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# **BANDUNDU TRANSPORT SECTOR MARKETING STUDY**

**PHASE II**

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# **BANDUNDU TRANSPORT SECTOR AND MARKETING STUDY**

## **USAID PROJECT 660 - 0098**

### **PHASE II**

The final objective of the second phase of the Bandundu Transport sector Marketing Study was to prepare a priority ranking of interventions to serve as a guide for USAID projects in the Bandundu project area. To this end, the first phase of the study examined the existing data base to determine its appropriateness as a basis for analysing the feasibility of alternative interventions. The results of the first phase indicated that there were significant gaps in the data necessary to provide a definition and ranking of interventions. Deficient areas identified were 1) origins, volumes and destinations of produce flows and traffic levels in the project area; 2) evaluation of existing infrastructure, especially relating to waterways; 3) evaluation of existing marketing infrastructure, such as warehouses and collection points; 4) a definition of zones within the project area which had high production potential to serve as a focal point for the analysis of potential interventions, called "Target Subzones". To eliminate these deficiencies, a series of surveys were proposed for the purpose of creating a statistical base which would serve in ranking the alternative interventions and which could be used in the future for evaluating the results of any projects undertaken.

The surveys were planned to be intensive in order to gather the maximum amount of data possible in the two month time period available. Unfortunately, the political unrest in Zaire cut short the survey effort, preventing the teams from actually taking to the field. However, a few days of data collection were possible at the Kikwit port, under the quite trying conditions of the military mutiny. This has been processed and is presented in this report.

In the sections which follow, the survey methodology will be outlined followed by the preliminary analysis of the Kikwit port data.

# CHAPTER 1 SURVEY METHODOLOGY

## 1.0 INTRODUCTION

The surveys planned for the Bandundu Transport Sector and Marketing Study can be divided in two types. The first are surveys designed to determine the origins, size and other characteristics of the produce flows from farm to market. These were two origin- destination surveys, one undertaken at exit points from the region, and the other interviewing local produce buyers. Both surveys utilized questionnaire forms for interviews.

The second group of surveys examined the existing transport and marketing infrastructure over which these flows would move, as well as existing traffic volumes. In all cases the infrastructure surveys were to be undertaken by engineers and agronomists in the field.

In the following sections the methodology of each of these surveys will be examined in turn. Questionnaires and forms prepared by the time the field work started can be found in the Appendix.

## 1.1 ORIGIN-DESTINATION SURVEYS

The origin-destination studies had four main objectives. The first was to locate the villages which were producing surplus for export to the urban markets. Secondly, to determine productivity levels of the villages and obtain an idea of their potential and consistency for use in the estimation of target subzones, which were defined as clusters of high surplus producing villages. Third, the survey was to indicate the hinterlands for each exit point; that is, the origins of the produce which passed through each. Finally, the surveys were designed to show the way in which the produce from each village cluster was evacuated- the mode utilized (piroque or truck), the infrastructure- roads, waterways and ports, their condition and the time involved in moving produce over them to market.

Due to the low traffic volumes on the roads, logistical problems and the short amount of time available for the survey phase, it was decided against stopping vehicles on roads for questioning. Instead, two kinds of surveys were planned; the first would be a normal O/D survey, but undertaken at the main exit points of the region where there is usually a modal change, such as a port. The second would be a buyer interview survey conducted mainly in the commercial centers, but also at the exit points.

### **1.1.1 The exit point o/d survey**

The exit point O/D survey was planned to take place over a minimum six week period during which teams of two people would be located at each of the main exit points of the region for interviewing transporters. As the points chosen were those where a change of mode takes place, there was no problem in having to stop vehicles for questioning. Also, these points were usually located near a town where the interviewers could find food and lodging so as to avoid interruption the survey. Nine interview stations were to be established at the following locations:

- 1) Kikwit port
- 2) Petit Kasai
- 3) Bulungu port
- 4) Panu port
- 5) Mimbiembe (Eolo) port
- 6) Lubaya Lubwe port
- 7) The ferry at Katerbo
- 8) The ferry at Biengue
- 9) Mangai ports I and II

The following information would be obtained from each transporter:

- 1) Type of vehicle and description. The types of vehicle could be either trucks, barges or pirogues (canoes) and described in terms of number of axles, tonnage, or length in meters respectively.
- 2) Origin and destination of the load. The origin would be the village where the load was picked up, which would be recorded with the collectivite to facilitate the locating of the villages later. The destination would be where the trip ended. In the case of loads arriving at a port from the interior, the destination would be the port. For loads leaving the port for Kinshasa aboard a barge, say, the origin would be the port and the destination Kinshasa. At the ferries there would be no modal change, so the origin would be the village and the destination the final one, in this case the Kasai.
- 3) Trip times. The number of hours taken (or to be taken) to the actual destination was asked of the transporters. This would give an idea of the time involved in getting produce to market from the villages.
- 4) Produce type and quantity. Although the first phase was concerned with only the three major crops - manioc, maize and peanuts - it was decided to include all agricultural products in the surveys in the second phase because all would benefit from the proposed interventions and all were important for the economy of the region. Thus, coffee, rice, palm oil and manufactured items ( for return trips) were included. The transporters were to be asked how many units

of each product were carried (sacks, barrels, etc.) and the weight of each unit to enable the total amounts of each product to be calculated. As loads were usually mixed, the questionnaire forms utilized a line for each product carried. A copy of the survey form is included in the Appendix.

The completed forms were to be gathered periodically and processed while the surveys were in progress. Beside each major item there was a space for a code number to facilitate the computer processing of the data. Once the basic data was processed, the origin villages would be located on the map. These would be grouped in terms of clusters of villages, each group receiving a code number. The total production coming from each cluster would be calculated by product type. Thus, the more productive villages/clusters could be recognized. These would be ranked for comparison with the data obtained from the buyer interview survey, conducted concurrently.

### **1.1.2 Buyer interview survey**

The purpose of the buyer interview survey was to obtain the same basic information as the port O/D survey discussed in the last section. In addition, it would serve as a check on the port survey through obtaining this information from a different source, the commercial buyers. The marketing system utilized in Zaire is that of buyers working independently or for the larger commercants, visiting the villages periodically for the purpose of purchasing the local harvest. The buyers usually have a given group of villages which they habitually visit in search of produce. They pay for the product which is put in sacks to await a truck which comes by to gather it. Because the buyers continue to visit the same villages year after year, they know what each area is capable of producing, and how much produce they can expect to find in a given area. Because the buyers have a much broader picture than the transporters who carry the produce to the ports, the buyer data could be used to expand and check the results shown by the port data. The buyers could also be asked about trends in production for the areas with which they are acquainted, whether they were finding more or less being produced in a given area than in previous years and why. Finally, the buyer survey would give an idea of total sales from the study region, which would not be obtainable from the port survey due to its short time period.

The buyers would be queried at all the exit points and major commercial centers such as Kikwit and Bulungu. These interviews would be carried out by the traffic engineer in charge of interviews and not by the local enqueteurs. Principal data from the buyer survey would be

- 1) Location of villages,
- 2) Quantities of each product bought per year,
- 3) Past and potential supply from each village,
- 4) Transport and storage facilities used,

- 5) Time, modes and conditions of transport,
- 6) Spoilage and other losses as a function of transport and storage.

The data obtained would be keypunched in much the same format as the port O/D surveys and coded for product types and village clusters. Comparison of the results from the two surveys should indicate the village clusters with the highest potential and the exit ports utilized by the products therefrom. This data would show the relative importance of the infrastructure upon which the produce was evacuated, forming the basis for the infrastructure surveys. The high potential areas indicated in the surveys would subsequently be scrutinized in terms of their designation as target subzones.

## **1.2 INFRASTRUCTURE SURVEYS**

As the data compiled on village clusters and productivity began to form patterns of produce movements in the study region, the infrastructure utilized by the produce flows - roads, waterways and ports- would be examined to determine its characteristics, and condition, including "hot spots" and repair costs. The infrastructure related surveys planned were four; the updating of the road inventory, the river/port inventory, the marketing infrastructure survey and traffic counts. Each of these will be examined in turn.

### **1.2.1 The road inventory**

The purpose of the road survey would be to update the study region road inventory prepared by Louis Berger in 1988-89. As much deterioration of the road network had taken place since the original survey was done, and new "hot spots" had developed, it was worthwhile to reexamine the condition of the road network. However, as the network including the dessert agricole roads was quite extensive in view of the time allotted for the study, the network to be examined would be limited to that related to the target subzones. Therefore, while the initial O/D studies were underway, the road inventory would be carried out on the most heavily utilized roads in the project area. Once the potential target subzones were identified, then the roads servicing those areas would be inventoried and evaluated. To facilitate the work, a link system would be utilized to better indicate the road sections under consideration.

The inventory would be carried out by a team of engineers from the ODR under project supervision who had had previous experience with this kind of work in the project area. The data to be gathered by the survey team would be the following :

- 1) **Characteristics**. These would be type of road, dimensions, and structures such as bridges, causeways and cuts. Vertical profile would also be determined to estimate the rise and fall of the road which is important for the vehicle operating cost calculation.
- 2) **Condition**. The purpose of this item is to quantify "hot spots" such as delapidated bridges and areas affected by rains. An estimate would be made of the extent of the repairs necessary to put the road in order.
- 3) **Costing**. Costs would be calculated for the required repairs on the road sections.

### **1.2.2. River/port inventory**

The purpose of the river inventory would be the same as the other infrastructure surveys, viz; to determine the navigability of the waterways which could be utilized for the evacuation of produce from the project region. To date, the rivers to the south of the project area have been examined, the results of which are included in Appendix B. As the entire river network was to be examined, there would be no need to limit the investigation to those waterways providing access to the target subzones.

The size and condition of the study region ports would also have to be investigated. The capacity and actual utilization of the Kwilu and Kasai ports would have to be determined, as well as existing equipment, quays and their condition. Any civil works proposed would have to be quantified and costed in terms of projected utilization under different assumptions for the development of the target subzones.

### **1.2.3. Marketing infrastructure survey**

The purpose of this survey would be to determine the marketing infrastructure available for the evacuation of produce from the study region. This included a description of produce collection points and storage facilities such as warehouses, and their condition. As a major cost to produce movement is spoilage, this item would take on major importance. Upon the completion of the general marketing infrastructure survey, the facilities available for produce gathering and storage in the target subzones would be determined, as well as needs for improvements to facilitate produce collection and storage and diminish losses. Also, any additional facilities needed similar to those at Petit Kasai would be proposed and costed. This survey would be carried out by the agronomist in the course of his examination of the target subzones.

#### **1.2.4. Traffic counts**

The purpose of the traffic counting was to obtain an idea of the total volumes of traffic utilizing the present road network. As the traffic on the roads consists not only of vehicles carrying produce covered in the survey, but other commodities of importance, such as fertilizer, trade goods and beer, the benefits of improving the infrastructure for the target subzones would also accrue to other kinds of traffic. The additional benefits thus included would also add to the total for the target subzone related traffic, enhancing the feasibility of proposed interventions.

The traffic counts would be classified/ manual counts; that is, counts classified by vehicle type - auto, utility, two and three axle trucks- and carried out by manual counting. Teams of two people would be placed at the midpoint of the road section to be surveyed where they would count passing vehicles in each direction for ten hours a day over a week. These counts would be factored up to obtain an estimate of average annual daily traffic (AADT) through comparison with past counts and the seasonality implied in the results from the buyer's survey.

In sum, the surveys outlined above would first determine the present patterns of produce flows from the region, the infrastructure utilized, and the costs of using that infrastructure in terms of vehicle and river craft operating costs, time delays in arriving to market, and spoilage. Secondly, the surveys would establish the basis for future produce flows under hypothetical conditions established by the undertaking of selective interventions. The costs associated with the interventions would be compared with the cost savings from the infrastructure improvements which would in turn provide a priority listing of projects for future consideration.

## **CHAPTER 2 PRELIMINARY RESULTS**

On September 20th, the Louis Berger survey team arrived in Kikwit and proceeded to recruit interviewers for the port O/D survey. In spite of the difficulties caused by the ensuing unrest, the interviewers managed to question operators of pirogues and trucks arriving at the port and fill the forms during three days, September 23 to 26th. Although the data are somewhat questionable due to the rather trying conditions under which the interviews were conducted, the results are presented to give an idea of the kind of analysis which would have been undertaken, had the project been able to continue.

The results of the survey are presented in the Appendix and in summary form in Table 1 hereafter.

**TABLE 1 SUMMARY OF RIVER TRANSPORT DATA KIKWIT PORT**

BOAT		ORIGIN	DEST.		Time	Weight	Total Weight/Prod		
Type	Length	VILLAGE	COLL.	CODE	(Hrs)	(Tons)	Manioc	Maize	Palm
PIR	6.0	BELO	KIP	1 KIK	6	0.18	0.18		
PIR	5.0	BOMA	KIP	1 KIK	8	0.26	0.18	0.08	
PIR	5.0	BOMA	KIP	1 KIK	8	0.26	0.18		0.08
PIR	6.5	BULUMBU	KIP	1 KIK	4	1.32	1.20		0.12
PIR	4.6	KABANJI	IMB	1 KIK	5	1.66	1.62		0.04
PIR	10.0	KICONGO	KIP	1 KIK	4	3.48	2.14		1.34
PIR	5.0	KONZI	IMB	1 KIK	5	1.39	0.51		0.88
PIR	9.0	KWANGA	IMB	1 KIK	4	0.80			0.80
PIR	8.0	LAMBA	IMB	1 KIK	5	3.18	0.42	.08	0.92
TOTAL TONNAGE VILLAGE CLUSTER N°1 PERCENT						10.51 100%	6.25 59%	.08 1%	4.18 40%
PIR	8.5	BUNGU	MUN	2 KIK	21	0.50	0.30		0.20
PIR	8.0	KATEMBO	MUN	2 KIK	21	0.70	0.50		0.20
PIR	6.0	KIKAYA	KIP	2 KIK	6	2.75	2.51		0.24
PIR	10.0	KINGULU	MUN	2 KIK	27	6.69	2.82	0.37	3.50
PIR	8.0	KISENZELE	MUN	2 KIK	20	1.50	1.26		0.24
PIR	9.0	KITOMBE	MUN	2 KIK	21	5.95	4.02		1.93
PIR	7.0	LUTSHIMA	MUN	2 KIK	24	0.75	0.75		
PIR	6.0	MBUTO	MUN	2 KIK	19	1.84	0.66		1.18
PIR	6.0	MWENGA	MUN	2 KIK	26	0.80	0.60		0.20
PIR	5.0	NGASHI	MUN	2 KIK	6	0.33	0.30		0.03
PIR	8.0	NGONGO	MUN	2 KIK	48	2.82	1.62	0.20	1.00
PIR	10.0	NIEKENENE	MUN	2 KIK	23	1.30	0.30		1.00
TOTAL TONNAGE VILLAGE CULSTER N°2 PERCENT						25.9 100%	15.64 60%	0.57 2%	9.72 37%

The first column indicates the type of craft utilized, in this case all pirogues, and the average length of the craft, which varied from 4 to 10 meters. The next two columns

indicate the village from which the trip originated and the collectivité. This is followed by the trip destination which in this case is all Kikwit. The next column shows the average trip times between the village and Kikwit in hours. The last four columns indicate the tonnages of the products carried. The first of the four is the total tonnage transported between the village and Kikwit, followed by the breakdown between the three principal products carried; manioc, maize and palm oil.

In addition, the data included interviews with half a dozen trucks and one barge loaded for Kinshasa. These data, however, were not sufficient to draw any conclusions. For reference, they are included in the Appendix.

During the five days, 71 pirogues were interviewed. The loads they carried consisted of three products; manioc, maize and palm oil, and in nearly all cases, less than a tonne of all products per pirogue. The source of the produce was the area to the south of Kikwit, mainly on the Kwilu river and its confluence with the Lutshima. The results are tenuous, not only because of the deteriorating security situation, but because road traffic from the same areas was not included. As is the case in most of the region, the villages quoted by the transporters were located on the roads some distance from the water. The general conclusions based on the data are as follows:

- 1) By plotting the villages serviced by the pirogues, a definite pattern can be seen. The villages form two clusters; one, a day's voyage down the Kwilu to Kikwit, and the other 2 to 3 days voyage centered around the confluence of the Kwilu with the Lutshima, Bwele-Milonda and Lufuku rivers. Two villages lying outside these areas were also serviced; Kasombo, lying half way between the first and second cluster, and Mbanza, on the Kwilu, a week trip by pirogue. These areas are shown on the map in Figure 1.
- 2) The village cluster nearest to Kikwit, referred to as #1, is an average 5 hours travel time to Kikwit. During the 3 days of the survey, the total tonnage carried of all three products was nearly 11 tonnes of which the larger part was manioc (6.3 tonnes or 59 percent), followed by palm oil (4.2 tonnes or 40 percent) and maize (.08 tonnes, or 1 percent).
- 3) The village cluster around the river confluence (#2), provided two and a half times the tonnage over the three day period in spite of the fact that it was between 8 and 36 hours (average 22 hours) travel time from Kikwit. The same three products were transported, a total of close to 26 tonnes. Manioc was again the principal product with 15.6 tonnes or about 60 percent, with palm oil amounting to 9.7 tonnes or 37 percent. Maize volumes, with only around 2 percent, were insignificant.
- 4) Little produce appeared in the survey from south of cluster 2. Either all the surplus is sold at the larger towns in the area, Gungu or Feshi, or is brought to Kikwit by truck, although this could not be determined by the survey.
- 5) The most promising area for agricultural production would appear to be #2. Referring to the regional maps in the Annex to the Phase 1 report, the population

level of 20 to 50 per square kilometer suggests an adequate labor force, and the moderately fertile soils among oil palm plantations indicates the area has potential. Particularly fertile areas could be found in the bottom lands of the river confluences. The quantities involved for the five day period were not large, constituting only a truck load. However, it is unclear whether these were influenced by the civil unrest at the time or if larger quantities normally move out by truck, as most villages are along the roads. Whether or not #2 constitutes a potential target zone would require additional data, first, in comparison with other potential areas, and secondly, through on the spot investigations of soils and other aspects regarding its potential productivity. As an example, however, it does serve to show the aspects which would be analyzed in the selection of the target subzones.

## **APPENDIX A**

### **DESCRIPTION OF PORT O/D SURVEY PREPARATIONS AND EXECUTION**

1. Overview of Survey Activities
2. Organization of the Origin/Destination Surveys
3. Preparations for the Surveys
4. Preliminary Results
5. Forms for O/D Survey

## **APPENDIX B**

### **RIVER INVENTORY**

1. The Kwilu
2. The Lutshima
3. The Kwenge
4. The Lufuku
5. The Bwele- Milonda

## **APPENDIX A - DESCRIPTION OF PORT O/D SURVEY PREPARATIONS AND EXECUTION**

### **1. Overview of Survey Activities**

The organization and execution of the field surveys was the responsibility of the traffic engineer. In accordance with the program of activities agreed upon with USAID, the traffic engineer was given the following tasks:

- a) The preparation and execution of the Origin/Destination surveys at the ports, ferries and at Petit Kasai;
- b) The execution of the buyer survey;
- c) The preparation and execution of the manual traffic counts on certain roads in the study area;
- d) The supervision of the road inventory.

The schedule of the survey programme was as follows:

Preparation of the O/D/ surveys and buyer interviews	8-22 September
Execution of the same.	22 Sept.-3 November
Preparation of the manual counts	6-20 October
Execution of the manual traffic counts:	20 Oct.-10 November
Road Inventory	22 September -10 November

During the 14 days that the traffic engineer was in Zaire before the study was interrupted by the political unrest, the preparation for the O/D and buyer surveys was completed and the execution was begun. The necessary forms for the manual counts were prepared and the engineers were selected for the road inventory.

### **2. Organization of the Origin/ Destination survey**

In order to cover the possible exits of the region and obtain the largest amount of data during the available time period, it was decided that the O/D surveys would be undertaken at the following points:

- a) The two Kikwit ports which are located on the same side of the river some hundred meters apart.
- b) The two ports at Bulungu which are on opposite sides of the river.
- c) Petit Kasai where the trucks normally stop for transshipment of produce cargos for Kinshasa.
- d) The port of Panu
- e) The port of Mimbieme located 7 kilometers from Eolo.
- f) The two Mangai ports located on the south bank of the Kasai some nine kilometers apart
- g) The port of Diabaya Lubue
- h) The Katerbo ferry
- i) The Biengue ferry.

It was planned to place two interviewers at each of the 12 stations, thus requiring a total of 24 individuals. These would be recruited from Kikwit, which is the best center in the Region for obtaining qualified labour. The surveys at each station would be realized between 700 hours and 1800 hours. The interviewers would alternate every 2-3 hours, which would total 5 hours 30 minutes per interviewer per day. For this work, they would receive a daily wage of 270,000 (US\$3.60). The interviews would continue for a 6 week period between the 22 of September and November 3. The interviewers would be visited every week by the traffic engineer who would collect the forms and double check the work. After checking, the forms filled during each week would be sent to Kinshasa for keypunching and the preparation of the database.

### **3. Preparation of the O/D Surveys**

Following the arrival of the traffic engineer in Kikwit the selection of the interviewers was undertaken on the 21 and 22 of September in accordance with the following criteria.

- Initial test,
- Classroom orientation,
- Practice session at Kikwit port,

- Analysis of the results of the Kikwit port trial,
- Final choice of the 24 interviewers,
- Choosing of the two person teams for each post.

The interview teams finally chosen consisted of four women and 20 men, averaging 28 years of age, all with good educational backgrounds (10 of the 24 had university diplomas). These were divided into teams based on their origins and the lodging facilities at the stations. The women were placed at the stations closest to Kikwit, one per team.

It should be noted that the license numbers of trucks and names of boats were to be written on the forms to avoid double counting. Each interviewer received an advance in salary and several weeks supply of interview forms.

The operation of distributing the survey teams started the 23 of September utilizing three all terrain vehicles. Four interviewers were placed at the two Kikwit ports, two at Petit Kasai and four at the two Bulungu ports. On Tuesday, two interviewers were dispatched to Mimbeme, and on Wednesday, two were sent to Panu.

On Thursday morning, however, the traffic engineer decided to terminate the survey activity and recall the interviewers in view of the deterioration of the security situation. Thus, the same vehicles were utilized to gather the interviewers from the stations to which they had been distributed. This was accomplished by Friday afternoon.

#### **4. Preliminary Results**

The interviewers placed at the two Kikwit ports on September 23 were able to continue their survey until the 26th of September, in spite of the difficulties as a result of the deteriorating security situation. During this period, 61 craft were interviewed at the first port of which 57 were pirogues, and 22 at the second, of which 14 were likewise pirogues. The data gathered during the three day period is presented in the following table.

**TABLE SUMMARY OF RIVER TRANSPORT DATA - KIKWI PORT**

Vehicle Poids/prod.		ORIGINE		Dest.	Temps	Nature	Poids Total	
Type Huile	Descr.	VILLAGE	Coll.				Marioc	Maïs
PIR	10.0	KIK	KIK	KATEMBO	28	7	0.08	
PIR	5.0	BOMA	KIP	KIK	8	7	0.18	0.18
PIR	5.0	BOMA	KIP	KIK	8	5	0.08	0.08
PIR	6.0	BULUMBU	KIP	KIK	4	1	0.60	
PIR	6.5	BULUMBU	KIP	KIK	3	1	0.42	
PIR	5.0	BULUMBU	KIP	KIK	4	1	0.18	1.20
PIR	5.0	BULUMBU	KIP	KIK	4	5	0.98	
PIR	5.0	BULUMBU	KIP	KIK	4	5	0.04	0.12
PIR	8.5	BUNGA	MUN	KIK	21	1	0.30	0.30
PIR	8.5	BUNGA	MUN	KIK	21	5	0.20	0.50
PIR	8.0	GONGO	MUN	KIK	48	1	0.72	0.72
PIR	8.0	GONGO	MUN	KIK	48	2	0.10	0.10
PIR	8.0	GONGO	MUN	KIK	48	5	0.20	0.20
PIR	6.0	IBANSI	IMB	KIK	5	1	0.54	
PIR	4.6	IBANSI	IMB	KIK	5	1	0.24	
PIR	08.0	KATEMBO	MUN	KIK	21	1	0.50	1.28
PIR	8.0	KATEMBO	MUN	KIK	21	5	0.20	0.20
PIR	10.0	KIBENGI	KIP	KIK	22	1	0.84	
PIR	9.0	KICONGO	KIP	KIK	4	1	0.78	
PIR	10.0	KICONGO	KIP	KIK	4	1	0.40	2.02
PIR	9.0	KICONGO	KIP	KIK	4	5	0.80	
PIR	10.0	KICONGO	KIP	KIK	4	5	0.54	1.34
PIR	6.0	KIKAYA	KIP	KIK	8	1	0.36	
PIR	6.5	KIKAYA	IMB	KIK	5	1	0.54	0.90
PIR	6.0	KIKAYA	KIP	KIK	8	3	0.05	
PIR	6.5	KIKAYA	IMB	KIK	5	5	0.04	
PIR	6.0	KIKAYA	KIP	KIK	8	5	0.01	
PIR	6.0	KIKAYA	KIP	KIK	8	5	0.08	0.13

TABLE SUMMARY OF RIVER TRANSPORT DATA - KIKWIT PORT (2)

Vehicle Poids/prod.		ORIGINE					Poids Total	
Type Huile	Desor.	VILLAGE	Coll.				Dest.	Temps
PIR	8.0	KIKONGO	KIP	KIK	18	1	0.96	0.96
PIR	8.0	KIMBENGI	KIP	KIK	19	5	0.04	0.4
PIR	12.0	KINDELA	KIL	KIK	48	1	0.24	0.24
PIR	12.0	KINDELA	KIL	KIK	48	2	0.50	0.50
PIR	12.0	KINDELA	KIL	KIK	48	5	0.80	
PIR	12.0	KINDELA	KIL	KIK	48	5	0.04	
PIR	12.0	KINDELA	KIL	KIK	48	5	0.08	0.92
PIR	8.0	KINGULA	MUN	KIK	21	1	0.48	0.48
PIR	8.0	KINGULA	MUN	KIK	21	2	0.27	0.27
PIR	8.0	KINGULA	MUN	KIK	21	5	0.60	0.60
PIR	8.0	KINGULU	MUN	KIK	22	1	0.36	
PIR	10.0	KINGULU	MUN	KIK	48	1	1.08	
PIR	7.0	KINGULU	MUN	KIK	22	1	0.30	
PIR	14.0	KINGULU	MUN	KIK	48	1	0.60	2.34
PIR	7.0	KINGULU	MUN	KIK	22	2	0.10	0.10
PIR	14.0	KINGULU	MUN	KIK	48	5	0.04	
PIR	10.0	KINGULU	MUN	KIK	48	5	0.02	
PIR	10.0	KINGULU	MUN	KIK	48	5	0.04	
PIR	8.0	KINGULU	MUN	KIK	22	5	0.60	
PIR	14.0	KINGULU	MUN	KIK	48	5	2.20	2.90
PIR	8.0	KINSENZELE	MUN	KIK	48	1	0.72	
PIR	7.0	KINSENZELE	MUN	KIK	20	1	0.54	1.26
PIR	7.0	KINSENZELE	MUN	KIK	20	5	0.20	
PIR	7.0	KINSENZELE	MUN	KIK	20	5	0.04	0.24
PIR	8.0	KISUMBA	KIP	KIK	7	1	0.63	
PIR	8.0	KITEZIA	KIL	KIK	24	1	0.24	0.87
PIR	8.0	KITEZIA	KIL	KIK	24	5	0.06	
PIR	8.0	KITEZIA	KIL	KIK	24	5	0.80	

**TABLE SUMMARY OF RIVER TRANSPORT DATA - KIKWIT PORT (3)**

Vehicle Poids/prod.		ORIGINE		Dest.	Temps	Nature	Poids Total	
Type Huile	Descr.	VILLAGE	Coll.				Manioc	Maïs
PIR	6.0	KITEZQ	KIL	KIK	24	5	0.12	
PIR	6.0	KITEZQ	KIL	KIK	24	5	0.80	1.78
PIR	8.0	KITOMBE	MUN	KIK	20	1	0.12	
PIR	8.0	KITOMBE	MUN	KIK	18	1	0.66	
PIR	8.0	KITOMBE	MUN	KIK	21	1	1.02	
PIR	10.0	KITOMBE	MUN	KIK	18	1	1.20	
PIR	8.0	KITOMBE	MUN	KIK	26	1	0.06	4.02
PIR	9.0	KITOMBE	MUN	KIK	26	5	0.02	
PIR	8.0	KITOMBE	MUN	KIK	20	5	0.40	
PIR	10.0	KITOMBE	MUN	KIK	18	5	0.02	
PIR	8.0	KITOMBE	MUN	KIK	21	5	0.20	
PIR	10.0	KITOMBE	MUN	KIK	18	5	0.03	
PIR	10.0	KITOMBE	MUN	KIK	18	5	0.20	
PIR	8.0	KITOMBE	MUN	KIK	21	5	0.09	
PIR	8.0	KITOMBE	MUN	KIK	18	5	0.08	
PIR	8.0	KITOMBE	MUN	KIK	21	5	0.12	
PIR	10.0	KITOMBE	MUN	KIK	21	5	0.60	
PIR	8.0	KITOMBE	MUN	KIK	21	5	0.06	1.82
PIR	9.0	KITOMBE	MUN	KIK	26	7	0.11	
PIR	11.0	KIYAKA	KIP	KIK	6	1	1.02	
PIR	7.0	KIYAKA	IMB	KIK	5	1	0.54	1.56
PIR	11.0	KIYAKA	KIP	KIK	6	5	0.08	
PIR	7.0	KIYAKA	IMB	KIK	5	5	0.03	1.10
PIR	5.0	KONZI	IMB	KIK	5	1	0.36	
PIR	5.0	KONZI	IMB	KIK	5	1	0.09	
PIR	6.5	KONZI	IMB	KIK	4	1	0.06	0.51
PIR	5.0	KONZI	IMB	KIK	5	5	0.01	
PIR	5.0	KONZI	IMB	KIK	5	5	0.08	

TABLE SUMMARY OF RIVER TRANSPORT DATA - KIKWIT PORT (4)

Vehicle Poids/prod.		ORIGINE		Dest.	Temps	Nature	Poids Total	
Type Huile	Descr.	VILLAGE	Coll.				Manioc	Maïs
PIR	4.0	KONZI	IMB	KIK	4	5	0.03	
PIR	6.5	KONZI	IMB	KIK	4	5	0.60	
PIR	4.0	KONAI	IMB	KIK	4	5	0.01	
PIR	4.0	KONAI	IMB	KIK	4	5	0.03	
PIR	4.0	KONZI	IMB	KIK	4	5	0.03	
PIR	4.0	KONZI	IMB	KIK	4	5	0.10	
PIR	9.0	KWANGA	IMB	KIK	4	5	0.80	1.68
PIR	8.0	LAMA	IMB	KIK	5	1	0.24	0.24
PIR	8.0	LAMA	IMB	KIK	5	5	0.03	
PIR	8.0	LAMA	IMB	KIK	5	5	0.05	
PIR	8.0	LAMA	IMB	KIK	5	5	0.08	
PIR	8.0	LAMA	IMB	KIK	5	5	0.02	0.18
PIR	9.0	LAMBA	IMB	KIK	5	1	0.18	
PIR	9.0	LAMBA	IMB	KIK	5	1	0.18	0.37
PIR	9.0	LAMBA	IMB	KIK	5	2	0.08	
PIR	9.0	LAMBA	IMB	KIK	5	2	0.08	
PIR	9.0	LAMBA	IMB	KIK	5	2	0.08	0.16
PIR	9.0	LAMBA	IMB	KIK	5	5	0.40	
PIR	9.0	LAMBA	IMB	KIK	5	5	0.40	0.80
PIR	7.0	LUTSHIMA	MUN	KIK	24	1	0.75	0.75
PIR	7.0	MALUNGA	KIL	KIK	24	5	0.80	0.80
PIR	9.0	MBANZA	MUN	KIK	120	1	0.63	0.63
PIR	9.0	MBANZA	MUN	KIK	120	5	0.20	0.20
PIR	6.0	MBELO	KIP	KIK	6	1	0.18	
PIR	8.0	MBUTO	MUN	KIK	18	1	0.54	
PIR	6.0	MBUTO	MUN	KIK	19	1	0.12	0.84
PIR	7.0	MBUTO	MUN	KIK	18	5	0.80	
PIR	8.0	MBUTO	MUN	KIK	18	5	0.18	1.18

TABLE SUMMARY OF RIVER TRANSPORT DATA - KIKWIT PORT (5)

Vehicle Poids/prod.		ORIGINE		Dest.	Temps	Nature	Poids Total	
Type Huile	Descr.	VILLAGE	Coll.				Menisc	Maie
PIR	6.0	MWENGA	MUN	KIK	26	1	0.60	0.60
PIR	6.0	MWENGA	MUN	KIK	26	5	0.20	0.20
PIR	5.0	NGASHI	MUN	KIK	6	1	0.30	0.30
PIR	5.0	NGASHI	MUN	KIK	6	5	0.03	0.03
PIR	8.0	NGONGO	MUN	KIK	48	1	0.72	
PIR	9.0	NGONGO	MUN	KIK	48	1	0.18	0.90
PIR	8.0	NGONGO	MUN	KIK	48	2	0.10	0.10
PIR	9.0	NGONGO	MUN	KIK	48	5	0.80	0.80
PIR	10.0	NIEKENENE	MUN	KIK	23	1	0.30	0.30
PIR	10.0	NIEKENENE	MUN	KIK	23	5	1.00	1.00
POUS	500.0	KIK	KIK	KIN	60	1	30.00	
POUS	500.0	KIK	KIK	KIN	60	2	30.00	
POUS	500.0	KIK	KIK	KIN	60	5	3.00	
POUS	500.0	KIK	KIK	KIN	60	5	128.00	
POUS	500.0	KIK	KIK	KIN	60	7	56.00	
PIR	9.0	KIK	KIK	NIEKENENE	26	7	0.03	
PIR	9.0	KIK	KIK	NIEKENENE	26	7	0.01	

**APPENDIX - B**

**RIVER INVENTORY**

**KWILU RIVER**

**LUTSHIMA RIVER**

**THE KWENGE RIVER**

**LUKUFU RIVER**

**BWELE-MILONDA RIVER**

## **APPENDIX B      RIVER INVENTORY**

The purpose of the river inventory, within the context of the Bandundu Transport Sector Marketing Study, was to determine the possibilities of navigation on the smaller rivers in the study region which could serve for the evacuation of agricultural produce to the larger ports for transshipment to the Kinshasa market. Up to the time that this activity was terminated by the deteriorating security situation during the last week of September, the navigability of the following rivers had been investigated:

- the Kwilu south of Kikwit;
- the Lutshima
- the Kwenge
- the Lufuku
- the Bwele-Milonda

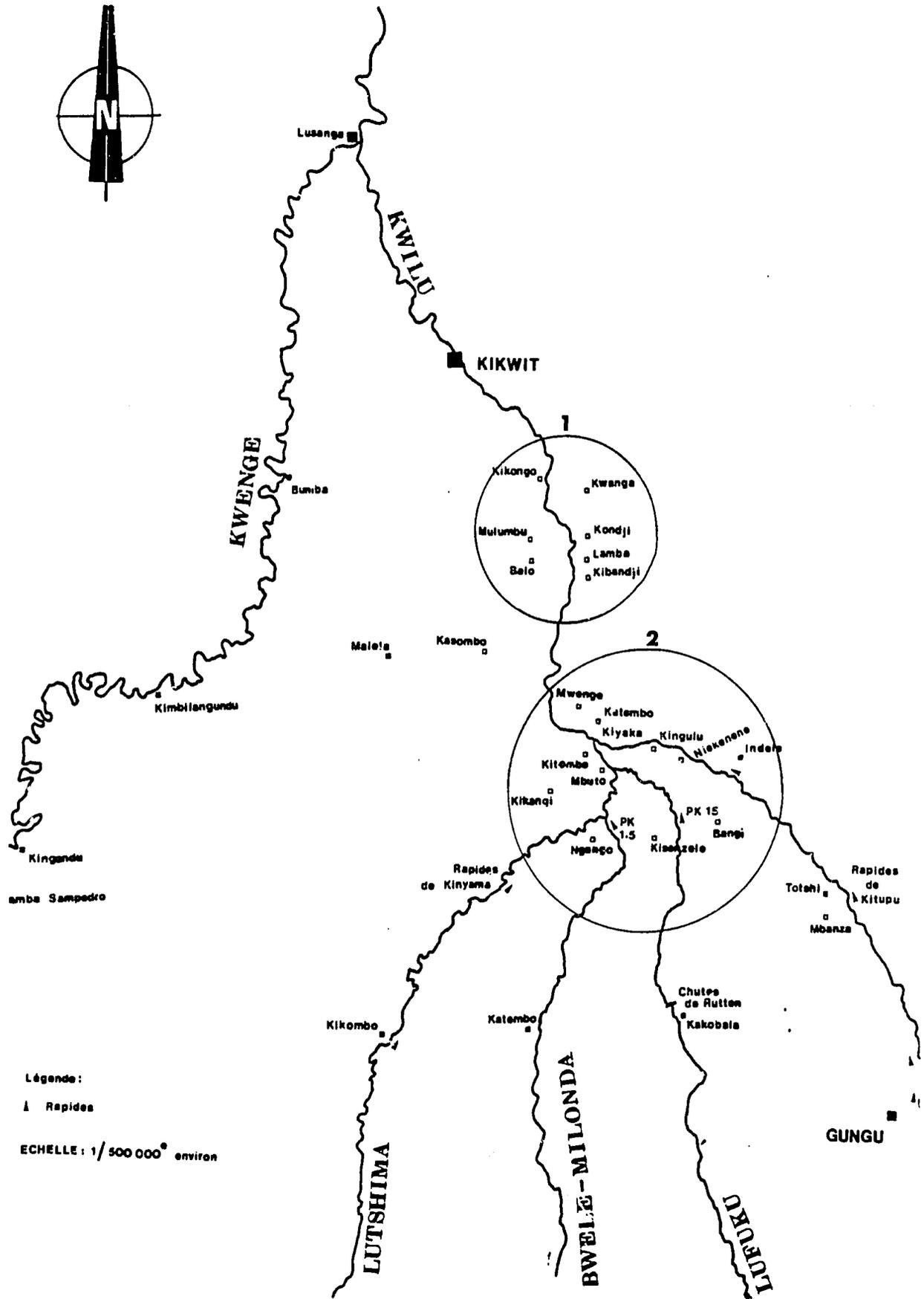
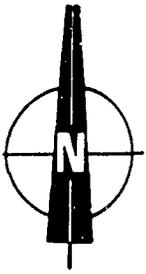
Since the study was done during the month of September which corresponds to the height of the dry season, the low water measurements approached quite closely the true low water confirmed by the villagers in the area. This does not show the same results as the data from the Geographic Institute of Zaire.

The study began with the collection of maps at 1/50,000 and 1/200,000 scale from the Geographic Institute of Zaire. These maps formed the basis for the information to be gathered in the field, such as depth, width, visible obstacles, and vegetation.

The data gathering was done by travelling up the rivers in a Zodiac inflatable raft with an outboard motor. Movement to the rivers was accomplished with 2 all terrain vehicles. The depth information was gathered with a depth finder "Echopilot Classic Plus". The river widths were measured using a distance finder, "Topo Fil". The maps were used to determine the lengths of the rivers travelled.

Before exploring a river, local canoe operators were queried concerning river conditions so as to avoid certain difficult passages. In all, the fieldwork was accomplished without problems.

In the following text the data on each river studied are shown on the maps covering 10 kilometers each and show the vertical profile of the river bottom and the general plan, indicating the characteristics listed above.



## **KWILU RIVER**

## **KWILU RIVER**

This river is navigable from Kikwit (pk0) to the Indenle rapids (pk77). Above these, the navigability is interrupted by several rapids, such as those at pk 95, pk 117 and pk120. Apart from certain difficult passages, the river is deemed navigable to pk77 by baleinieres drawing up to 1.3 meters.

During the trip, it was noted that there was considerable transport of palm oil and manioc in small canoes towards Kikwit.

**KWILU RIVER**



**PK 77 - Rapides d'Indenle**



**PK 95 - Rapides de Kitupu**

24

**KWILU RIVER**



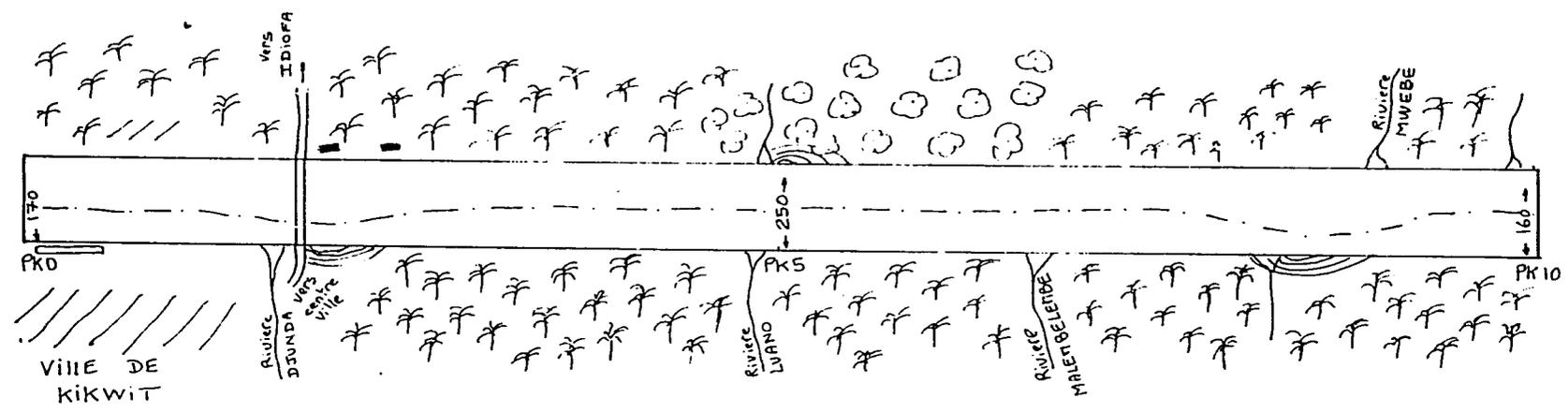
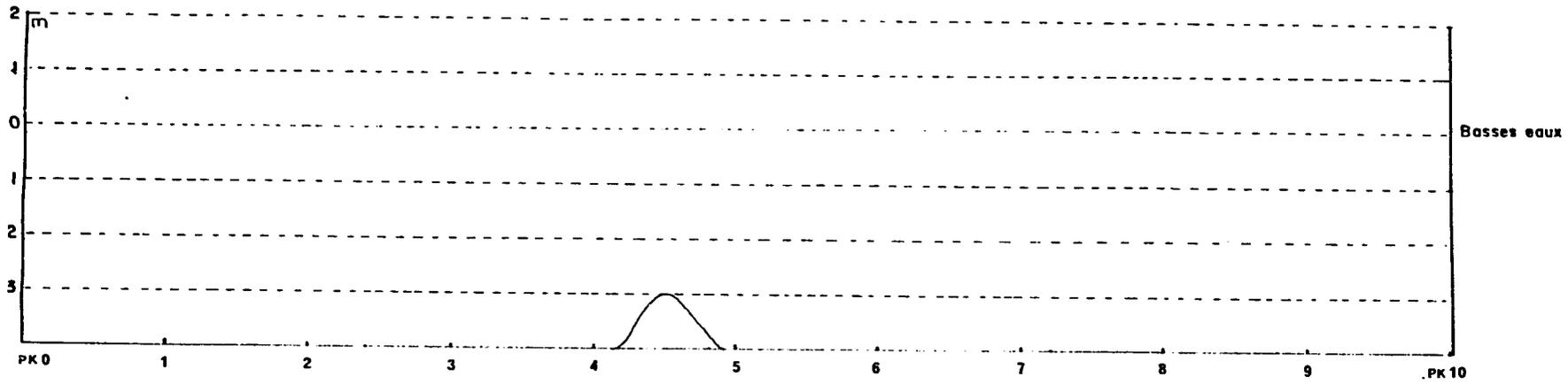
**PK117 - Village Kimunda**



**PK 120 - Ville de Gungu**

1  
25

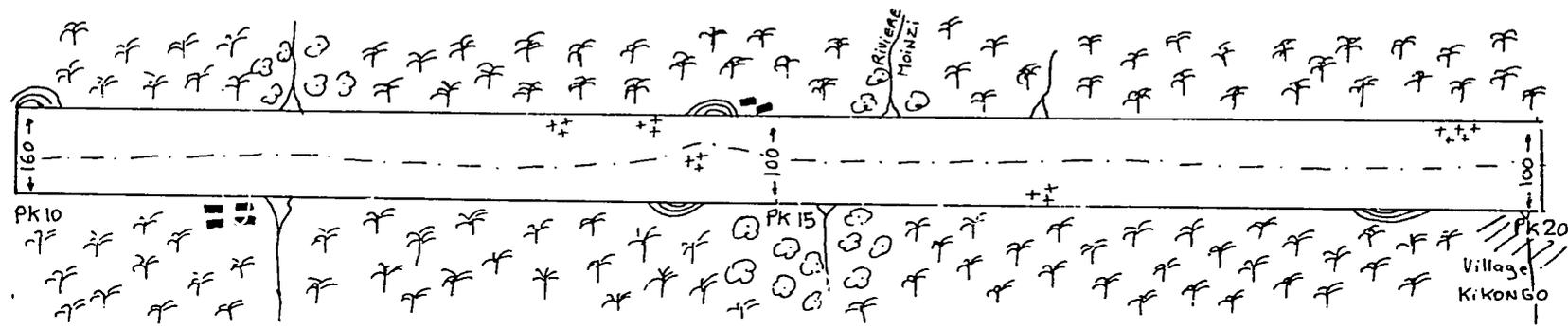
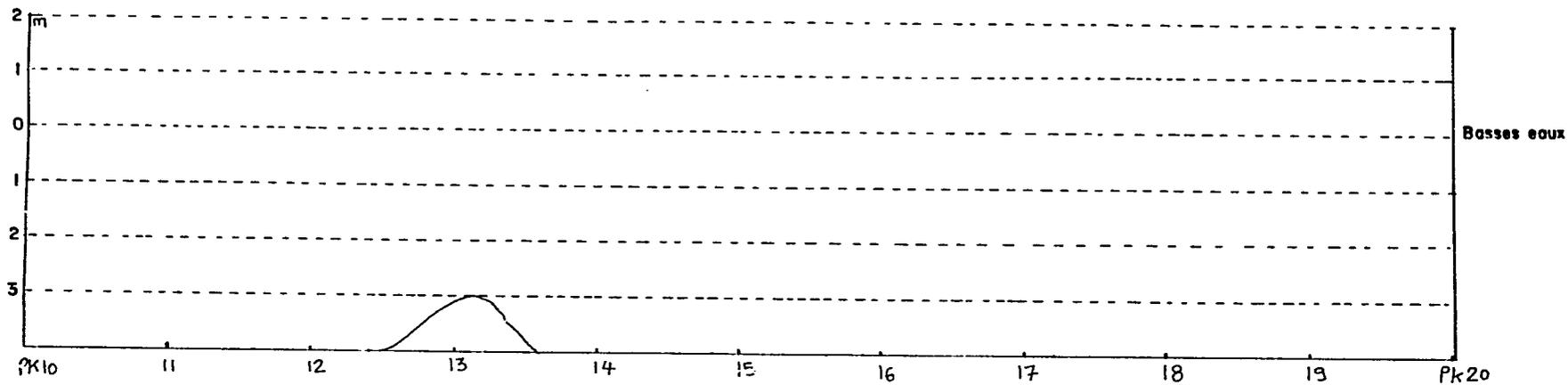
PROFIL EN LONG



- LEGENDE:
- case
  - /// village
  - II pont
  - ☐ bac
  - ← 60+ largeur
  - ☒ huilerie
  - ☐ débarcadère
  - ☒ épave
  - ⇒ route
  - piste
  - ~ rivière
  - ☼ savane
  - ☁ forêt
  - ☒ plantations
  - ☒ marécage
  - + + + rocher
  - ☒ snags
  - ☒ colline
  - chenal

BANDUNDU TRANSPORT SECTOR  
AND MARKETING STUDY  
RIVER INVENTORY

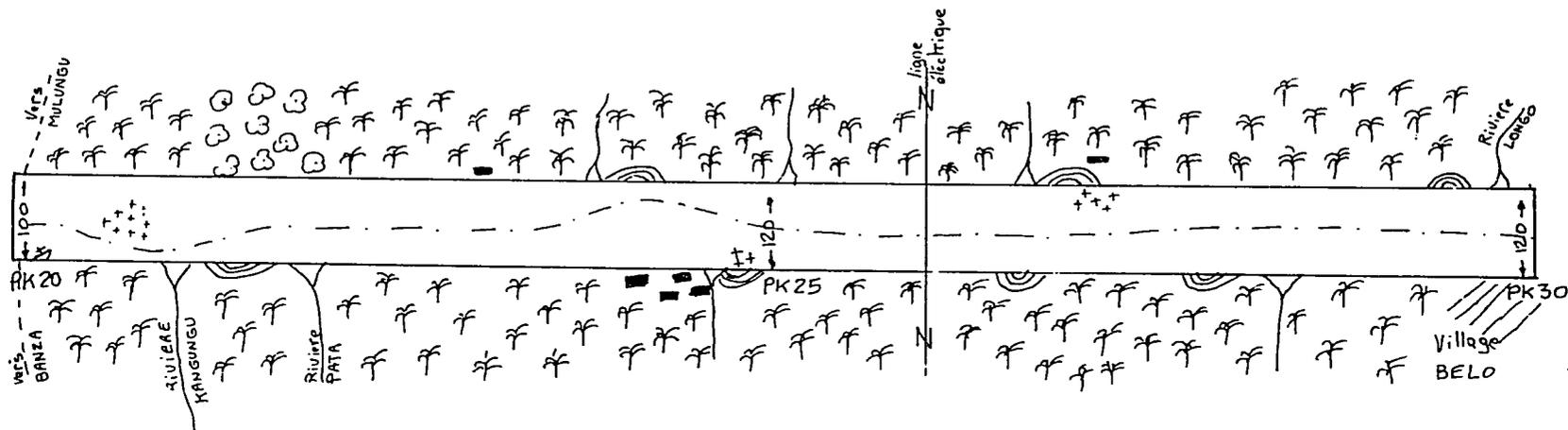
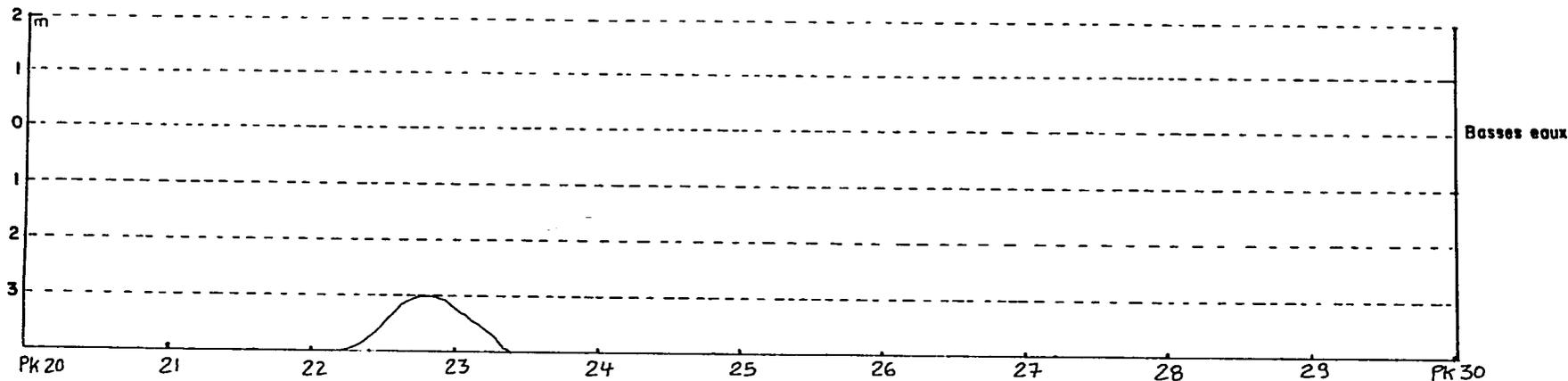
KWILU RIVER KM 0 to 10



- LEGENDE:**
- |                |            |               |            |
|----------------|------------|---------------|------------|
| ■ case         | ≡ épave    | • savane      | + + rocher |
| /// village    | ⇒ route    | ☁ forêt       | ⌒ snags    |
| ⌌ pont         | --- piste  | 🌳 plantations | ⌒ colline  |
| ⊔ bac          | ⌒ rivière  | ⌒ marécage    | --- chenal |
| ← 60 → largeur | ⊠ huilerie |               |            |

BANDUNDU TRANSPORT SECTOR  
AND MARKETING STUDY  
RIVER INVENTORY  
KWILU RIVER KM 10 to 20

PROFIL EN LONG



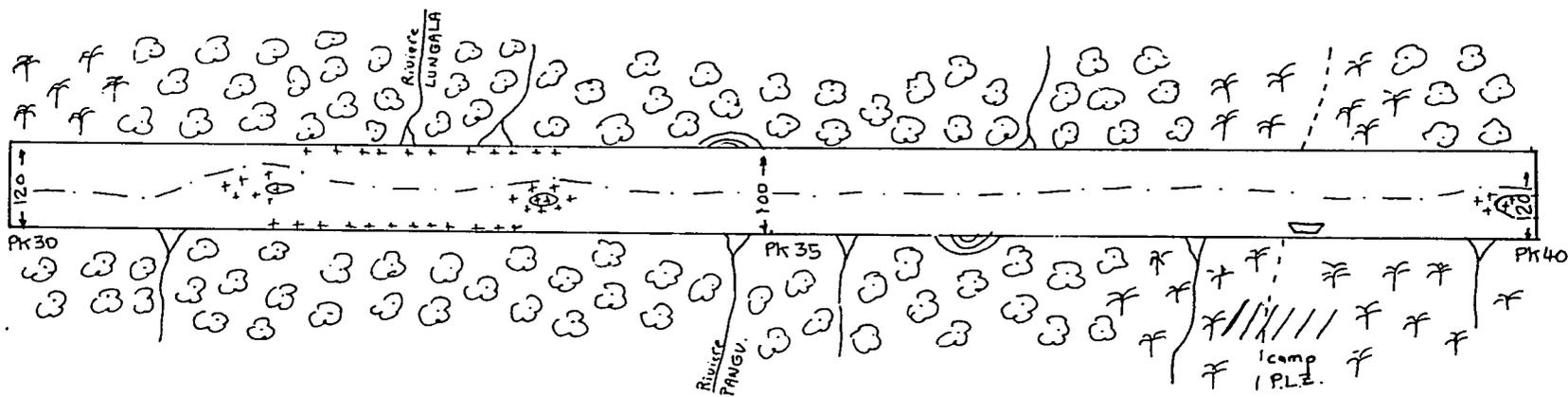
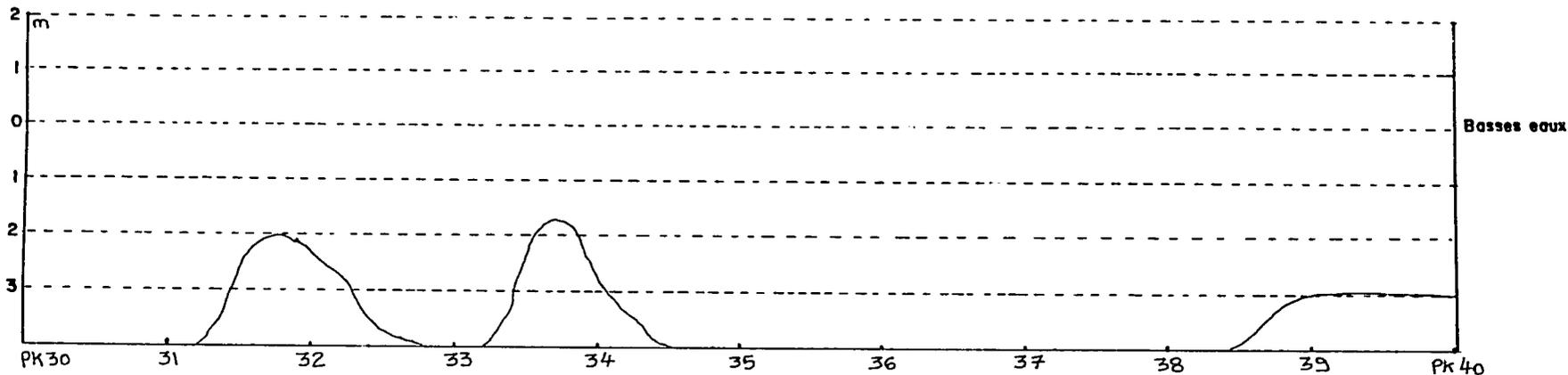
LEGENDE:

■ case	⚓ épave	☼ savane	+ + rocher
//// village	⇒ route	☪ forêt	⌒ snags
II pont	- - - piste	🌳 plantations	⌒ calline
⊔ bac	~ rivière	🌿 marécage	- - - chenal
← 60 → largeur	⊠ huilerie		

BANDUNDU TRANSPORT SECTOR  
AND MARKETING STUDY  
RIVER INVENTORY

KWILU RIVER KM 20 to 30

PROFIL EN LONG



LEGENDE:

■ case	≡ épave	••• savane	+ + rocher
//// village	⇒ route	☁ forêt	⌒ snags
∩ pont	- - - piste	☎ plantations	⌒ colline
▭ bac	∩ rivière	∩ marécage	- - - chenal
← 60 → largeur	⊠ huilerie		

BANDUNDU TRANSPORT SECTOR

AND MARKETING STUDY

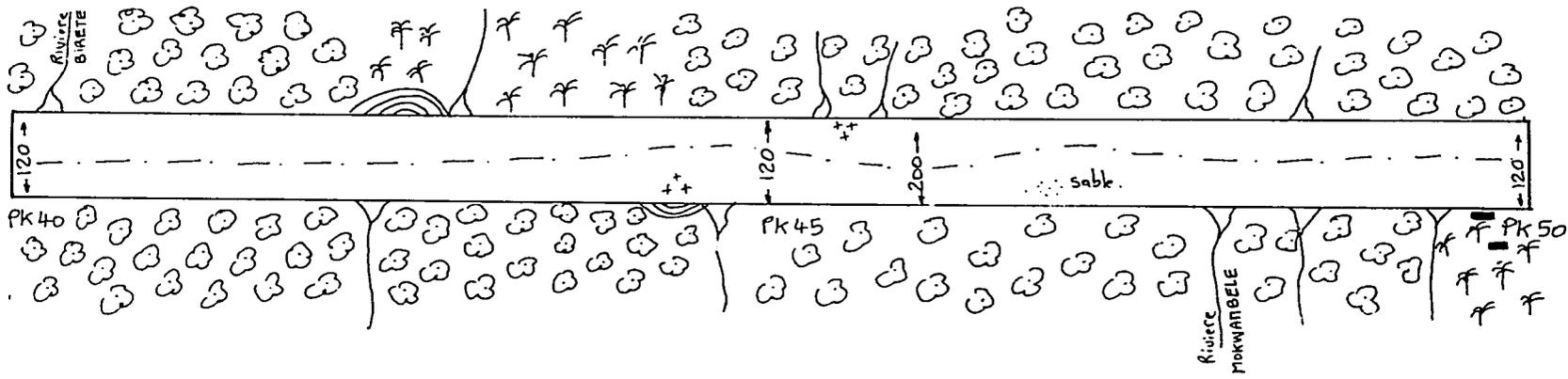
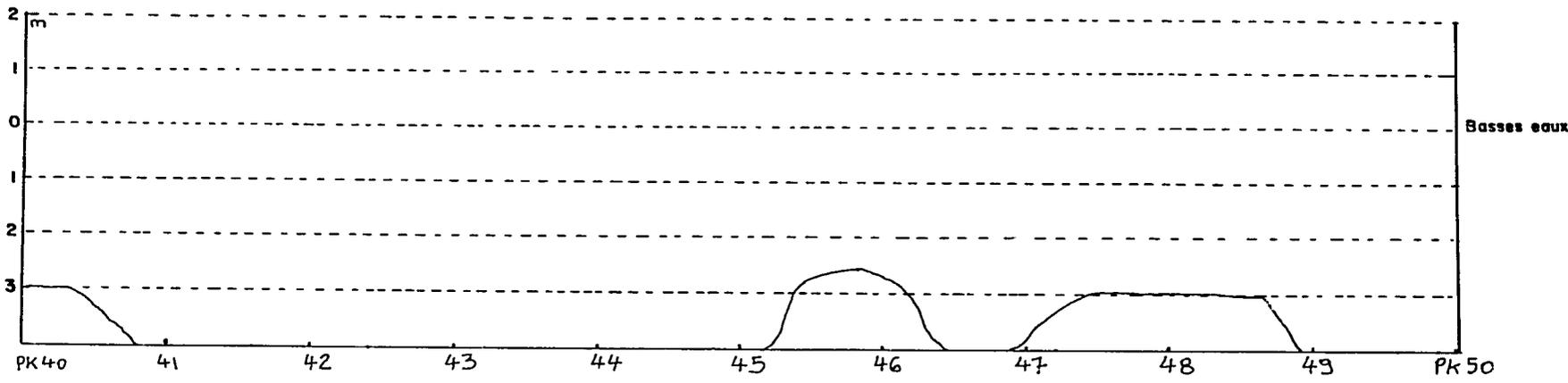
RIVER INVENTORY

KWILU RIVER

KM 30 to 40

W

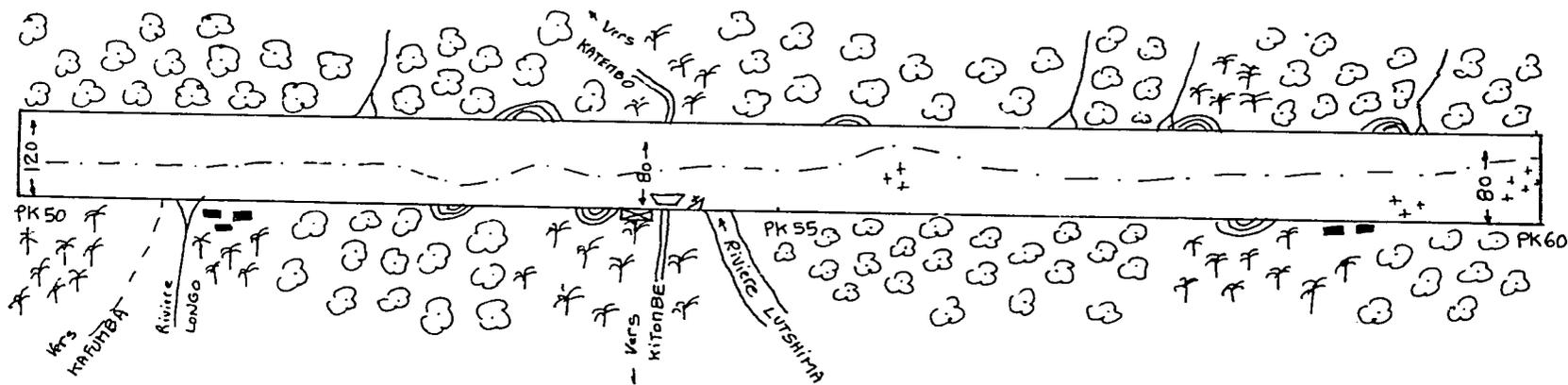
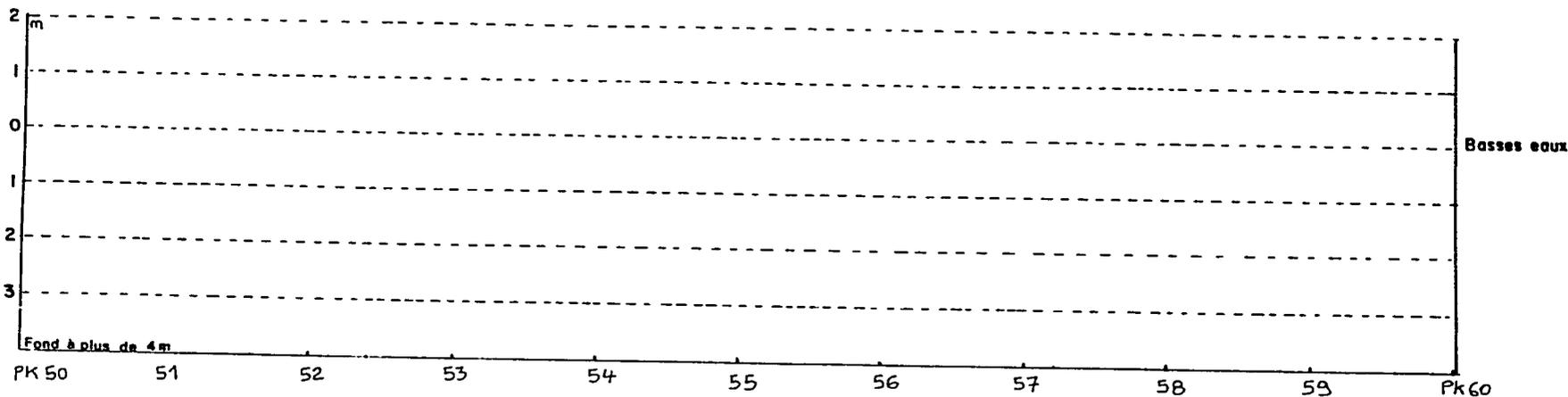
PROFIL EN LONG



- LEGENDE:
- |                |             |               |              |
|----------------|-------------|---------------|--------------|
| ■ case         | ↘ épave     | ☼ savane      | + + + rocher |
| //// village   | ⇒ route     | ☁ forêt       | ⌋ snags      |
| ⌌ pont         | - - - piste | 🌳 plantations | ⌒ colline    |
| ▭ bac          | ∩ rivière   | 🌿 marécage    | - - - chenal |
| ← 60 → largeur | ☒ huilerie  |               |              |

BANDUNDU TRANSPORT SECTOR  
AND MARKETING STUDY  
RIVER INVENTORY  
KWILU RIVER KM 40 to 50

06



LEGENDE :

- |                |             |               |              |
|----------------|-------------|---------------|--------------|
| ■ case         | ⚓ épave     | ☼ savane      | + + rocher   |
| /// village    | ⇒ route     | ☁ forêt       | ⌒ snags      |
| ⌒ pont         | - - - piste | 🌳 plantations | ⌒ calline    |
| ⊔ bac          | ⌒ rivière   | 🌿 marécage    | - - - chenal |
| ← 60 → largeur | ⊠ huilerie  |               |              |

BANDUNDU TRANSPORT SECTOR

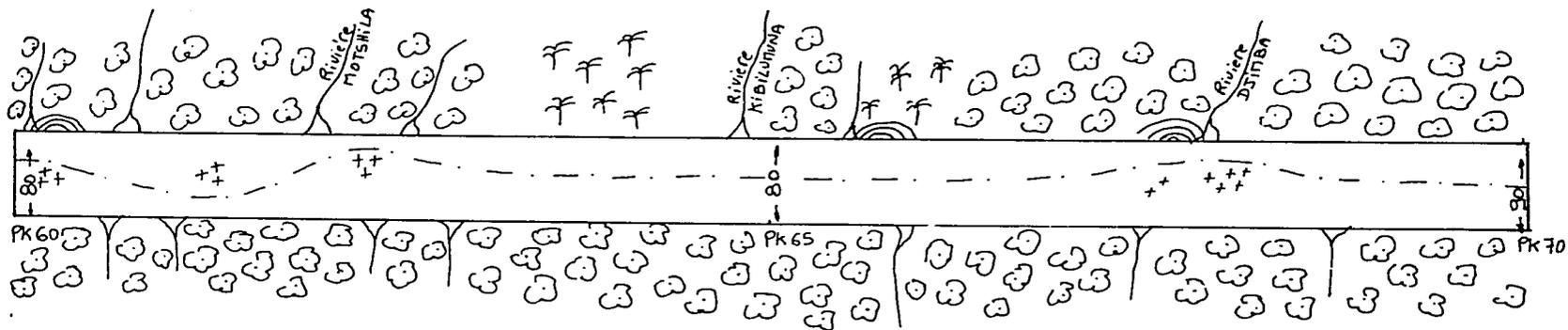
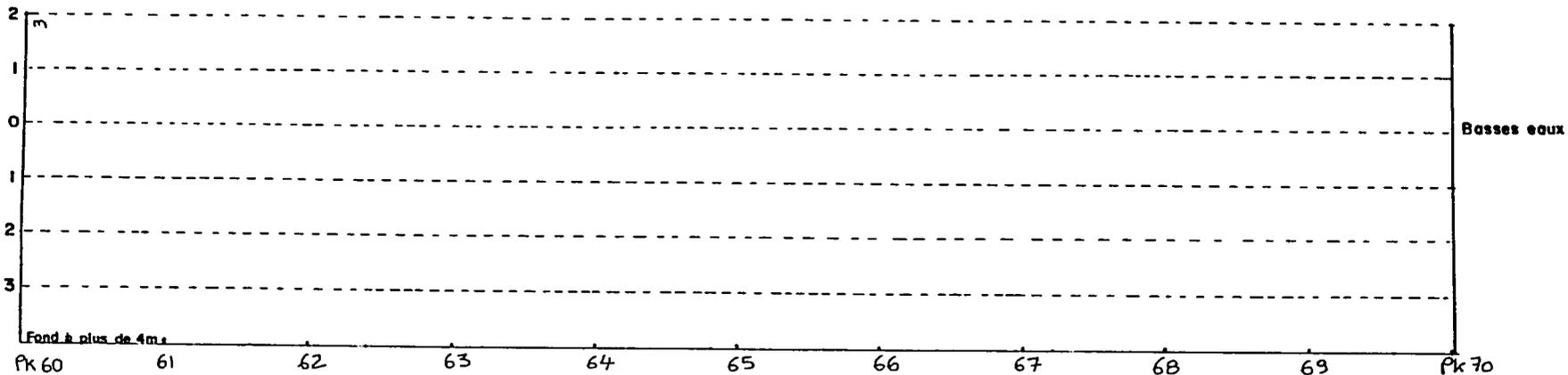
AND MARKETING STUDY

RIVER INVENTORY

KWILU RIVER

KM 50 to 60

16



LEGENDE:

- |                |            |               |              |
|----------------|------------|---------------|--------------|
| ■ case         | ≡ épave    | ☼ savane      | + + rocher   |
| //// village   | ⇒ route    | ☁ forêt       | ⌒ snags      |
| ⊥ pont         | - - piste  | ⌘ plantations | ⌒ colline    |
| ⊃ bac          | ∩ rivière  | ∩ marécage    | - - - chenal |
| ← 60 → largeur | ⊠ huilerie |               |              |

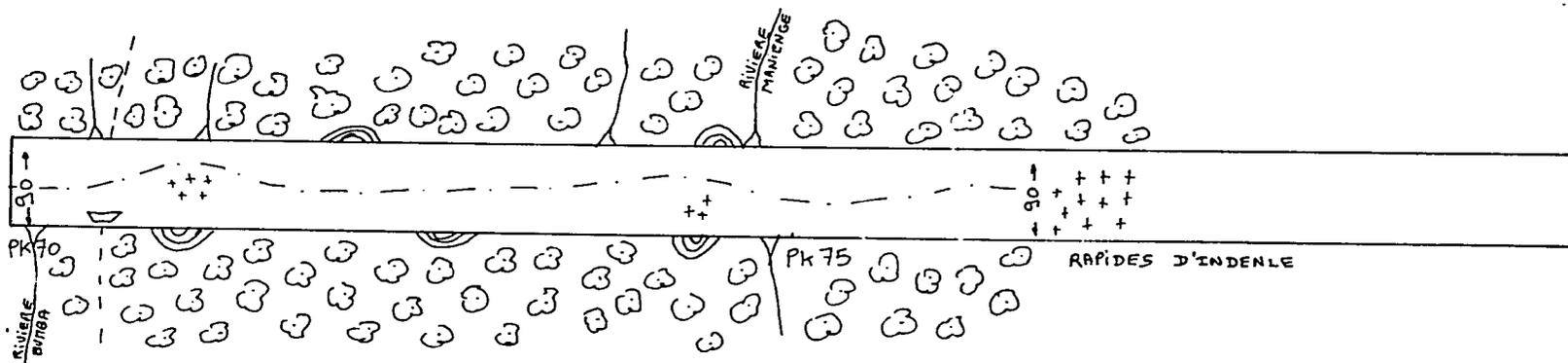
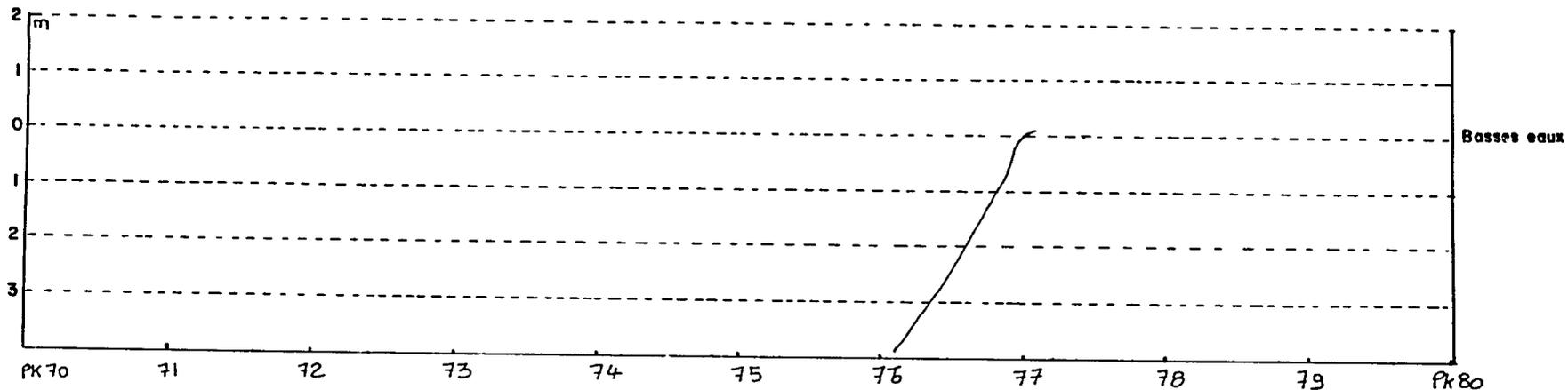
BANDUNDU TRANSPORT SECTOR

AND MARKETING STUDY

RIVER INVENTORY

KWILU RIVER

KM 60 to 70



**LEGENDE:**

■ case	⚓ épave	☼ savane	+ + rocher
/// village	⇒ route	☁ forêt	⌒ snags
≡ pont	- - - piste	🌳 plantations	⌒ colline
▭ bac	~ rivière	🌿 marécage	- - - chenal
← 60 → largeur	☒ huilerie		

**BANDUNDU TRANSPORT SECTOR  
AND MARKETING STUDY  
RIVER INVENTORY  
KWILU RIVER KM 70 to 77**

## LUTSHIMA RIVER

## **LUTSHIMA RIVER**

**This river is navigable from its confluence with the Kwilu to the rapids of Kinyama (pk 35). Above this, navigability is non existant. It was noted that there exists considerable agricultural activity the products of which are evacuated down river by canoe to the Kwilu.**

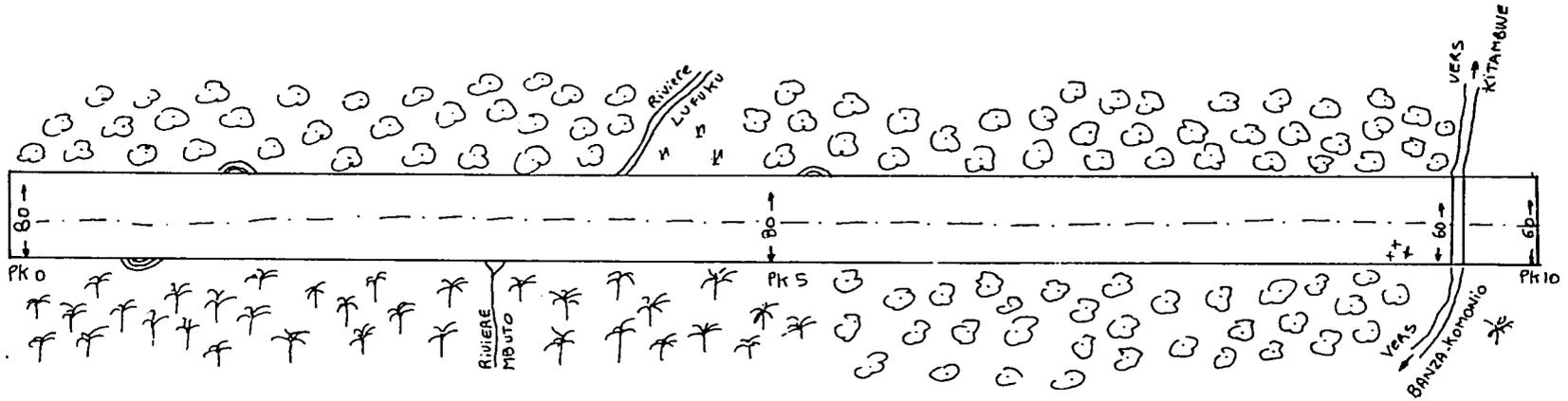
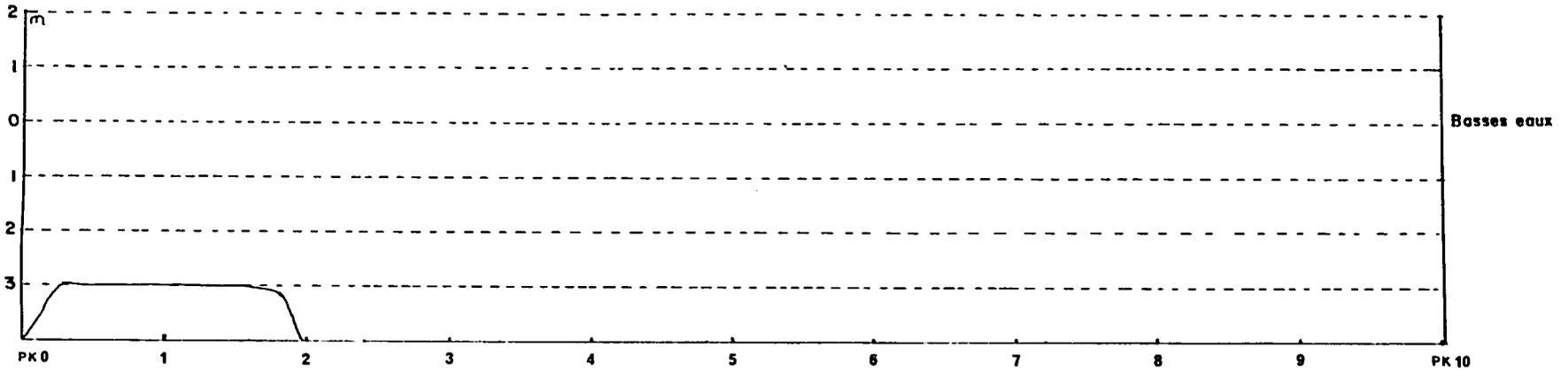
**LUTSHIMA RIVER**



**PK 35 - Rapides de Kinyama**



**PK 61 - Rapides de Kikombo**



LEGENDE:

■ case	⚓ épave	☼ savane	++ rocher
//// village	⇒ route	☁ forêt	☾ snags
II pont	--- piste	🌳 plantations	🌊 calline
⊃ bac	~ rivière	🌿 marécage	--- chenal
← 60 → largeur	☒ huilerie		

BANDUNDU TRANSPORT SECTOR

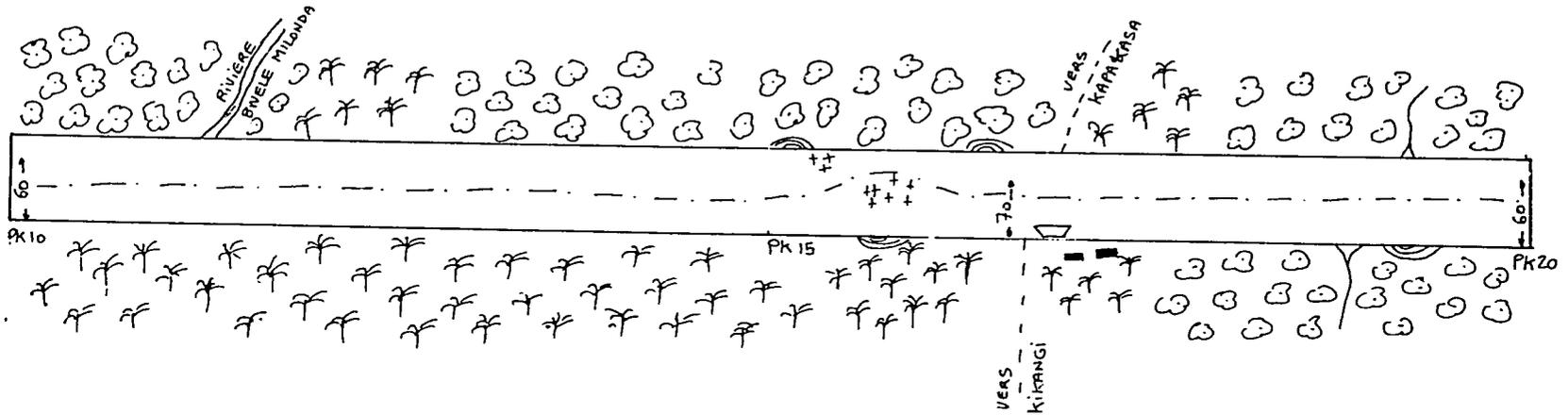
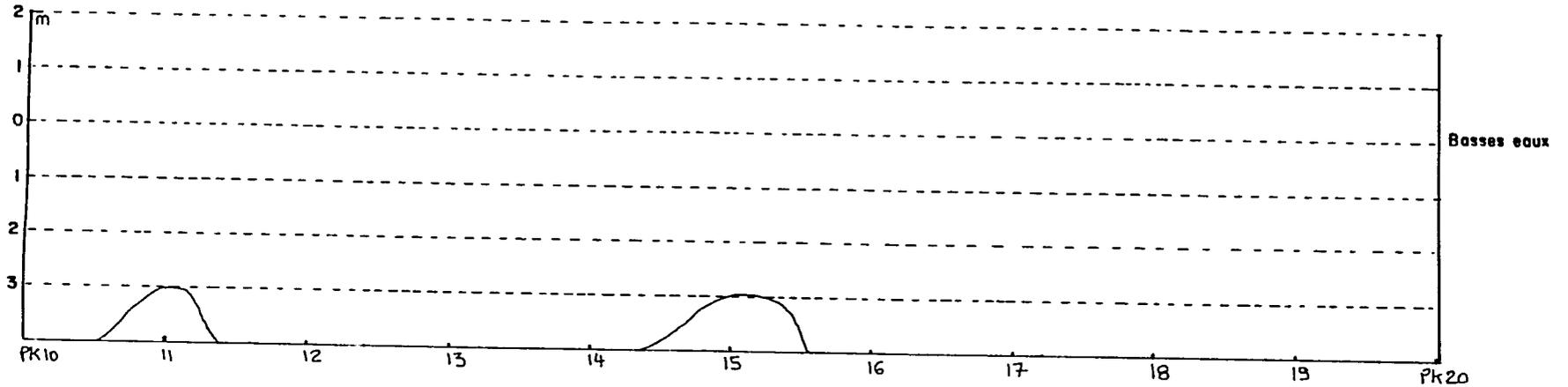
AND MARKETING STUDY

RIVER INVENTORY

LUTSHIMA RIVER

KM 0 to 10

PROFIL EN LONG



LEGENDE:

- |                |             |               |              |
|----------------|-------------|---------------|--------------|
| ■ case         | ⚓ épave     | ☼ savane      | + + rocher   |
| //// village   | ⇒ route     | ☁ forêt       | ⌒ snags      |
| ⌒ pont         | - - - piste | 🌴 plantations | ⌒ colline    |
| ▭ bac          | ⌒ rivière   | 🌿 marécage    | - - - chenal |
| ← 60 → largeur | ☒ huilerie  |               |              |

BANDUNDU TRANSPORT SECTOR

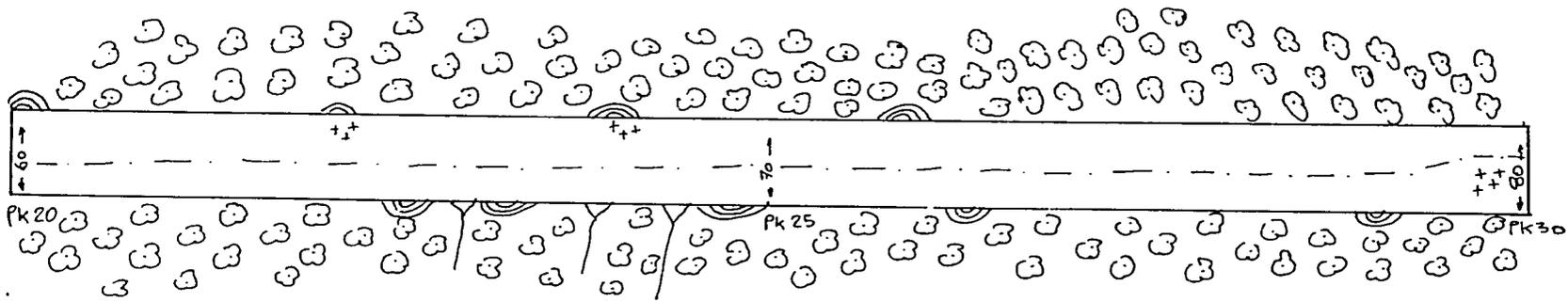
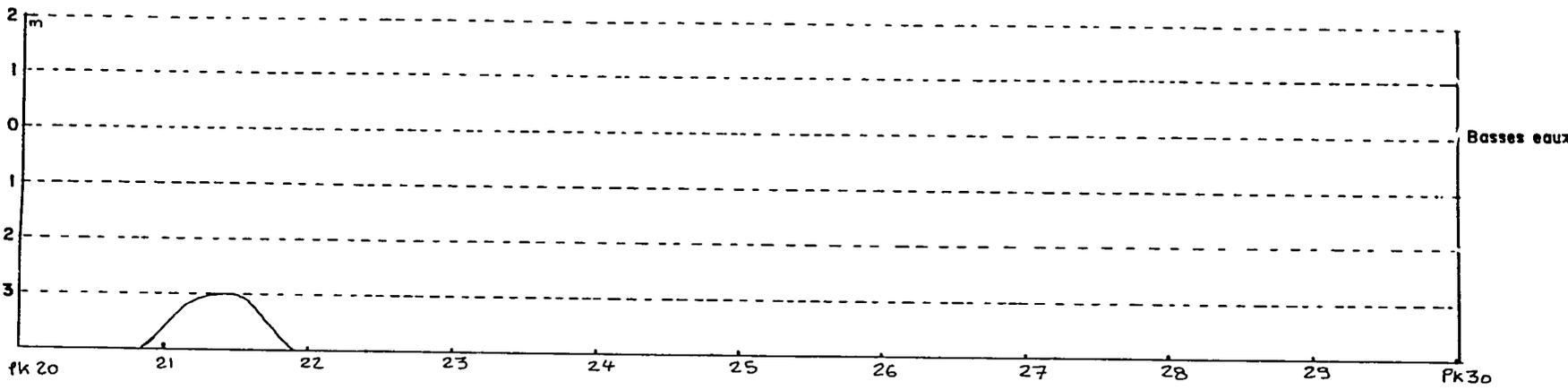
AND MARKETING STUDY

RIVER INVENTORY

LUTSHIMA RIVER

KM 10 to 20

PROFIL EN LONG



LEGENDE:

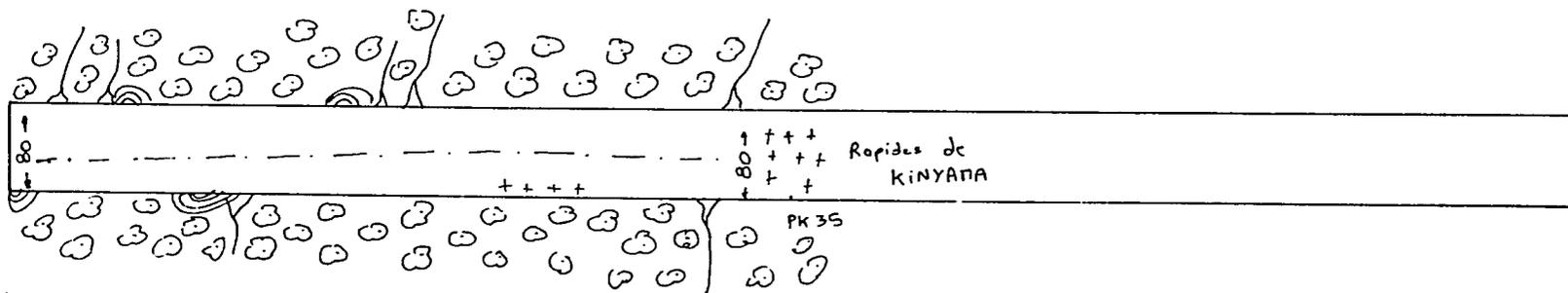
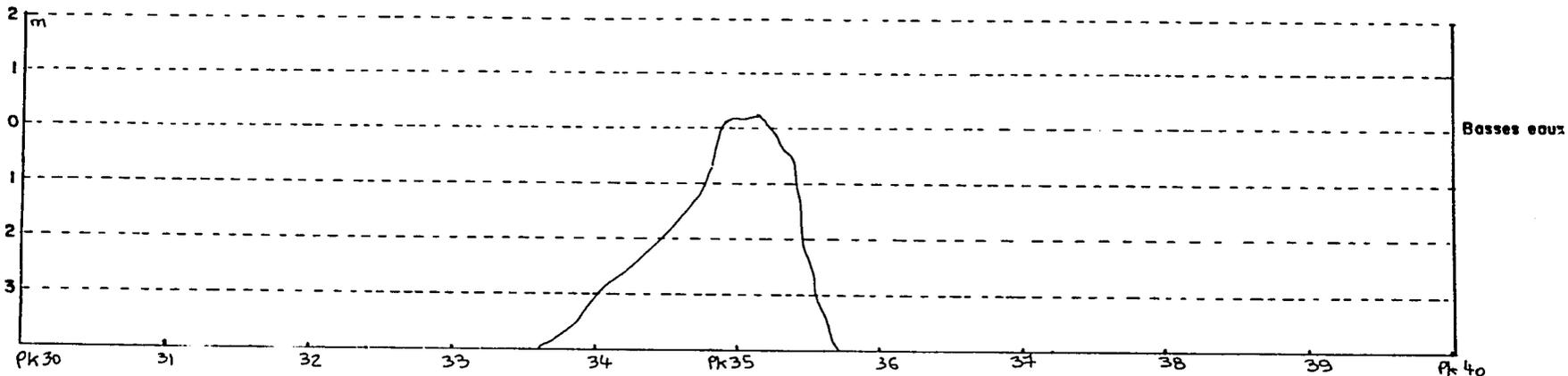
- |                |          |             |         |
|----------------|----------|-------------|---------|
| case           | épave    | savane      | rocher  |
| village        | route    | forêt       | snags   |
| pont           | piste    | plantations | colline |
| bac            | rivière  | marécage    | chenal  |
| ← 60 → largeur | huilerie |             |         |

BANDUNDU TRANSPORT SECTOR

AND MARKETING STUDY

RIVER INVENTORY

LUTSHIMA RIVER KM 20 to 30



LEGENDE:

- |                |             |               |              |
|----------------|-------------|---------------|--------------|
| ■ case         | ⚓ épave     | ☉ savane      | + + + rocher |
| //// village   | ⇒ route     | ☪ forêt       | ⌋ snags      |
| ⌌ pont         | - - - piste | 🌳 plantations | ⌒ colline    |
| ▭ bac          | ⌒ rivière   | 🌿 marécage    | - - - chenal |
| + 60 + largeur | ☒ hatterie  |               |              |

BANDUNDU TRANSPORT SECTOR

AND MARKETING STUDY

RIVER INVENTORY

LUTSHIMA RIVER

KM 30 to 35

ok

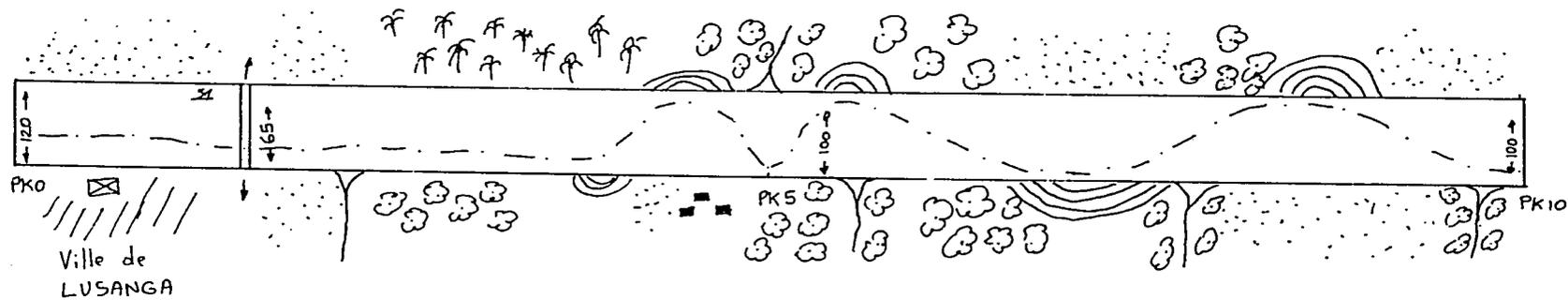
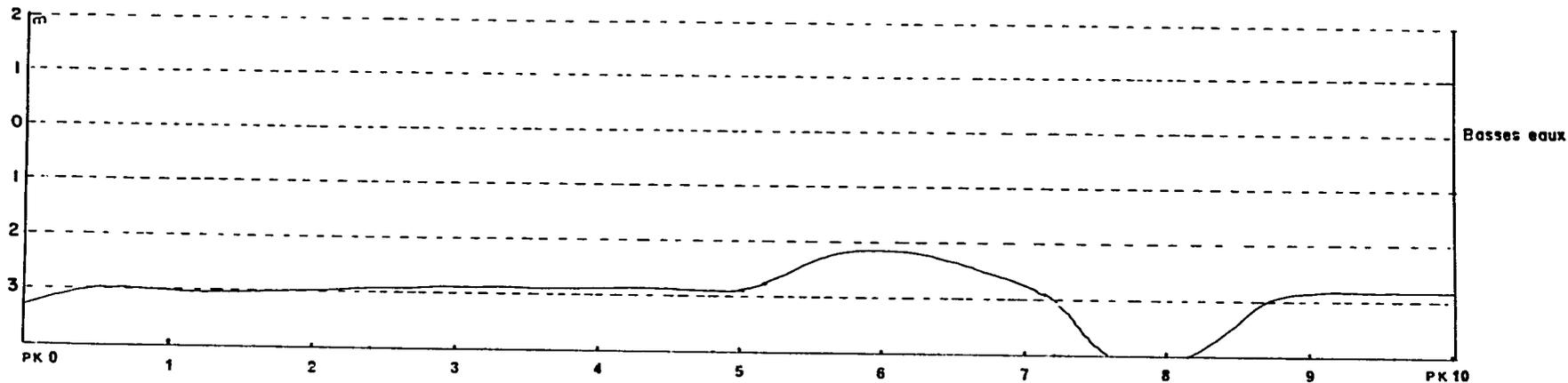
## **KWENGE RIVER**

## **THE KWENGE RIVER**

The Kwenge is navigable from its confluence with the Kwilu to Mayamba San Pedro (pk 200). The study was made up to Kimbilangundu (pk130). The river is currently utilized by Baleinieres up to Bumba (pk 63). The only obstacles encountered were a few snags.

The uniform width indicates that the watercourse is quite stable. The river consists of a series of large, u-shaped meanders, as seen from the map.

PROFIL EN LONG



LEGENDE:

- |                |          |             |         |
|----------------|----------|-------------|---------|
| case           | épave    | savane      | rocher  |
| village        | route    | foret       | snags   |
| pont           | piste    | plantations | colline |
| bac            | rivière  | marécage    | chenal  |
| ← 50 → largeur | hullerie |             |         |

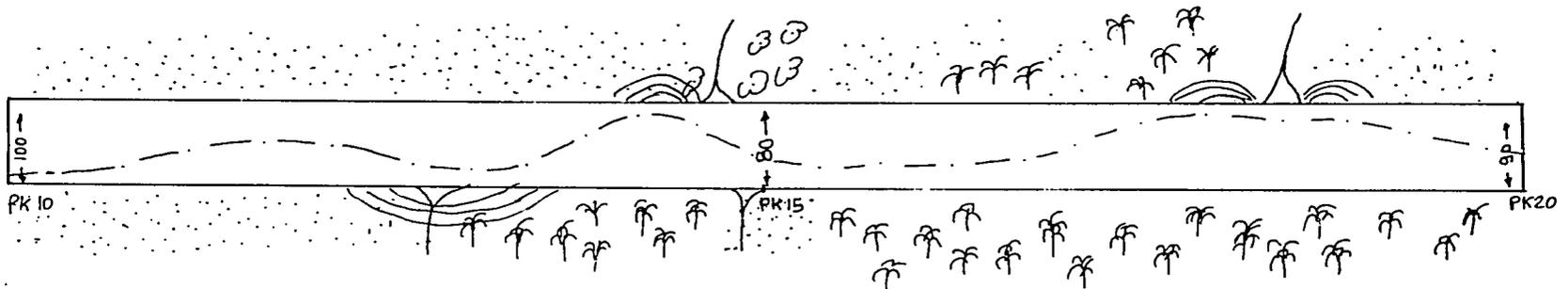
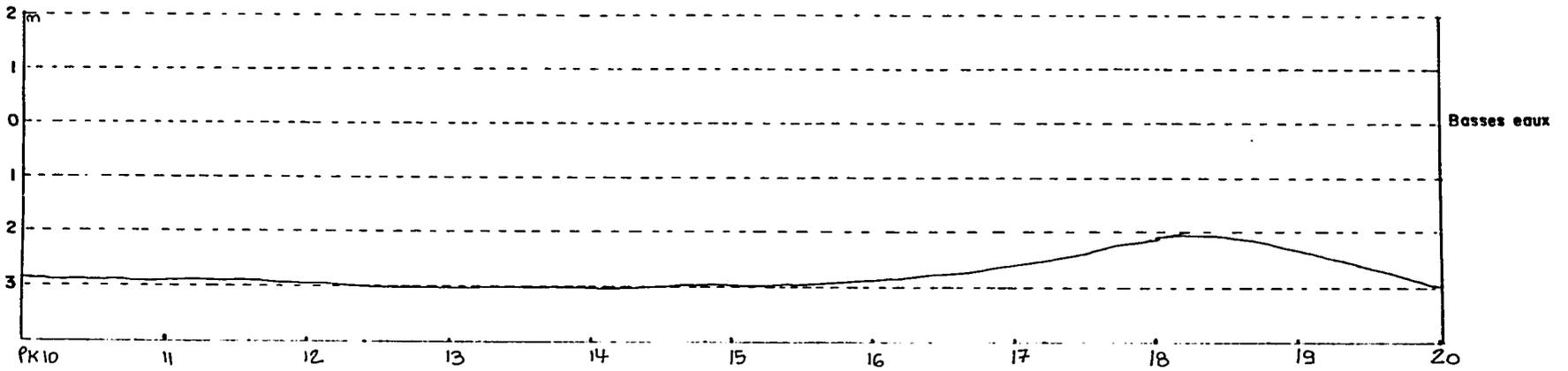
BANDUNDU TRANSPORT SECTOR

AND MARKETING STUDY

RIVER INVENTORY

KWENGE RIVER KM 0 to 10

Handwritten initials or mark.



LEGENDE:

- |                |             |               |              |
|----------------|-------------|---------------|--------------|
| ■ case         | ⚓ épave     | • savane      | + + rocher   |
| /// village    | ⇒ route     | ☁ forêt       | ⌋ snags      |
| II pont        | - - - piste | 🌳 plantations | ⌋ colline    |
| ▭ bac          | ∩ rivière   | ⚓ marécage    | - - - chenal |
| ← 60 → Inraeur | ⊠ huilerie  |               |              |

BANDUNDU TRANSPORT SECTOR

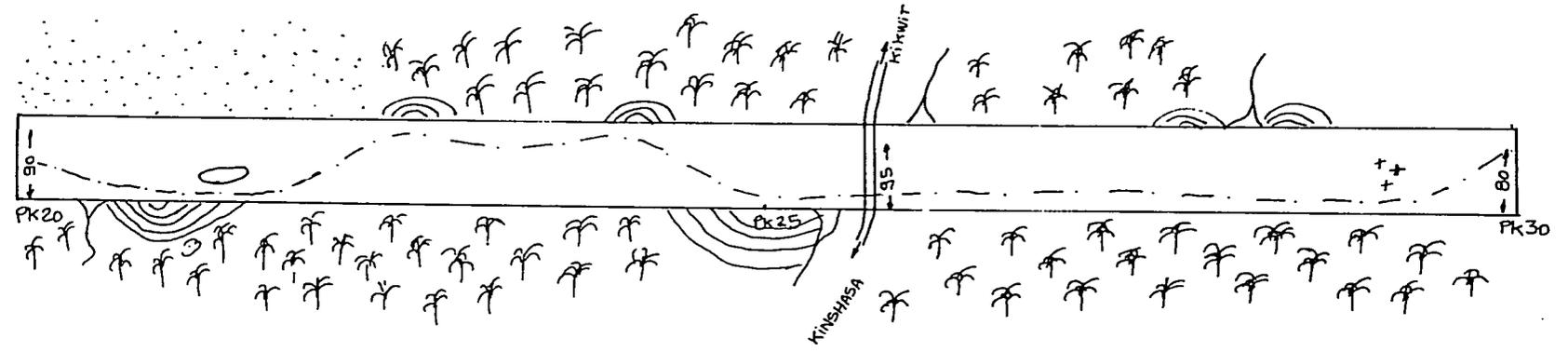
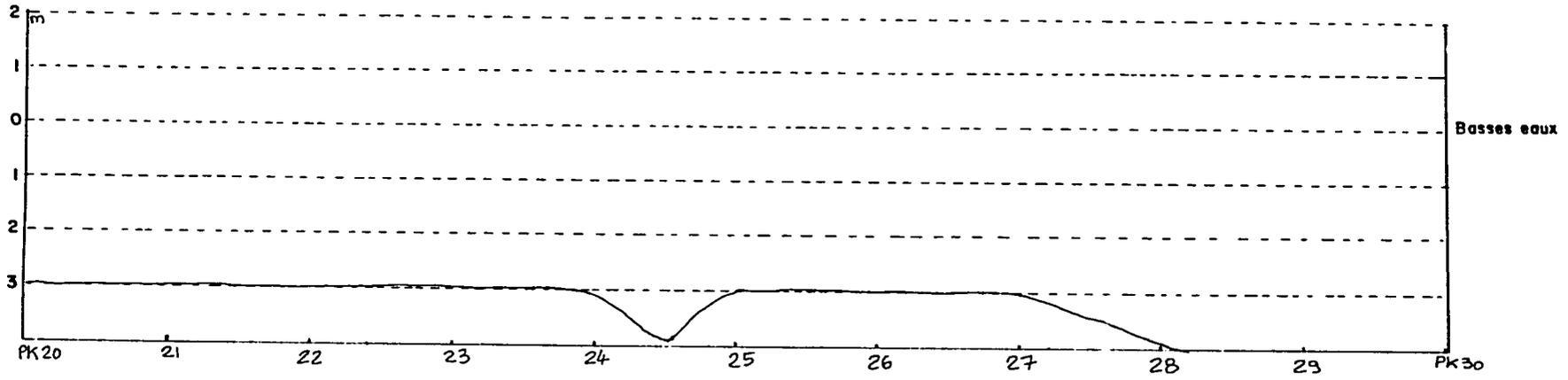
AND MARKETING STUDY

RIVER INVENTORY

KWENGE RIVER

KM 10 to 20

44



**LEGENDE:**

■ case	⚓ épave	• savane	+ + rocher
//// village	⇒ route	☁ forêt	⌋ snags
∩ pont	- - - piste	🌴 plantations	⌒ colline
⊏ bac	⌒ rivière	⌒ marécage	- - - chenal
← 60 → largeur	⊠ huilerie		

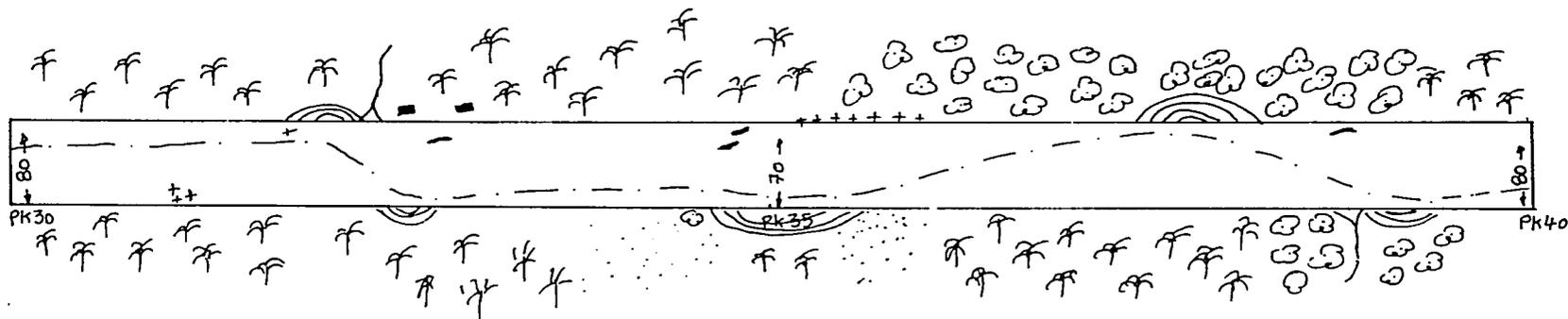
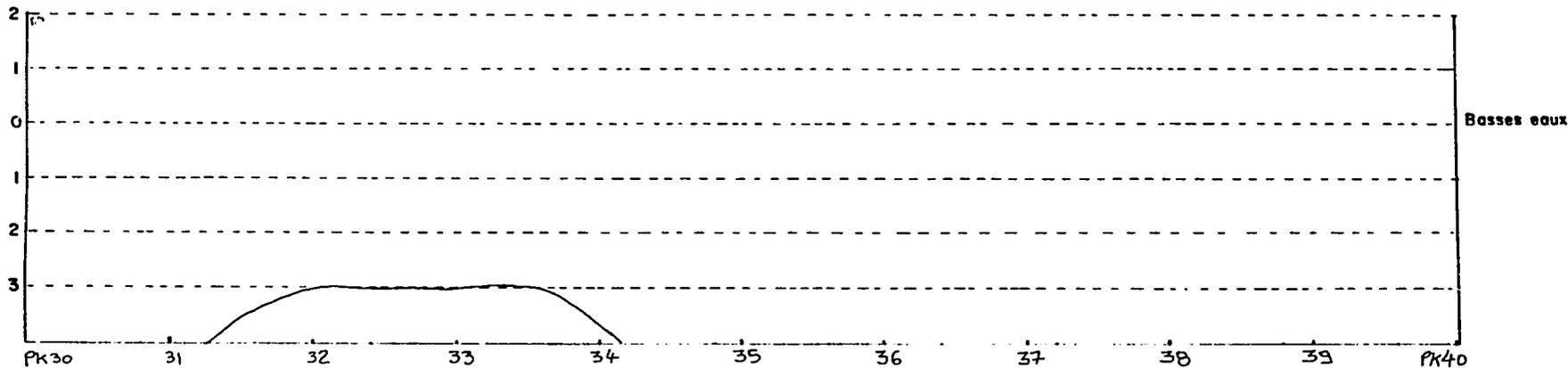
**BANDUNDU TRANSPORT SECTOR**

**AND MARKETING STUDY**

**RIVER INVENTORY**

**KWENGE RIVER**

**KM 20 to 30**



LEGENDE:

- |                |            |               |            |
|----------------|------------|---------------|------------|
| ■ case         | ≡ épave    | • savane      | + + rocher |
| //// village   | ⇒ route    | ☁ forêt       | ⌒ snags    |
| ⊥ pont         | --- piste  | 🌴 plantations | ⌒ colline  |
| ▭ bac          | ∩ rivière  | 🌿 marécage    | — chenal   |
| ← 60 → largeur | ⊠ huilerie |               |            |

BANDUNDU TRANSPORT SECTOR

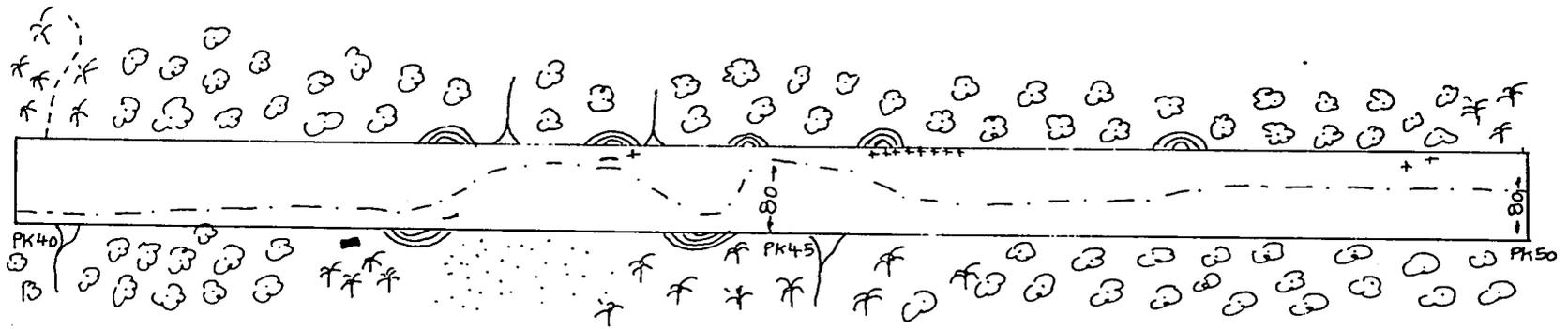
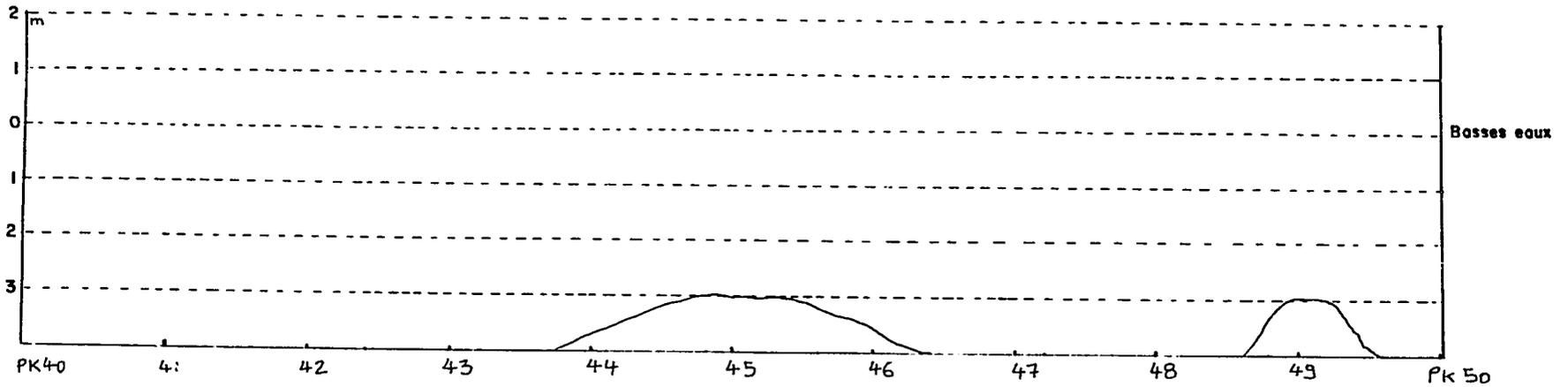
AND MARKETING STUDY

RIVER INVENTORY

KWENGE RIVER

KM 30 to 40

4/6



LEGENDE:

- |                |          |             |         |
|----------------|----------|-------------|---------|
| case           | épave    | savane      | rocher  |
| village        | route    | foret       | snags   |
| pont           | piste    | plantations | colline |
| bac            | rivière  | marécage    | chenal  |
| + 60 + largeur | huilerie |             |         |

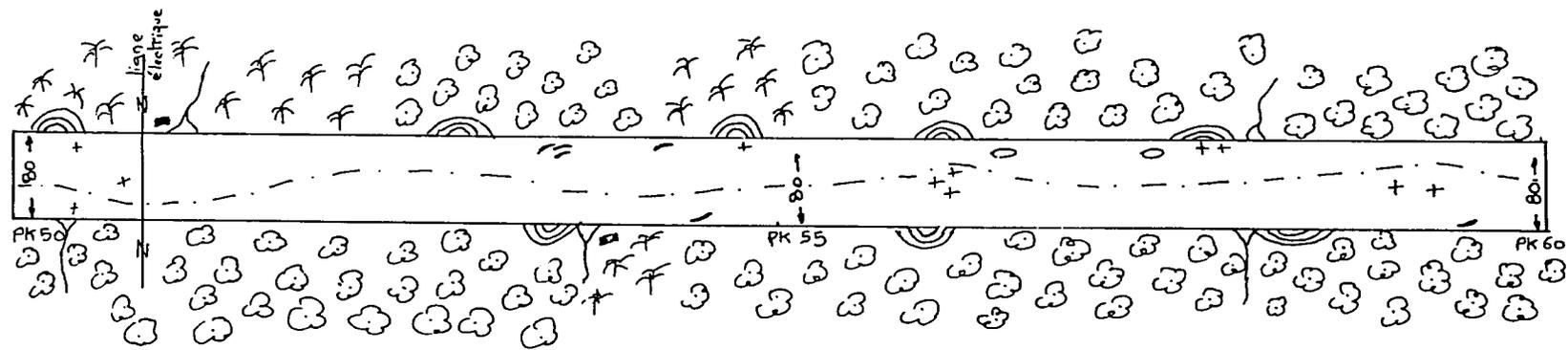
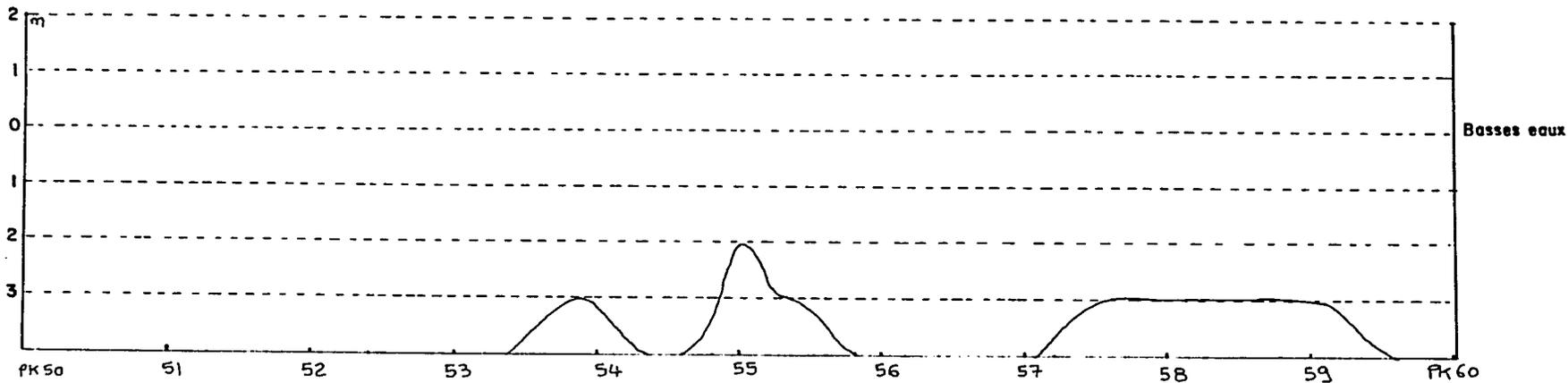
BANDUNDU TRANSPORT SECTOR

AND MARKETING STUDY

RIVER INVENTORY

KWENGE RIVER

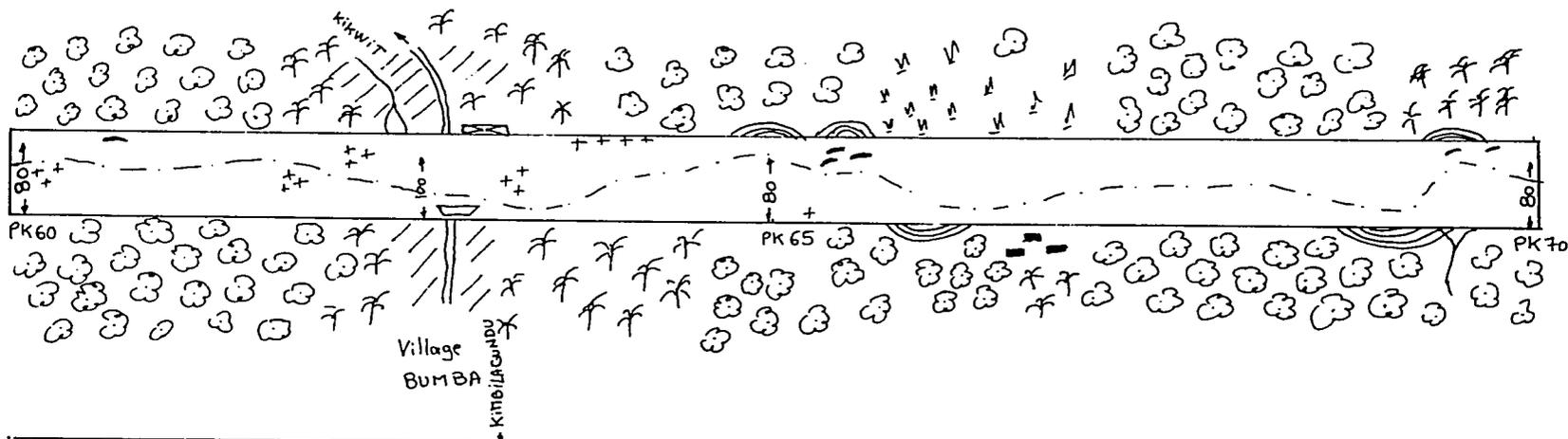
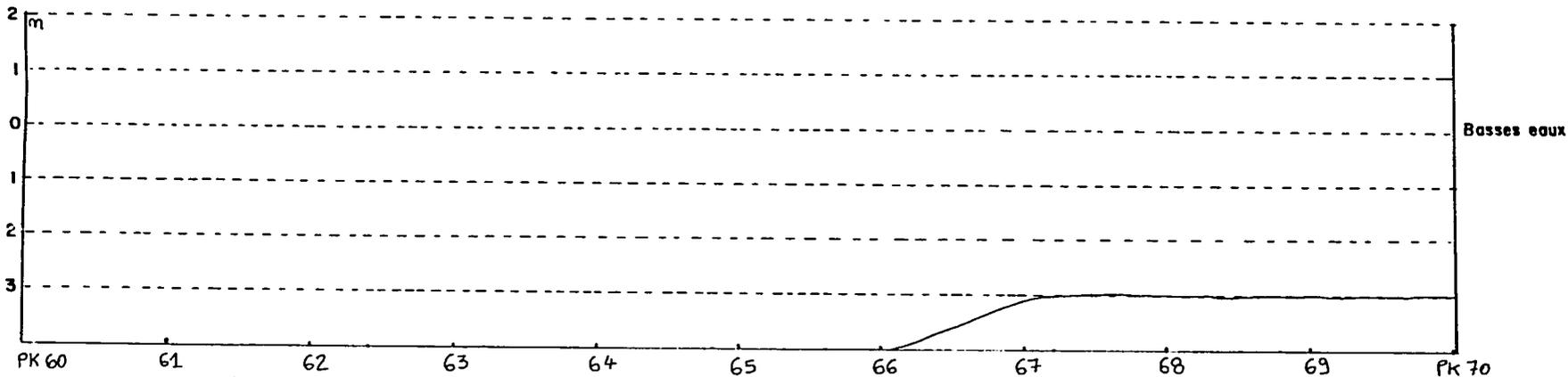
KM 40 to 50



- LEGENDE:
- |                |            |               |              |
|----------------|------------|---------------|--------------|
| ■ case         | ≡ épave    | ☁ savane      | + + rocher   |
| /// village    | ⇒ route    | ☁ forêt       | ⌋ snags      |
| ∩ pant         | - - piste  | 🌴 plantations | ⌒ colline    |
| ▭ bac          | ⌒ rivière  | 🌿 marécage    | - - - chenal |
| ← 60 → Inroeur | ⊠ huilerie |               |              |

BANDUNDU TRANSPORT SECTOR  
 AND MARKETING STUDY  
 RIVER INVENTORY  
 KWENGE RIVER KM 50 to 60

gh



LEGENDE:

- |                |            |               |              |
|----------------|------------|---------------|--------------|
| ■ case         | ≡ épave    | ☼ savane      | + + + rocher |
| //// village   | ⇒ route    | ☁ forêt       | ⌢ snags      |
| ⌌ pont         | --- piste  | 🌳 plantations | ⌒ colline    |
| ▭ bac          | ∩ rivière  | ∩ marécage    | --- chenal   |
| ← 60 → largeur | ⊠ huilerie | ▭ quais       |              |

BANDUNDU TRANSPORT SECTOR

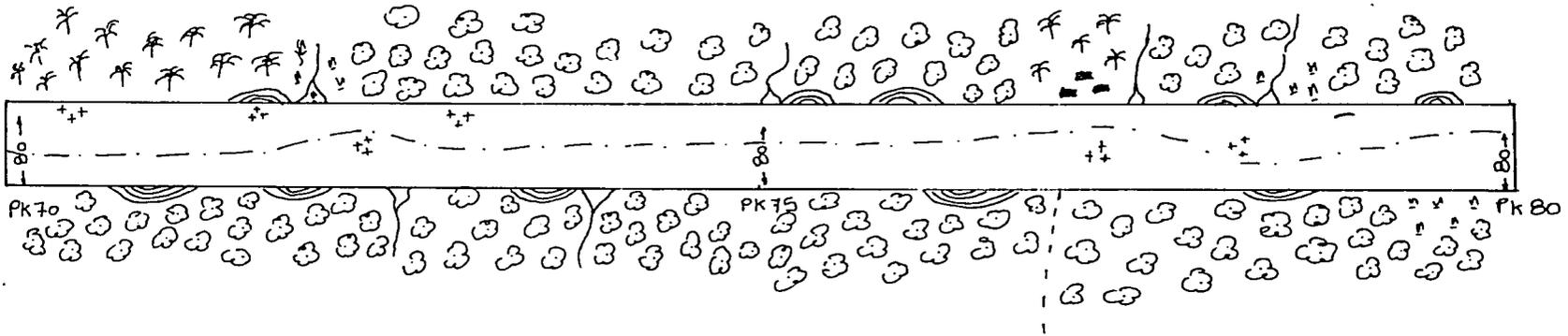
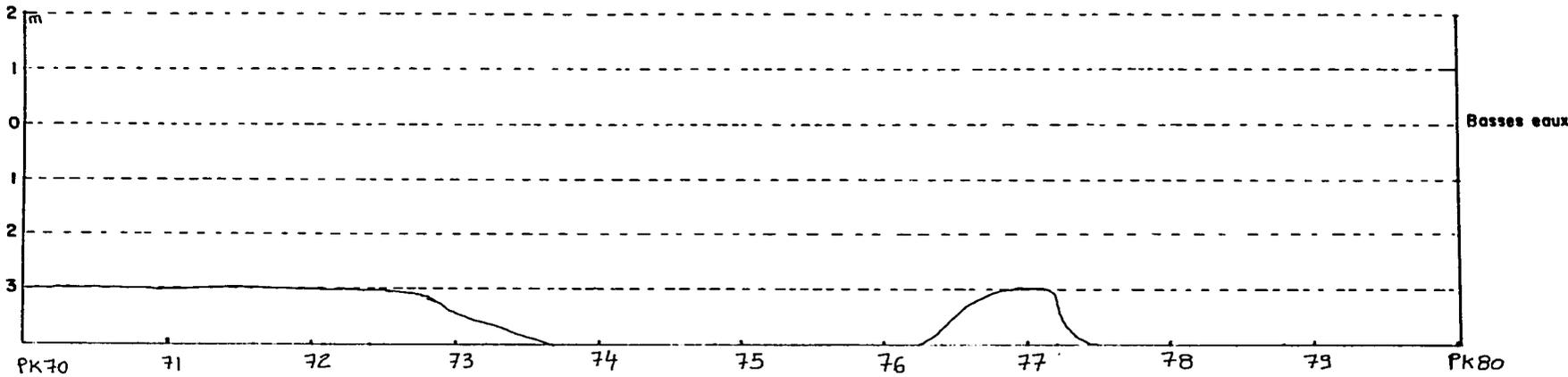
AND MARKETING STUDY

RIVER INVENTORY

KWENGE RIVER

KM 60 to 70

SA



LEGENDE:

- |                |            |               |            |
|----------------|------------|---------------|------------|
| ■ case         | ≡ épave    | ☼ savane      | +++ rocher |
| //// village   | ⇒ route    | ☁ forêt       | ⌒ snags    |
| ∩ pont         | --- piste  | 🌴 plantations | ⌒ colline  |
| ⊃ bac          | ∩ rivière  | 🌿 marécage    | --- chenal |
| ← 60 → largeur | ☒ huilerie |               |            |

BANDUNDU TRANSPORT SECTOR

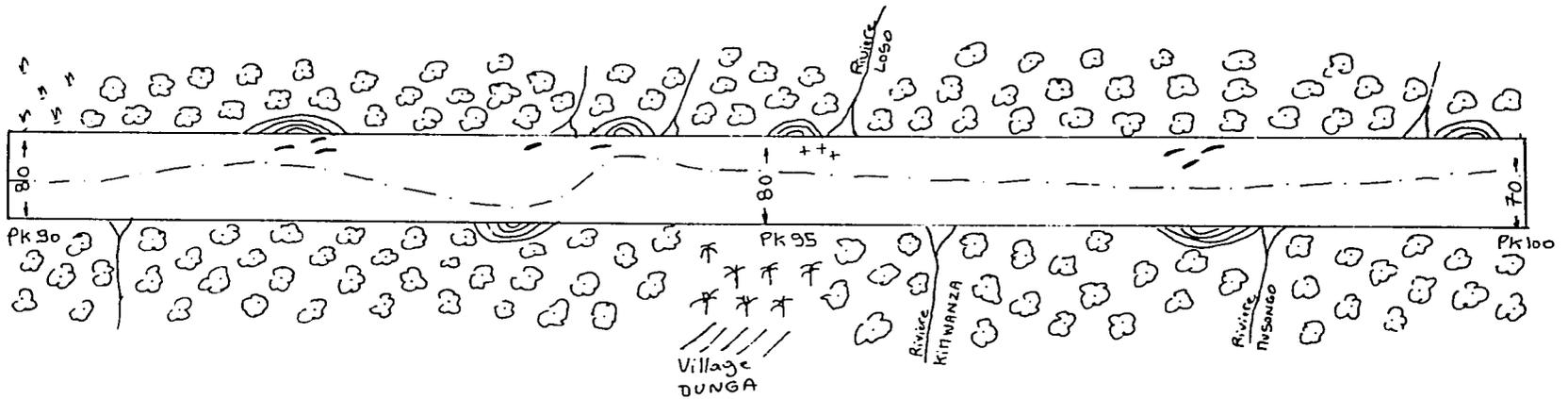
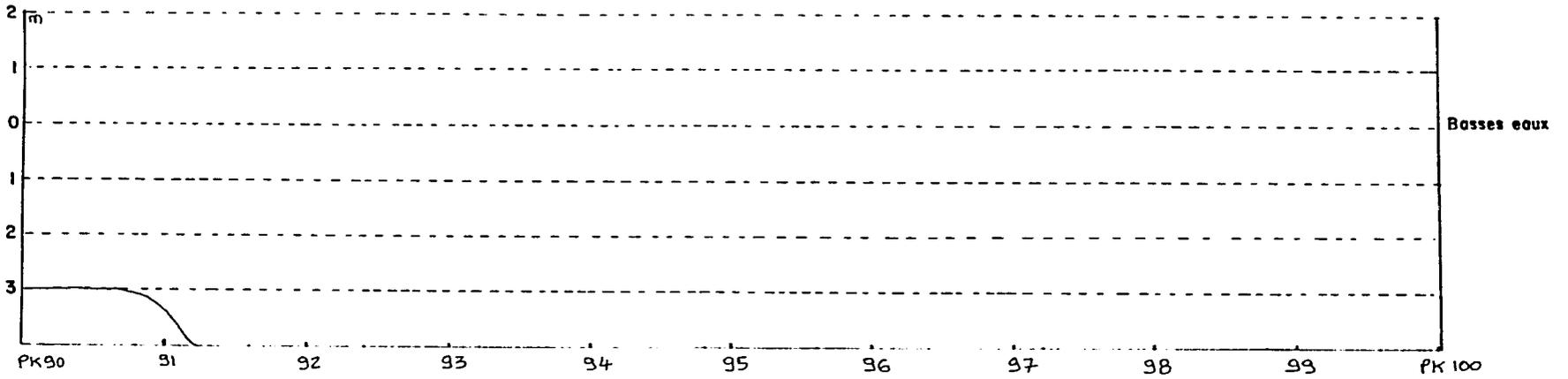
AND MARKETING STUDY

RIVER INVENTORY

KWENGE RIVER

KM 70 to 80





LEGENDE:

- |               |            |               |              |
|---------------|------------|---------------|--------------|
| ■ case        | ⚓ épave    | ☁ savane      | + + + rocher |
| //// villoge  | ⇒ route    | ☁ faret       | ⌋ snags      |
| II pont       | --- piste  | 🌳 plantations | ⌒ colline    |
| ⊃ bac         | ⌒ rivière  | ⌒ marécage    | --- chenal   |
| ← ⊃ + largeur | ✉ huilerie |               |              |

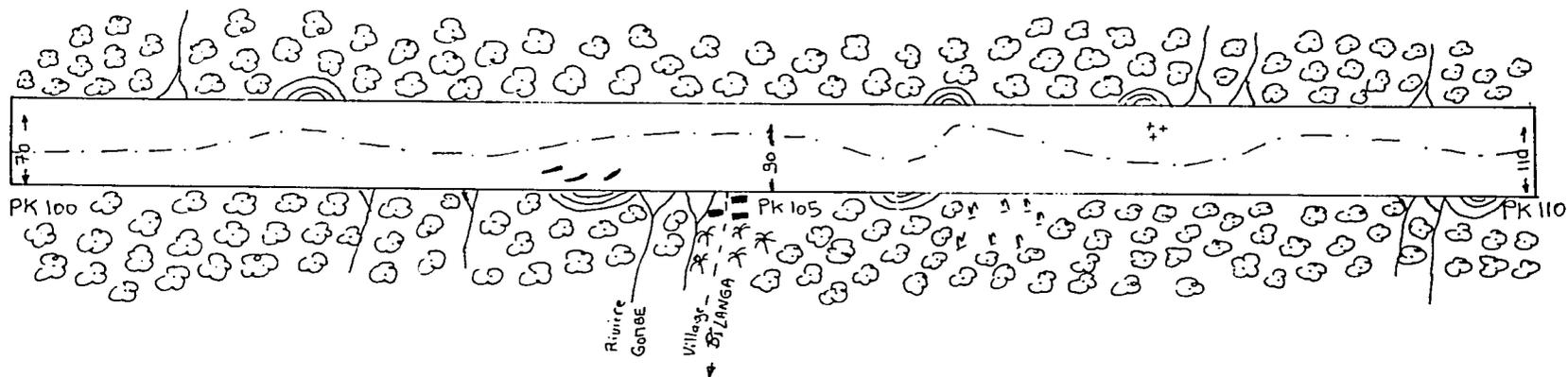
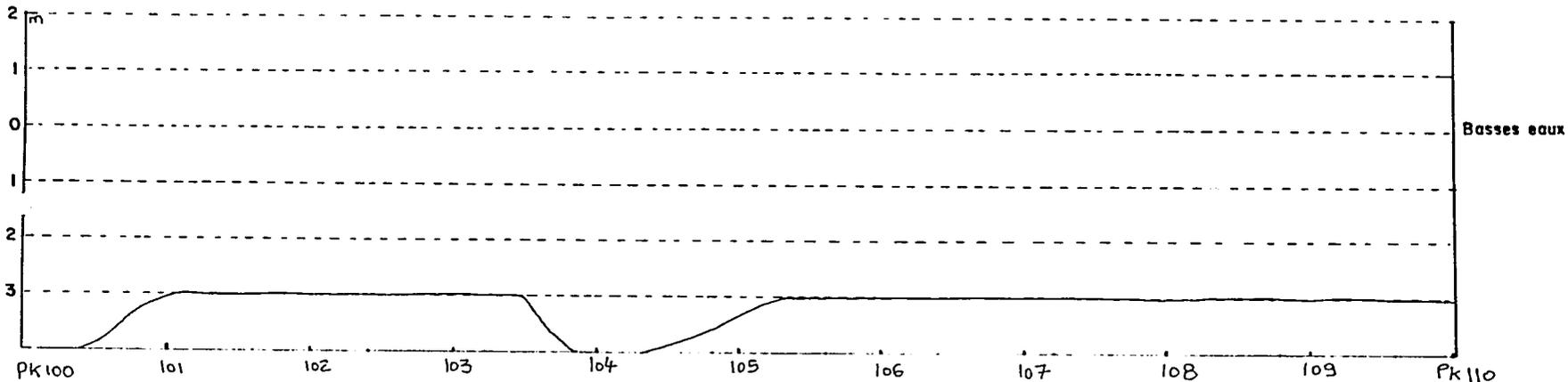
BANDUNDU TRANSPORT SECTOR

AND MARKETING STUDY

RIVER INVENTORY

KWENGE RIVER

KM 90 to 100



LEGENDE:

- |                |            |               |            |
|----------------|------------|---------------|------------|
| ■ case         | ⚓ épave    | ☁ savane      | + + rocher |
| //// villoge   | ⇒ route    | ☁ forêt       | ⌒ snags    |
| II pont        | --- piste  | 🌳 plantations | 🌒 colline  |
| ⊃ bac          | ⌒ rivière  | 🌿 marécage    | --- chenal |
| ← 60 → largeur | ☒ hullerie |               |            |

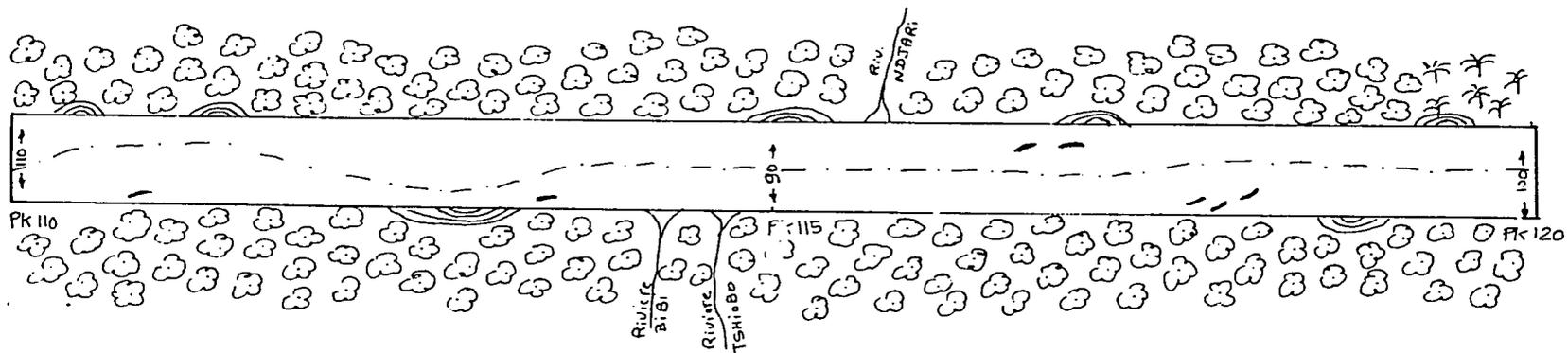
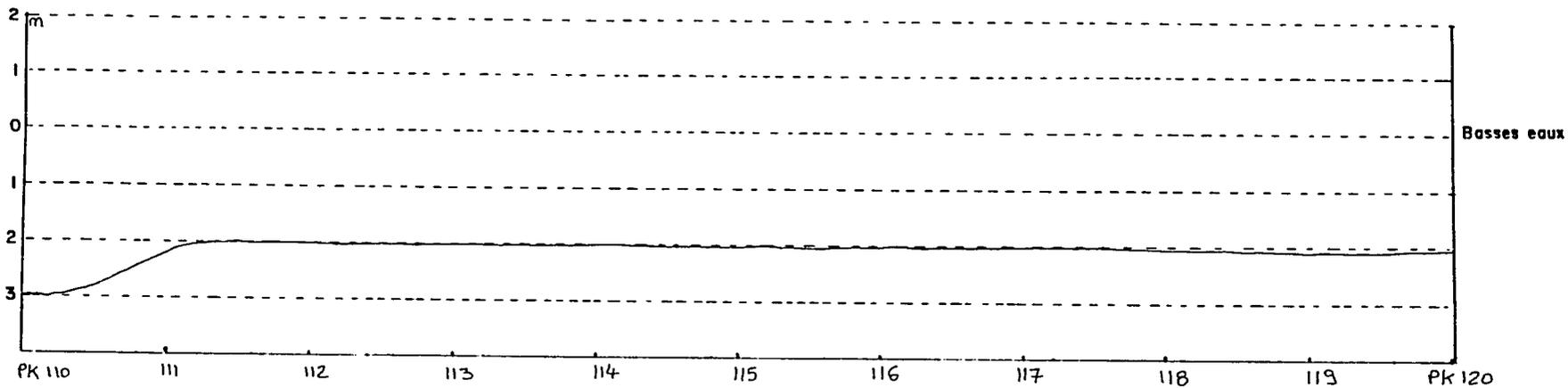
BANDUNDU TRANSPORT SECTOR

AND MARKETING STUDY

RIVER INVENTORY

KWENGE RIVER

KM 100 to 110



LEGENDE:

- |                |             |               |              |
|----------------|-------------|---------------|--------------|
| ■ case         | ⚓ épave     | ☼ savane      | + + rocher   |
| //// village   | ⇒ route     | ☪ forêt       | ⌢ snags      |
| II pont        | - - - piste | 🌴 plantations | ⌒ colline    |
| ▭ bac          | ~ rivière   | ♣ marécage    | - - - chenal |
| ← 60 → largeur | ☒ huilerie  |               |              |

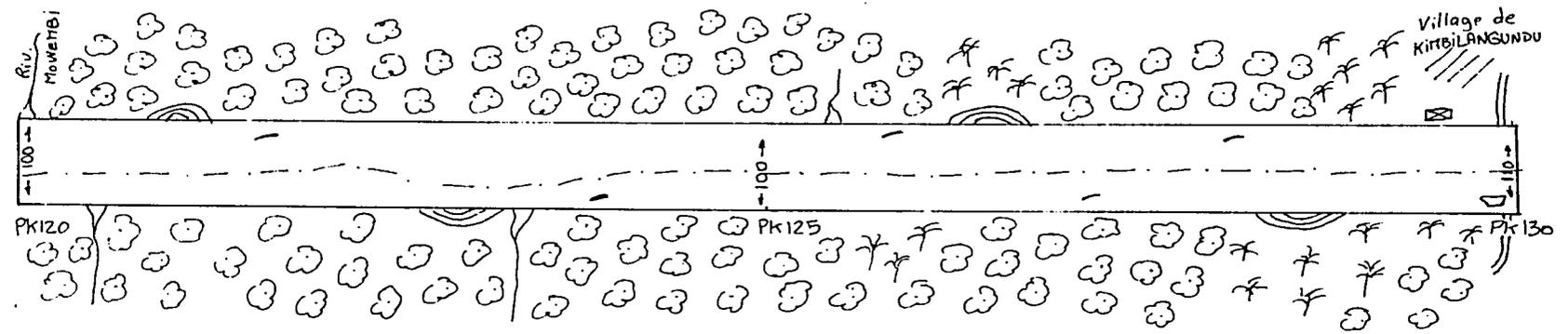
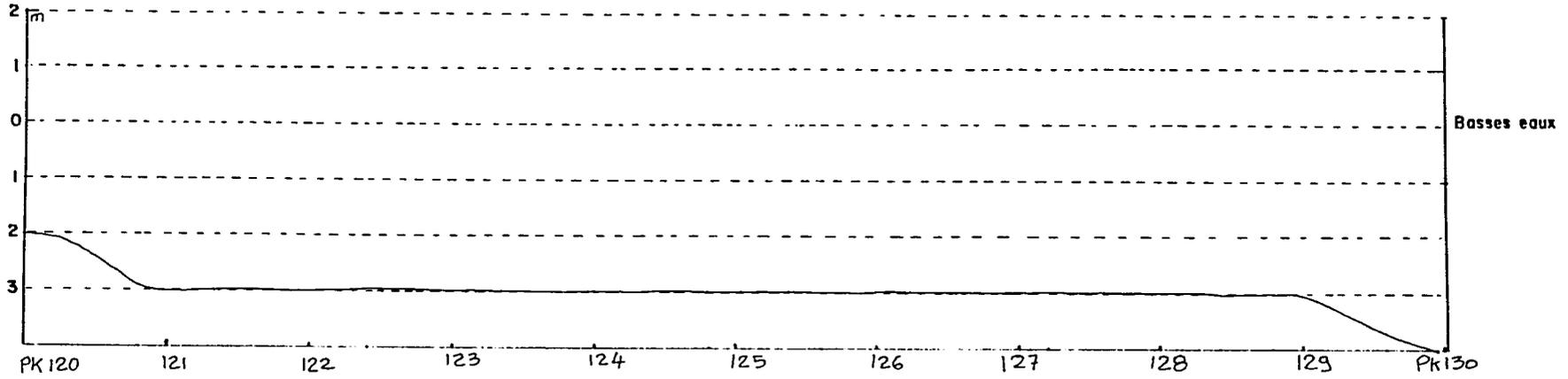
BANDUNDU TRANSPORT SECTOR

AND MARKETING STUDY

RIVER INVENTORY

KWENGÉ RIVER

KM 110 to 120



**LEGENDE:**

■ case	⚓ épave	☁ savane	+ + rocher
//// village	⇒ route	☪ foret	⌋ snags
II pont	--- piste	🌳 plantations	⌒ colline
▭ bac	⤵ rivière	🌿 marécage	--- chenal
← 60 → laraeur	⊠ huilerie		

**BANDUNDU TRANSPORT SECTOR**

**AND MARKETING STUDY**

**RIVER INVENTORY**

**KWENGE RIVER**

**KM 120 to 130**

## LUFUKU RIVER

## **LUKUFU RIVER**

The Lukufu is navigable from its confluence with the Lutshima river to the Kisenzele rapids situated at pk 15. Following this at pk35 there are the Rutten waterfalls, over 10 meters high. No agricultural activity was seen.

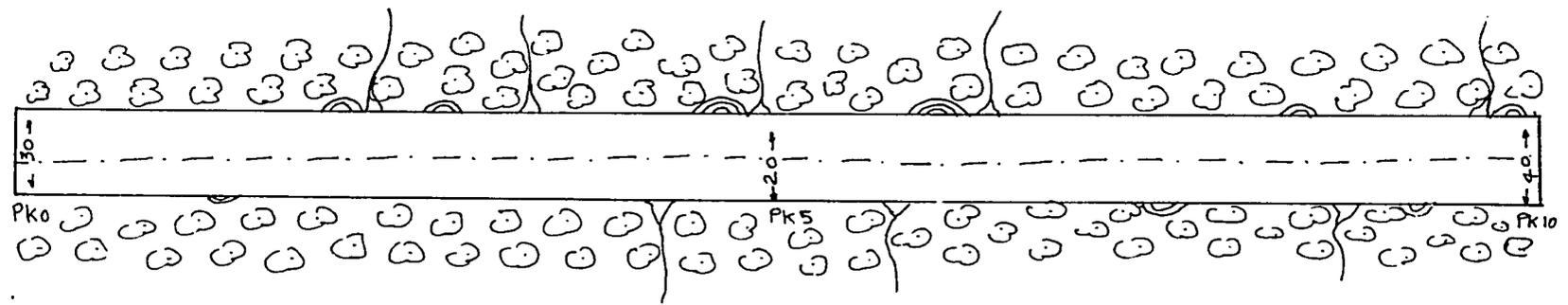
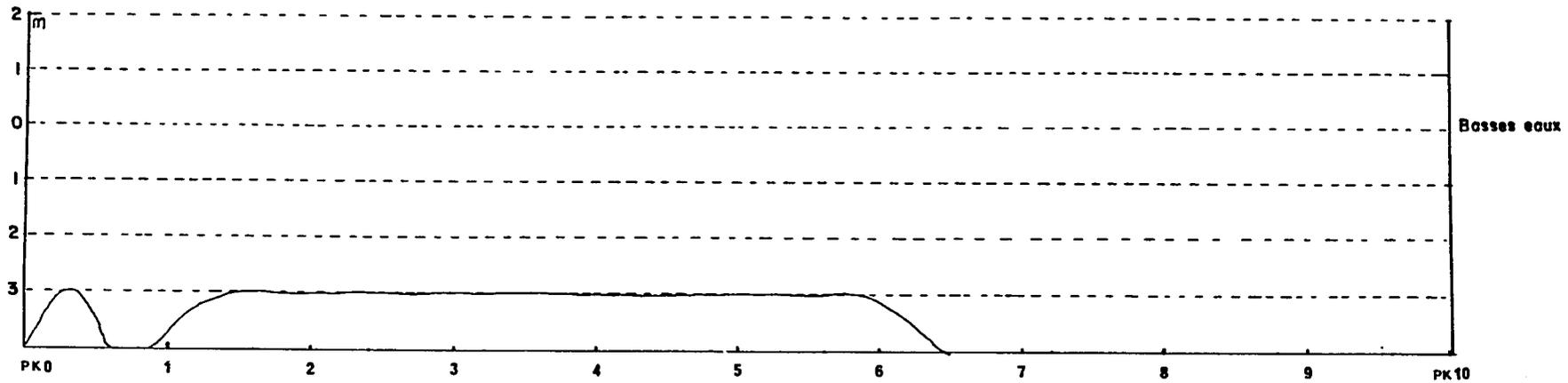
**LUFUKU RIVER**



**PK 15**



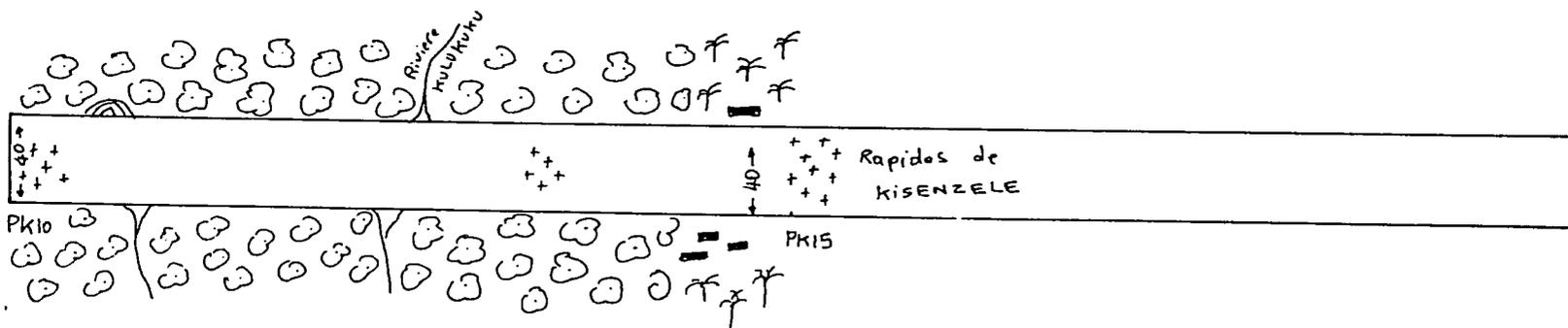
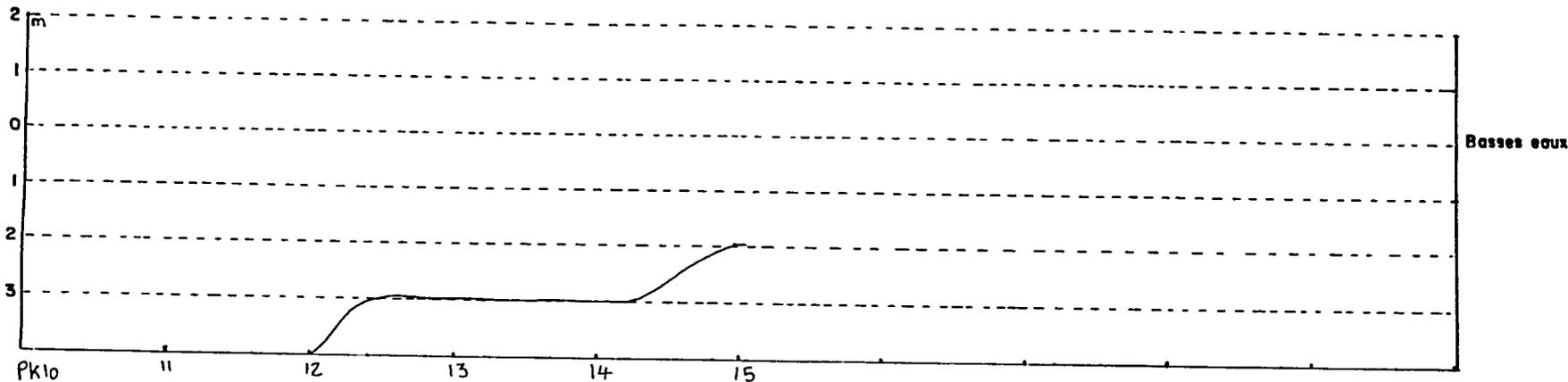
**PK35**  
**Chutes de Rutten**



- LEGENDE:**
- |                |          |             |         |
|----------------|----------|-------------|---------|
| case           | épave    | savane      | rocher  |
| village        | route    | forêt       | snags   |
| pont           | piste    | plantations | colline |
| bac            | rivière  | marécage    | chenal  |
| ← 60 → largeur | huilerie |             |         |

BANDUNDU TRANSPORT SECTOR  
AND MARKETING STUDY  
RIVER INVENTORY  
LUFUKU RIVER KM 0 to 10

54



LEGENDE:

- |                |          |             |         |
|----------------|----------|-------------|---------|
| case           | épave    | savane      | rocher  |
| village        | route    | forêt       | snags   |
| pont           | piste    | plantations | colline |
| bac            | rivière  | marécage    | chenal  |
| ← 60 → largeur | huilerie |             |         |

BANDUNDU TRANSPORT SECTOR

AND MARKETING STUDY

RIVER INVENTORY

LUFUKU RIVER

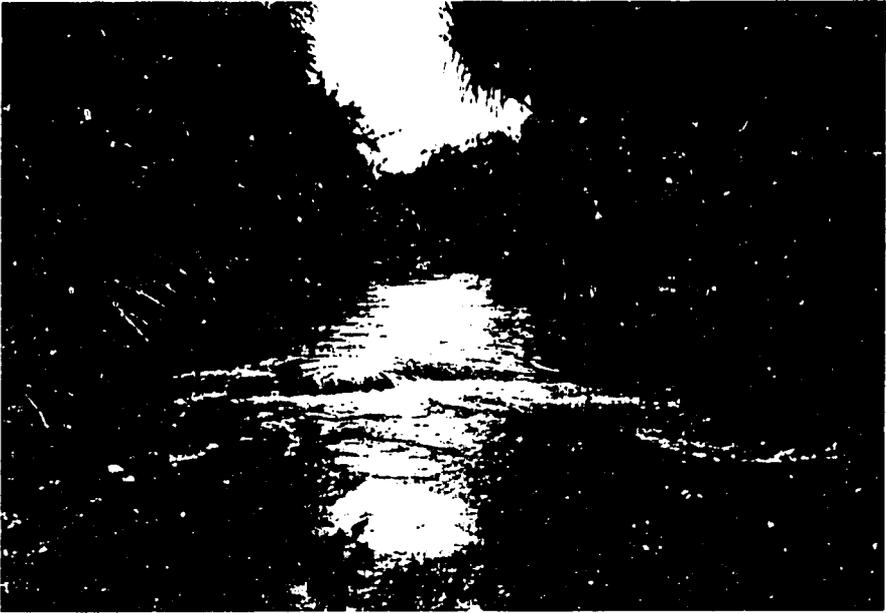
KM 10 to 15

**BWELE-MILONDA RIVER**

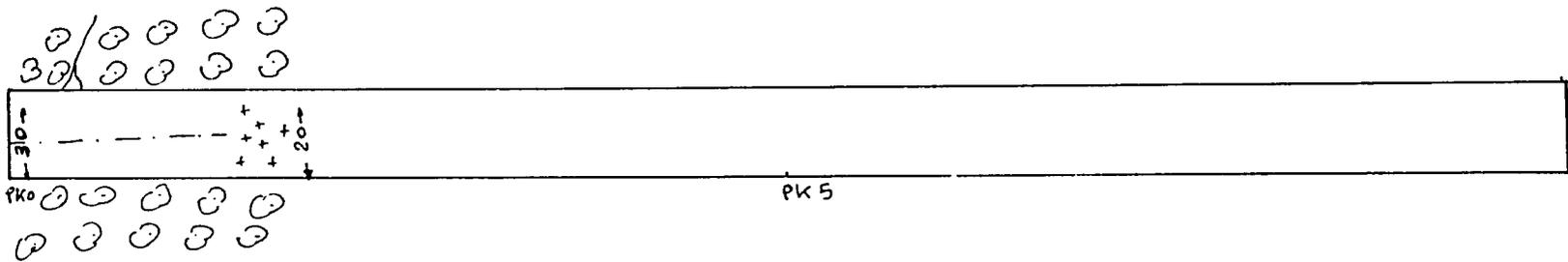
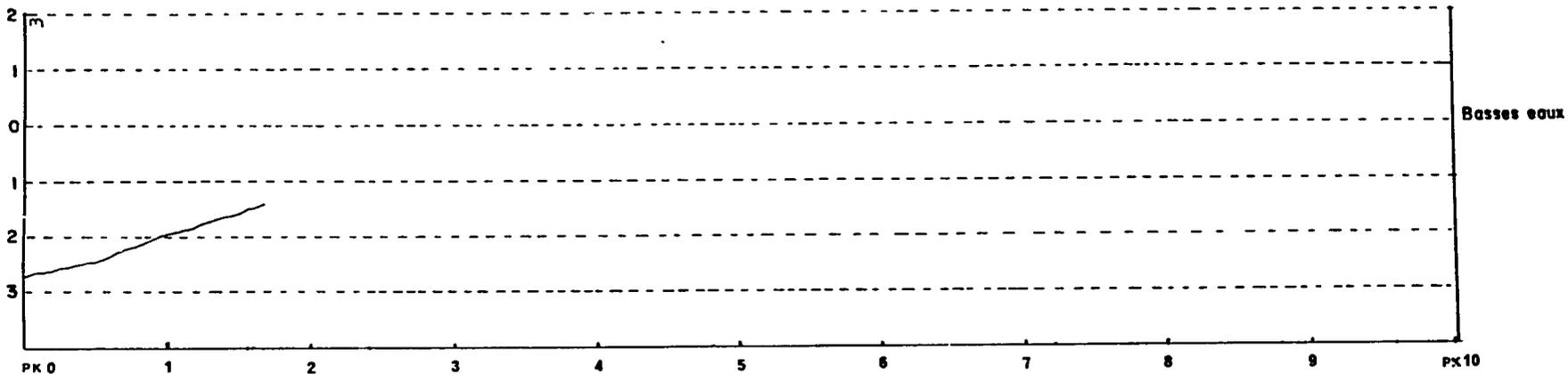
## **BWELE-MILONDA RIVER**

The navigability of this river is very difficult in view of its shallow depth and narrow width. At pk1.5 the large rocks and current make navigation difficult and dangerous. No agricultural activity was noted.

**BWELE - MILONDA RIVER**



**PK 1,5**



- LEGENDE:**
- |                |            |               |            |
|----------------|------------|---------------|------------|
| ■ case         | ≡ épave    | ⋯ savane      | + + rocher |
| /// village    | ⇒ route    | ⊙ forêt       | ⌢ snags    |
| ▯ pant         | --- piste  | ⌘ plantations | ⌒ colline  |
| ▭ bac          | ⌒ rivière  | ⌘ marécage    | --- chenal |
| + 50 + largeur | ⊠ hullerie |               |            |

**BANDUNDU TRANSPORT SECTOR  
AND MARKETING STUDY  
RIVER INVENTORY**

**BWELE-MILONDA RIVER KM 0 to 1,5**

10