



CRAFT SHRIMPING POTENTIALITIES  
IN SIERRA LEONE

FOR

LE MINISTÈRE DE LA COOPÉRATION ET DU DÉVELOPPEMENT

ET

LA CAISSE CENTRALE DE COOPÉRATION TECHNIQUE

BY

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POUR LE DÉVELOPPEMENT EN COOPÉRATION (ORSTOM)

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MISSION PLAN

march 31th, Departure DAKAR and arrival FREETOWN

april 1st, Contacts with :  
The French Embassy  
The F.A.O.  
The Ministry and natural Ressources-Fisheries Division  
The Institute of marine biology and oceanography

april 2nd, Mission plan with the french Embassy and the Fisheries Division  
Contacts with several projects managers for coastal craft shrimping development

april 3rd, Mission plan with the Embassy and the Fisheries Service  
Contacts with the Meteorological Center

april 4th car trip Freetown-Port Loko-Kambia-Kychoh with observations in different rivers

april 5th rowing up and observations in the GREAT SCARCIES until ROKUPR

april 6th rowing up and observations in the LITTLE SCARCIES until KONTA

april 7th Back to FREETOWN by car with observations in the FREETOWN river (south)

april 8 Failed attempt to fly to BONTHE where we were going to go aboard

april 9th Contacts with the French Embassy to get a vehicule  
contacts with Land and Resources, Ministry of Energy and Power, Water Supply Division and the Technical Fisheries Service

april 10th car trip and observations in the north Freetown river

april 11th car trip and observations in the RIBI river

april 12th Hydrology data gathering at the Water Supply Division  
Contacts with the IMBO  
Conversation with the French Ambassador in SIERRA LEONE

april 13th Come back to DAKAR

#### IMPORTANT PEOPLE MET

Mr. C. TONANI, French Embassy cooperation and cultural attaché

Mr. M. DAGUSAN, Volontaire du Progrès, working at the FAO in FREETOWN

Mr. G. DEPRELLE, Volontaire du Progrès, working at the FAO in PORT LOKO

M. GOLLEY MORGAN, Chief Fisheries Officer at the Fisheries Division

Melle S. GEORGE, researcher at the IMBO

Mr. BECH, "craft shrimping development project" project manager in SHEMGE

Mr. RAEBURN, "EEC/Gose project development" project manager in YELIBUYA ISLAND

Mr. S. LAMONT, Station manager at BONTHE Fisheries

Mr. CAMARA, Technical Fisheries Service Chief

Mr. I.W.O. FINDLAY, researcher at the IMBO

Mr. I.S. KABIA, chief engineer at the Water Supply Division

Mr. ABC. JONES, researcher at the IMBO

#### ACKNOWLEDGEMENTS

In spite of the particularly difficult conditions in which this mission was planned, we found a very precious help with the important people met and we send them our sincere thankness. We particularly thank M. TONANI who, in spite of the reduced means of the french Embassy in Sierra Leone has done all what it was possible to minimize some material difficulties.

We thank too very much M. DAGUSAN who accepted to come with us to the north and Miss GEORGE who helped us very kindly when we contacted the Sierra Leone different services.

## INTRODUCTION

The purpose of this mission was to study shrimping craft possibilities in SIERRA LEONE. There is already an industrial activity (*Penaeus notialis*) in SHERBRO district ; annual production could be estimated at 2000 metric tons ; the main beneficiary is Sierra Leone (Sierra Fishing Company).

However, craft shrimping development represents a profit-earning operation (following the Casamance example) ; at first, it's a mean to create new jobs and to earn money and then, it's a way to develop an industrial and commercial activity for exportation (devises supply).

The different rios prospection has allowed to specify salinity and current conditions from estuaries mouth to fresh water zones. These data with the inquiries realised with fishermen will allow to estimate shrimps retention possibilities in the environment and so, the interest of craft shrimping project development.

## SOME RECALLS ABOUT THE SHRIMPS BIOLOGY

The shrimps biological cycle is characterized by a marine phase and a briny environment phase. Larva are laid in sea (salinity up to 35‰ and optimum temperature 24°C) ; after a very short sea water stay (15 to 30 days) post-larva go up with the tidal current to suitable inland zones called nursery grounds (lagoons, mangroove). At this stage, we can observe different progressive moultings until shrimps become adults. At this moment, water salinity and currents are very important parameters for the growth and the stay time juvenile shrimps in briny environment. When they are 3 or 4 months, shrimps go down to the sea (swimming + current) : they measure 7 cm. First maturity age is reached at 6, 7 months (12 to 13 cm) and life time can be up to 2 years.

All tropical zones where there is an important interpenetration between sea and earth are very suitable for the growth of this sort of shrimps : rios, lagoons, mangrooves. At this regard, Sierra Leone is privileged because according to Aqua Service (1980), the mangrooves surface in this country would be of 1700 km<sup>2</sup>, which is very near of the Casamance 2000 km<sup>2</sup> surface mangrooves. We know that this region of Senegal has very important shrimps nursery grounds.

The problem is to know if the environmental conditions in the estuaries are suitable for shrimps retention in these zones until they have a sufficient size to allow fishing and trading.

Shrimps retention in the estuaries principally depends of 2 parameters : salinity and current speed.

The first one has to be between 20‰ and 45‰, the second one has not to be up to 80 cm/s.

COURANTOMETRY AND SALINITY

The current measures have been realised with a General Oceanic "flowmeters 2030". Usually, the current maximum speed is got during middle ebb-tide. As our mission was very short, and because of obvious reasons of calendar, it has not been always possible to take measures in every place at the best time. When, it has been possible to take several measures in a same place at different moments, we have only retained the highest value measure. However, the retained values have to be considered as minimum values.

Salinities have been calculated with a SOPELEM RCT 0-18% refractor. Every time it was possible, we tried for every place to get values at high tide (maximum salinity) and at low tide (minimum salinity).

During this mission, we got informations and measures about four estuaries :

- GREAT SCARCIES
- LITTLE SCARCIES
- FREETOWN RIVER
- RIBI RIVER

PLUVIOMETRY

TABLE 1

Monthly and annual precipitations averages in different places  
of Sierra-Leone shore

Place	Date	J	V	M	A	M	J	Jt	A	S	O.	N	D	Annual Average
Rokopr	80/84	1,5	10,5	7,1	48,3	201	403,1	630,2	753,1	410,5	285,1	89,8	23,5	2935,5
Lungi	80/84	1,6	13,1	6,2	67,7	235,1	414,1	705,4	702,6	357,4	254,7	109	18,7	2884,1
Port Loko	65/70	9,7	1,1	32,3	38,2	186,2	401,1	412	540,	409,7	327,3	85,6	15	2453,1
Falcon Bridge	80/84	3,6	11,5	26,6	58,2	216,7	402,1	673,4	778,6	354,1	239,1	65,6	9,5	2835,9
Newton	60/65	23,4	1,1	16,5	35,5	158,2	363,1	697,7	811,9	456,7	236,9	146,6	18,3	3009,5
Matru	58/61	16,7	11,2	51,6	123	239,4	414,5	502,8	530,7	608,4	259,6	241	17,6	3024,3
Gambia	78/82	13,3	17	32,6	112,3	377,	481	796,8	941,4	571,6	327,8	215,7	58,3	3929,1
Bonthe	80/84	0,2	10,1	16,3	127,8	377,5	581,1	895,5	988,1	495,5	320,3	148,8	36,5	3995,8
Sulina	78/82	10,3	25,5	51,4	151,6	318,2	597,	1008	858,8	708,3	423,8	145,1	77,8	4378,1

These data concern 9 stations spread on all Sierra-Leone coast (map 1). The rainy season begins in april/may until october/november with maximum precipitation in july/august.

Precipitations are very important and have a main part in the water desalinization and the currents speed increasing at the rainy season.

Then again, there is an important gradient from the north to the south in this country ; annual precipitations fluctuate from 2935 mm to 4378 mm

OBSERVATIONS ABOUT THE GREAT SCARCIES

The collected informations are gathered in the Table 2.

TABLE 2  
Observations about the GREAT SCARCIES

Place	S ‰ (1)	Current cm/s	Marnage
Embouchure	35		
Kakonki	34		
Kychom	23-28	120	>2 m
Kassiri	28 (M.H)	60	
Kahohona	21-28	60	
Manbolo	16-23	60	
Rosinor	15-18	100	
Rotubono	13-15	60	
Rokupr	10 (M.D)	40	
Kambia	0 (M.D)	20	

(1) When there are 2 values it means that observations have been done at different moments of the tide

In dry season salinity seems right until ROSINOR. Unfortunately, current (100 to 200 cm/s at least) is too strong in this zone to allow the commercial size shrimps growth (> 10 cm)

During the rainy season, the current strenght is still stronger (because of the swelling) and salinity is less important.

We can consider this estuary as a not very suitable place for craft shrimping, in any season.

## OBSERVATIONS ABOUT THE LITTLE SCARCIES

The gathered informations are presented in the Table 3

TABLE 3  
Observations about the LITTLE SCARCIES

Place	S ‰	Current cm/s	Observations about fished shrimps
Embouchure	35		
Rokolo	28-29,5	60	
Tumbo	25-32	65	
Bali	24-29,5	45	
Kowta	18	50	
Rotimbana			5-6 cm shrimps
Katonga	2		Macro Brachium in rainy season
Katonga	0		

Our remarks about the LITTLE SCARCIES salinity and current measures are the same as GREAT SCARCIES parameters.

Salinity and strenght current can be good for trading size shrimps (if the current collected values are not too far from maximum values).

It's quite sure that it's not at all the same during the rainy season. According to the Water Supply, the extreme levels reached near KONTA would be about 4.73 and 9.75 m ; these figures indicate a very important swelling and consequently, a very little salinity and an extremely strong current during the rainy season.

In conclusion, this estuary would be eventually suitable, but only in dry season until KONTA.

OBSERVATIONS ABOUT THE FREETOWN RIVER

The collected data are presented in Table 4.

TABLE 4  
Observations on the FREETOWN RIVER

Place	S ‰ (1)	Current (2)	Marnage	Fished shrimps.
Cap Sierra Leone	27-34	rainy season : until 5 <sup>n</sup> dry season : ME 0,5 <sup>n</sup> 1 <sup>n</sup> VE 1 - 1,5 <sup>n</sup> 2 - 2,5 <sup>n</sup>	0,9 à 3 m	Little shrimps fished everywhere by women with nets fixed on a circle that they trail all along the banks  Big shrimps would be fished in the main channel with mesh nets and beach seine-nets
Tagrin point	16-33 st. in wet season		1 - 1,50 m	
(Kasongba)	10			
(Kunrabai)	26			
Pepel	8-28			
(Lungi Lol)	14			
(Mana)				
(Magbundus)	0			
Port Loko	2,5		1,50 m	
(Gbabai)	18			
Ferredugu	4		2 - 2,50 m	
Magbile	0			

(1) When there are 2 values, they concerned FINDLAY collected salinities (1978) in wet and dry season. When there is only one value, it concerns salinity that we have measured.

(2) In Findlay (1978)

In Table 4, the places in parenthesis are located on affluents.

In dry season, salinity is good all over the estuary large part (until KAGBALI Island and MA-KURUBULAI). The current speeds such as FINDLAY collected ones would be more or less suitable too. However, the marnages observed during the mission indicate very strong currents, even sometimes hardly bearable.

In wet season, salinity and current speed are not suitable.

The estuary seems to be welcome only in dry season until KAGBALI Island and MA-KURUBULAI.



## OBSERVATIONS ABOUT THE RIBI RIVER

The collected data are presented in the Table 5

TABLE 5  
Observations about the RIBI RIVER

Place	S ‰	Observations about shrimps
Fogbo	31,5	small shrimps fished everywhere by women along the banks bigger shrimps would be fished in the channel, principally at the beginning of the rainy season
Ma Swar	31,5	
(Rokunda)	21	
(Songo)	0	
Ma Bang	11,5	

Salinity is right until MA SWAR (the places located in parenthesis are located on affluents).

No currents measure had been done in this estuary. Low enough salinities observed one month before the rainy season beginning allow to obtain very low salinities, absolutely unbearable for big shrimps during this season.

Moreover, if current is good, shrimps could be fished only in dry season or, at the rainy season beginning, when water desalinization obliges shrimps to swim out of the estuary, as the fishers informations seem to indicate it.

## C O N C L U S I O N

If the observed zone seems suitable to set up "nourrisseries" (little shrimps are fished by women all along banks river), it seems difficult to grow up shrimps until a commercial size.

Low salinity seems to be a restrictive factor during a large part of the year and currents are too strong.

Suitable zones, only in dry season, are too small (between 20 and 50 km according to the studied estuaries) to set up trap structures as in Casamance (Senegal), or on the Cacheu rio (Guinée Bissau) ; it concerns up river zones (more than 70 km far from mouth river) ; here tidal current is less strong, but salinity is still good for big shrimps. So, if a fishery were going to be set up in the north zone, it would be operationnal only at the end of dry season and at the beginning of wet season. It's unlikely that captures could be more than one hundred metric tons.

We have not observed the south zone because of the mission bad conditions.

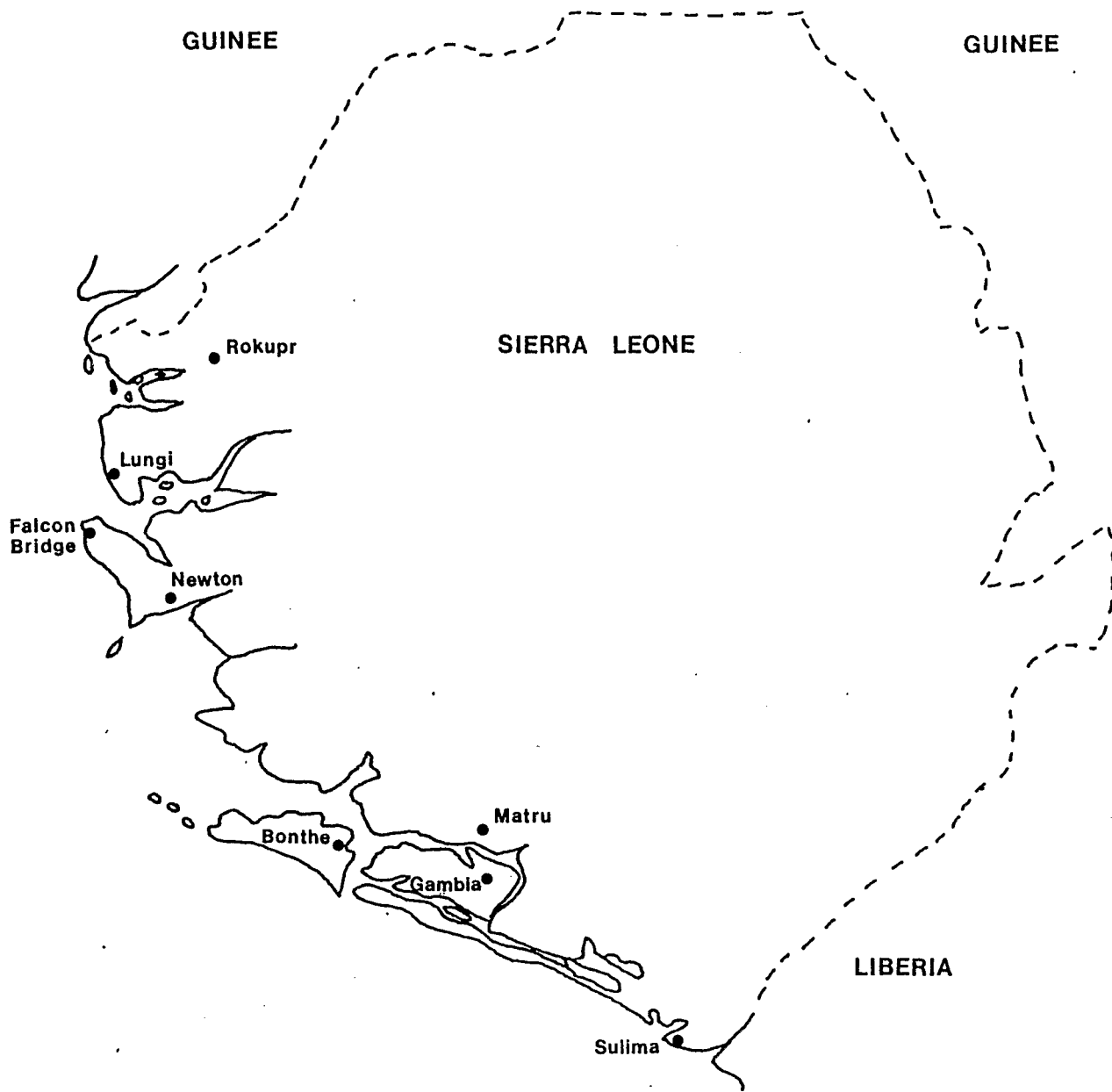


Figure 1  
Sierra Leone and main estuaries map - meteorological stations localization

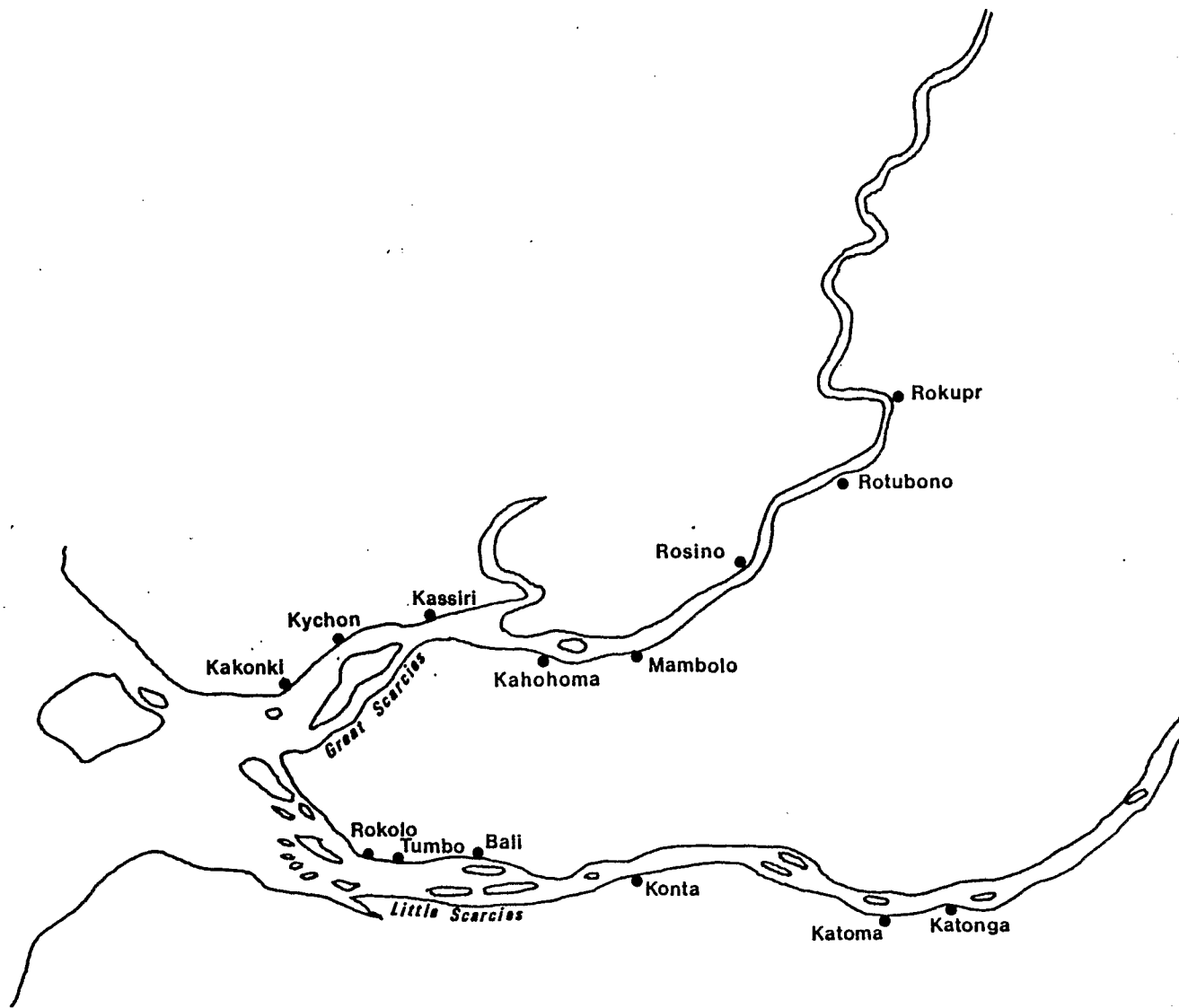


Figure 2  
Observed zone in the GREAT SCARCIES and the LITTLE SCARCIES

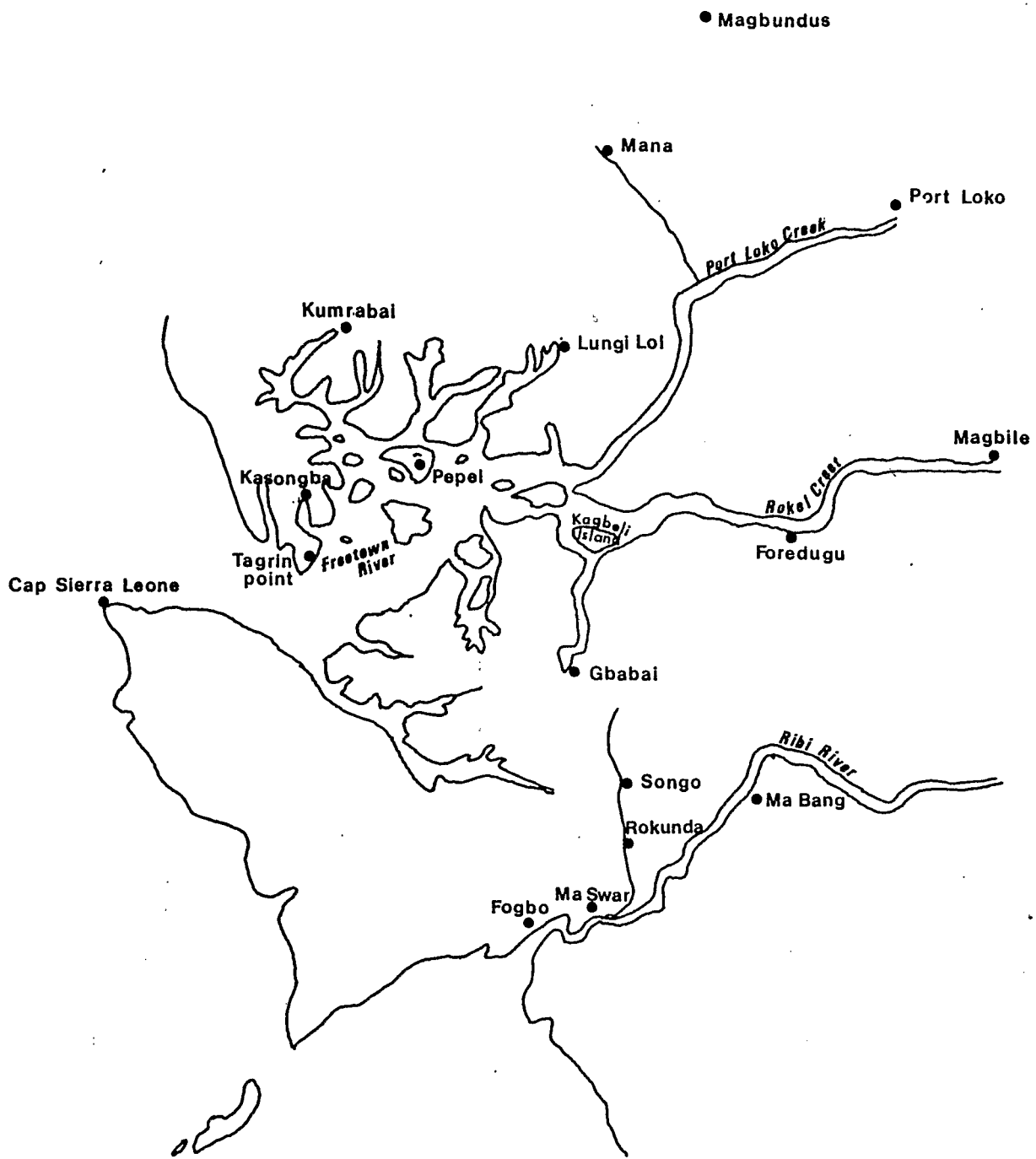


Figure 3  
 Observed zone in the FREETOWN RIVER and the RIBI RIVER