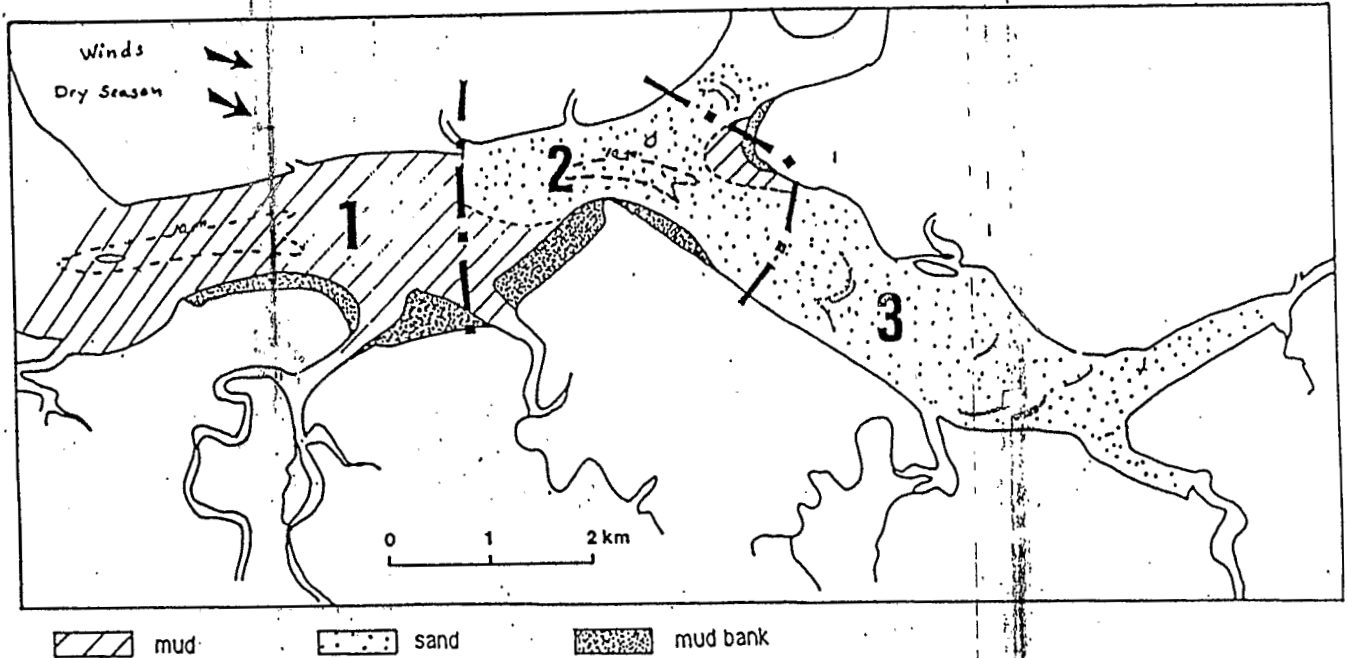
This river works as it was a collector for the northern part of peninsula condaring the liquid flow as well as suspended sediments.

Importance of mobile sand banks is characteristic of Bunce River.

### 5 - Spatial distribution of sediment types

The proportion of sand in sediment mixture increases from the mouth toupstream of Bunce River.

The areas can be distinguished on the map above :



### Repartition of sediments

- Area (1) - From mouth to station 2 where bottoms are mainly pelittic.
- Area 2 - From station 2 to station 1 (Magbema Creek junction), where bottoms are often mixed ; sandy at the deep and muddy near shore.
- Area 3, from station 1 to upstream where bottoms are shallower and almost exclusively sandy, with hydraulic dunes covered by ripples marks.

a) Area 1 : It is the largest sector of the river, where current speeds are lowest-current measures in neap-tide periods show the complete absence of currents from one meter of the bottom (see hydrology part).

This condition favors decantation at least during the neap-tide season. Since 1968, rainfalls deficit has limited flush effect; for this reason, muds have not moved toward the sea.

b) Area 2 : The biggest depth has been measured (more than 12 m) below the junctions with Magbema River.

This depth channel is situated at the bottleneck of the river. It is due to the acceleration of currents at this place. The bottom of this channel is covered by fine sands; consequently, it did not seem to work when the sampling was done.

With out any date, it certainly works during high tide and rainy season.

c) Area 3

Sedimentary figures, at the upper part of river, show that flow speed is maintained since the waters are shallower.

The later favours action of waves which reinforce the flow during dry season, to construct and to move this sedimentary pattern.

## 6 - Conclusion

This first sedimentary study of Bunce River has showed the spatial distributions of sediment and importance of flood tide currents on the sedimentation of dry season.

Granulometric, morphoscopy and chemical analysis of the sample taken will be carried out in a nearest futur.

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JOINT RESEARCH WORKSHOP  
MULTIDISCIPLINARY STUDY OF THE BUNCE RIVER  
SIERRA LEONE

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