



WFP Sudan, Logistics Unit

*Barge Operation
Capacity Assessment
For the Republic of Sudan*

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December 23,2003
Khartoum, Sudan*

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1. FACTS ABOUT SUDAN

Sudan is the largest country that has the largest area in Africa and it is the 10th largest country in the world. It covers an area of 2,505,000 Km², making 8.3% of Africa's area and 1.7% of the world. Sudan has 2,040 Km length (North-South), 1,444 km width (East-West), a border length of about 7,770 Km around nine African and Afro-Arab countries, and a coastline of 858 Km long at the Red Sea. Sudan borders with Egypt and Libya to the North, Chad and Central African Republic to the west, Democratic Republic of Congo to the southwest, Uganda and Kenya to the South, and Ethiopia and Eritrea to the east. The Red Sea lies at northeastern borders of Sudan and Saudi Arabia across the Red Sea which has an average width of about 240 Km. Sudan's topography is generally broad plain, with mountains both in the northeast near the Red Sea Coast and in the southeast.

2. LOGISTICS NETWORK IN SUDAN

Sudan's transportation infrastructure is not well developed and is limited. The impact of the long civil war between the government of Sudan and the SPLA/M significantly damaged infrastructure and further limited development of roads, and rail networks. Sudan's paved road network is mainly limited to the north and east of the country. There are no paved roads in the South. The key highway is the one that links Khartoum to Port Sudan, which is about 1,200Kms. Other highways include those that run from Khartoum to Elobeid, Kosti, Kadugli, and Demazin. The total paved highway is about 3,599 Kms only. It has about 2,611 Km of gravel road and most of the roads are un-surfaced dirt tracks that become completely impassable during the rainy season.

Other modes of transport are also limited. The Country has about 4,789 Kilometers narrow gauge railways, again mostly in the north and east. The railway lines are almost confined to the North, with only one line in the south that extends from Babanusa to Wau. 40% of the total rail network is out of service now and the Babanusa –Wau rail line is one of the non-functional railway links. The following map indicates the logistics network in the Sudan.

3. THE RIVER NILE

The Nile is the dominant geographical feature of Sudan as around 70% of the area of the country is situated within the Nile River catchments. Its headwaters - the White Nile and the Blue Nile - join in Khartoum to form the Nile River that flows to Egypt.

River Nile is the longest river in the world - 6,671 Km long from its remotest head stream up to the Mediterranean Sea. Ten countries share the Nile but about 60% of its length lies within Sudan.

The Nile River traverses the Sudan from South to North, and all the great tributaries of the river are either partly or entirely within its borders. The Nile has several tributaries and swamps in the South.

In addition to many economic contributions, the Nile River provides an important inland transportation route to the Sudan. The river has a greater potential for both cargo and passengers transportation. It should be noted that some sectors of the river are not navigable during dry season when water level drops, while some stretches of the river face restrictions due to cataracts. Overall, half of the river routes are navigable throughout the year (see Map 1).

The navigable internal waterways exceeds 5,000 Km in length, and represents one of the cheapest means of connecting the north and the south. The longest navigable part all the year round is on the White Nile that runs from Kosti to Juba. The Blue Nile, the Sobat River, Bahr El Ghazzal and Atbara Rivers are navigable during the rainy season only i.e. from mid-July to mid-October.

4. ORGANIZATION OF THE RIVER TRANSPORT

River Transport was one of the Sudan Railways Corporation's departments since 1912. In 1973, with the view to promoting the sector, River Transport Corporation was established. Since then the River Transport Corporation took the full responsibilities of implementing the river transport services of moving cargo, passengers, and livestock in the Sudan.

Its Head Quarter is located in Khartoum and in addition it runs its operation for the two regions; the northern region from Karima and the southern region from Kosti. The main dockyards, workshops and stores are located in Khartoum.

The new units of the corporation came into service since 1973 and by 1984 the corporation succeeded in setting up a fleet for passengers and goods. By using this fleet, the corporation was able to transport 151,000- 157,000 tons in 1981/82/83. South Sudan has been served regularly by river in the past until this has been stopped in 1999 due to security problems.

5. SIGNIFICANCE OF THE MOVEMENT OF CARGO VIA RIVER TRANSPORT

There are many advantages of river transportation in the Sudan:

- An alternative to inadequate all-weather roads to the South Sudan: - Sudan's paved road network is mainly limited to the north and eastern Sudan. For such a vast country the paved highway road is about 3,599 Km, and 2,611 Km is Gravel roads. Most of the roads in Sudan are earth or track roads and impassable during the rainy season, especially in the south. The special significance of river transport in the Sudan becomes obvious if one considers the size of the country and availability of all weather roads within the country. Thus, expanding the service by procurement of additional equipment and facilities, and/or upgrading existing ones would substitute road network deficiencies.
- An alternative to inadequate railways in the south: -Sudan has approximately 4,789 Kilometers of narrow gauge railways, again mostly in the north and east. The south is not connected by rail and this would leave the river transport as the only best available mode of transport for very far distances that are not linked by rail nor have access to asphalt or gravel roads.
- River transport has cost and economic advantages over the other competing modes: - river transport is cheap, e.g. Kosti –Juba route costs about \$109.00 by river and it costs about \$390 by commercial flight i.e. 1/3 of cost of air transport.
- River transport has an advantage of low operating cost relative to air operation:- the use of air transport would make the total operation expensive, while river transport involves much less running and/or operating cost.
- A great potential for expansion and development:- Sudan has a great potential for river transport that can be exploited further and can be used alternatively as the best mode of transport wherever it is available.
- River transport offers large cargo transportation:- river transport would enable to transport a larger tonnage of relief cargo using barge convoys. Pusher tugs and self – propelled barges are used for the transportation of cargo shipments on the river Nile. By using a barge convoy of two pushers with a capacity of 2,000 tons each and 8 barges with 500 tons capacity, it is possible to transport around 4,000 metric tons of food aid cargo. If this is maintained on a regular basis, air transport cost can be significantly reduced. Hence it will be the best mode of transport for bulk shipments such as food aid and other heavy cargo that need to be transported over long distances.
- Population along the major river corridors:- WFP can reach over 1 million beneficiaries residing in many locations along the riverbank and cannot be accessed by other means at comparable cost.
- All year round availability: -All year round availability of the major river route from Kosti to Juba (which is the major route that covers a distance of 1,436 Km), makes river transport more significant for the south. There is no any other alternative mode of transport that could serve such a long distance all year round.

- Relatively low initial investment and subsequent running cost:- Road construction, which is estimated to cost about \$200,000 to \$450,000 per Kilometer as indicated by the National Highway Authority is prohibitively expensive. In addition to the capital requirement road also takes longer time to construct. On the other hand, about \$1,150,000 is needed to buy a pusher-tug with a capacity of 2,000 tons, and \$200,000 for a barge. One pusher tug and four barges would cost about \$1,190,000, and can transport 2,000 tons. Once capital is invested to purchase the barges, the river transport service can be used immediately because the already existing capacities can be used. Hence this leaves the river transport as the only mode of transport that can be used immediately once the navigational constraints and capacity issues are addressed and security conditions permit its use.
- An important economic and traditional link between North and South: - important goods such as petroleum products, sugar, and flour mainly from the northern regions justifies the importance of river transport to the south.

The above factors point that river transport will continue to play an important role in the future of Sudan by connecting the south to the north. Therefore, movement of cargo by river has been significant in the past and it will remain significant even in the future.

The movement of cargo by river is more significant for the southern Sudan than the North because of the relative availability of road and rail network in the North, most of the river corridors are in the South than in the North. The Civil War has prevented the expansion of this mode of transport.

Moreover, natural features, including a number of cataracts on the Nile between Khartoum and the Egyptian border, have limited its overall usefulness. The White Nile to the south of Khartoum has shallow stretches and sharp bends that restrict carrying capacity of barges.

6. BARGE CORRIDORS

The White Nile flows about 3,500 Km through Sudanese territory. Its tributaries, the Bahr el Ghazal, Jur, Zeraf, Sobat and Baro Rivers all together give a further 700 km of waterways. From the historic point of view, these waterways have remained the primary traffic routes used in developing the hinterland until recent years. In view of this the major river transport corridors are the following.

6.1 River Route on the White Nile

- **The Juba Corridor:** -(stretches between Kosti and Juba) - the longest navigable part – 1,436 kms long - is on the White Nile and is servicable throughout the year. The river route stretches from Kosti through Renk, Malakal, Shambi, Bor, Mangalla, and Juba. It is this stretch of the White Nile from Kosti to Juba (also known as the

southern reach), that is more important because it provides the only generally usable transport connection between the central and southern parts of the country.

6.2 River routes on the tributaries of the White Nile in the southern region

River Bahr el Ghazal, River Jur, River Zeraf and Sobat Rivers are the tributaries of the White Nile in the Southern region.

- **The Sobat Corridor** – stretches between Malakal and Nassir
- **The Zeraf River** – Reaches up to Old Fanjak Canal Site, Obel and Nagdiar. This river route is seasonal and it is blocked also by water hyacinth.
- **The River Bahr el Ghazal route** – reaches from Malakal to Bentiu
- **The River Jur** – can extend up to Wau. This river route has been navigable in the past. These services went as far as Wau but were seasonal, depending on water levels. They were finally discontinued during the 1970's because vegetation blocked waterways, particularly the fast-growing water hyacinth, and security problem. This could be seen as an alternative route to Wau other than the railway line, which extends from Babanusa.

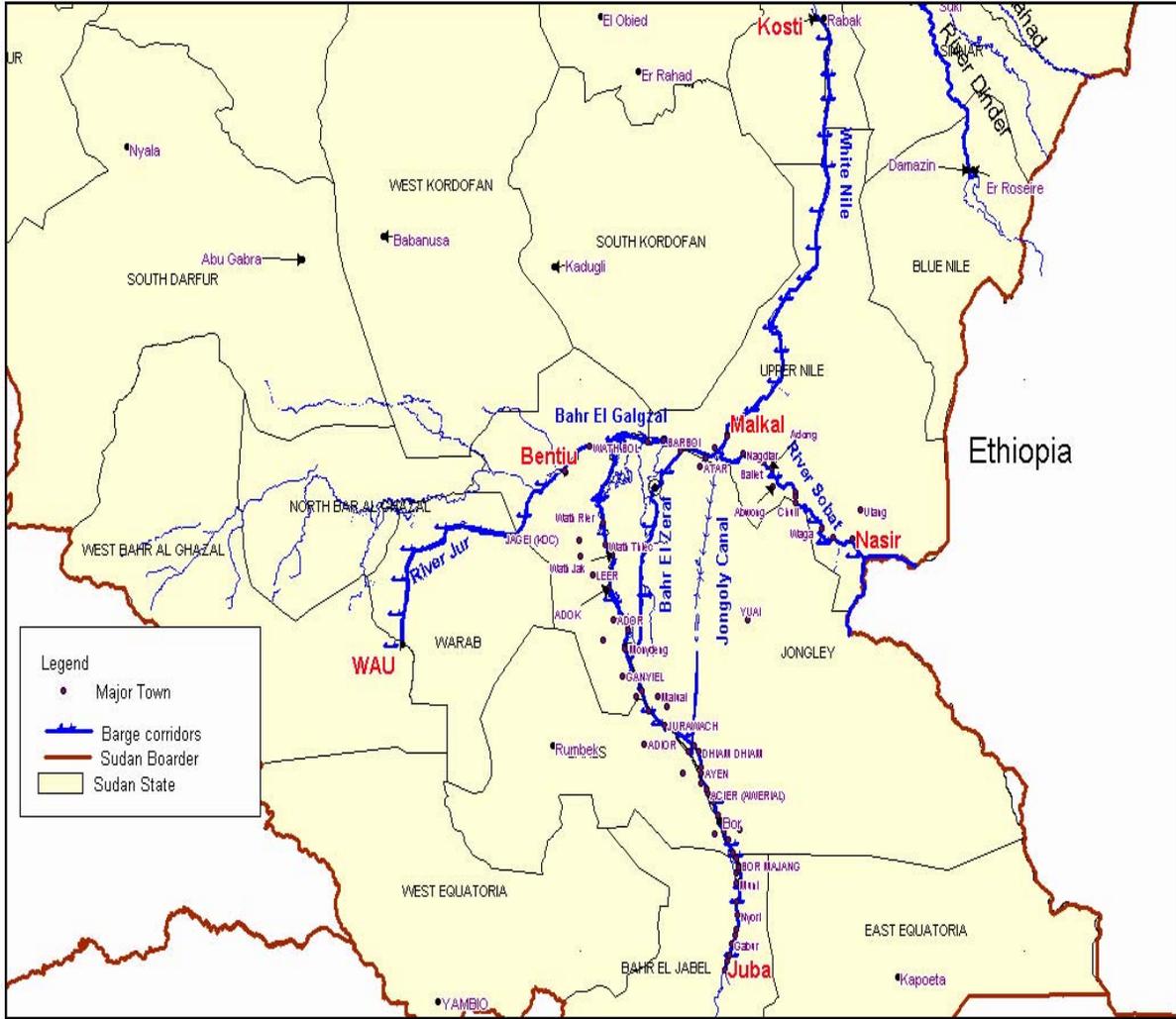
6.3 River route on the Blue Nile

- On the Blue Nile between **El Suki** and **El Rosiers** for a distance of 210 Km. Due to its low water levels the Blue Nile is navigable from August to February only. The following map indicates the barge corridors that are mentioned.

Table 1: Summary of Navigable Rivers

NAVIGABLE RIVERS	CORRIDORS AND RIVER ROUTE	LENGTH
ALL THE YEAR ROUND	JUBA CORRIDOR	
	Kosti - Malakal	501 Km.
	Malakal – Juba	935 km.
SEASONAL ROUTES	River Sobat, Malakal -Nassir to Gambella	568 Km
	River Bahr el Ghazal, Malakal – Bentiu	200 Km
	River Jur, Betiu - Wau	It has been blocked with the waterweed for a long time.
	Blue Nile, El Suki – El Rosiers	210 Km.

Map 2: Barge Corridors



7. WFP'S EXPERIENCE OF THE RIVER TRANSPORT SERVICE IN THE SUDAN

WFP uses the river transport to reach the beneficiaries that reside along the riverbank and destinations in the south that cannot be accessed by road. The following table summarizes the total cargo moved by this mode for the years 1991 to 2003.

7.1 Barge Operations Loading Summary

Table 2: Historical Performance of Barge Operation

YEAR	TOTAL VOYAGES	CEREALS & SORGHM	WHEAT	PULSES BEANS &	LENTILS	V. OIL	OTHERS	Total Food (Mts)	Grand Total
1991	9	1,410.00	6,078.10	300				7,788.10	7,788.10
1992	10	9,927.48	2,000.00	1,250.00	578.45	335.06	260.51	14,090.99	14,351.50
1993	16	17,409.70	532.18	69	3,168.68	817.28	131.5	21,996.84	22,128.34
1994	27	18,470.25	40	1,535.45	1,200.60	975.2	933.73	22,221.50	23,155.23
1995	8	4,285.74			640.9	188.76	297.74	5,115.40	5,413.14
1996	5	6,496.31			973.4	286.85	335.19	7,756.56	8,091.75
1997	5	4,969.41			123	433.93	166.36	5,526.34	5,692.70
1998	5	7,553.54		871.23		131.5	11.5	8,556.27	8,567.77
1999	9	3,450.73	1,991.60	669.7		36.27	550.88	6,148.30	6,699.18
2000	1	830.15	884.00	174	0	91.35	74.86	794.58	2059.46
2001	0	393.50	59.50	36.90	10.00	39.04	0	0	612.55
2002	1	672.73	186.20		48.17	76.33	74	713.09	1588.85
2003	4	4571.03	198.80	164.45	189.43	95.91	143.57	4,971.95	5,777
Total	100	79,216.92	11,375.88	4902	6,874.46	3309.83	2979.84	105,679.92	108,659.76

7.2 Barge Operations With Corridors and Destinations Served

Table: 3 BARGE OPERATIONS CORRIDORS AND DESTINATIONS

	Kosti - JUBA	RENK - MALAKAL	TONJA - FANJAK	SOBAT - Nassir	C.O.N.
1	KOSTI	ATHIDHWAY	OWACHI	PUJU	OBEL 3
2	RENK	BUSHARA	PANYIDWY	OGOD	CANAL SITE
3	WADAKONA	DELAL AJAK	OBAI / PAKANG	NAGDIAR	OBEL 1
4	THAK	DETANG	PANYAKANG	BALIET	OBEL 2
5	KAKA	DETWOK	ATAR	ADONG	PUJU
6	MELUT	DONJOL	TONGA	ABWONG	OGOD
7	DETWOK	FASHODA	NEW PANYAK	GEL ACHEL	NAGDIAR
8	KODOK	KAKA	WATHKECH	DINI	
9	LUL	KODOK	BERBOI	LONY	
10	FASHODA	KUEK	PAKAN	CHUIL	
11	WAU-SHILLUK	LUL	NYALUAL	YAKWACH	
12	MALAKAL	MELUT	TOUH	WAGA	
13	CANAL	OMARO	DIANG	DOMA	
14	ATAR	PADHIANG	OLD PANYAK	DUK	
15	FAM	TAKOUC	WATHDAHALLA	BARMACH	
16	TONGA	THACK	MAJOUR	DORADING	
17	BERBOI	THORGWONG	WATHGOAL	NOR	
18	WATHKECH	TIANGRIAL		NASIR	
19	LAKE NO	WADAKONA TOWN		YOMDING	
20	WATHBOL	WARAJOK		KUICH	
21	WATHTIEC	WAW SHILLUK		KER	
22	ADOK	ZARZUR		ULANG TOWN	
23	LAKE JUR	ADOK		JIKMIR	
24	TAIYAR	MALAKAL		KWERENGA	
25	LAKE SHAMBE			DONGKOK	
26	JURAWACH			TORKITCH	
27	LONGLEI			MAKER	
28	DHIAM			MALWAL	
29	TUER MAJOK			KEAC	
30	CHARLINY			WANDING	
31	AKUAK			LIRE	
32	ACIER			AKOBO	
33	AGUERDIIR			NYANDIT	
34	BOR				
35	MALUAL (S)				
36	TERAKEKA				

37	MONGALLA				
38	JUBA				

7.3 NUMBER OF BENEFICIARIES ALONG THE RIVER BANK

Beneficiaries served by WFP during 2003 were indicated to be over 500,000. Depending on need and seasonal demand, the total population that can be served is estimated to be over a million persons.

8. RIVER TRANSPORT SERVICE PROVIDERS IN THE SUDAN

The river transport service is provided by:

- The River Transport Corporation (RTC) - Public Enterprise)
- Private Operators

WFP uses both service providers as deemed necessary and depending on their capacity and availability.

Their fleet size and available capacity is presented here below.

8.1 River Transport Corporation's fleet size details

Table 3: Summary of type and description of existing fleets for barge operation

Type	Description	Status /Remarks
Push Tugs	Number of Pushers: 16 Propulsion System: 2XSCOTTLE NAVIGATION Type: NAV 300/300 Main Engine: XDEUTZ – Type SBA 8M.616 Pushing Capacity: 2000 Tons/Unit Date of Manufacturing: 1980-1981	9 Pusher Tugs are not operational. Out of them 4 need complete main engine and auxiliary engine rehabilitation. Even the 7 operational ones are not in good condition and they need rehabilitation.
Self Propelled Oil Barge	Number of Self-Propelled Oil Barge: 1 Propulsion System: 2XSCOTTEL NAVIGATOR Type: NAV 300/345 Main Engine 2XDEUTZ – Type SBA 8M616 Loading Capacity: 600 Tons/Unit Date of Manufacturing: 1983	It is operational but needs rehabilitation.
General Cargo Barge	Number of general Cargo barges: 76 Date of Manufacturing: 1975-1981 Capacity per barge: 500 Tons	Only 40 barges are operational. All the barges have never been maintained since they were assembled. They were imported from Norway and assembled in Sudan.
Flat Deck Cargo Barge	Number of Barges: 8 Date of Manufacturing: 1980-1981 Capacity per barge: 500 Tons	All are operational but have never been maintained since they were assembled.
Oil Fleet Barge	Number of Barges: 10 Date of Manufacturing: 1977-1981 Capacity per barge: 500 Tons	9 are operational. They have never been maintained.
Passenger Vessels	Number of Passenger Vessels: 4 Capacity 232 Passengers per vessel Date of Manufacturing: 1980-1981 Engine Type: 2X340HP Type General Motors V71.12	All of them are out of service and need new engines for rehabilitation.

8.2 Private companies operating on the Nile River

Table 4. Companies and their fleet size

Name of Company	Fleet Size and Available Capacity
Garab El Nuer Pusher	One Pusher and One flat top barge having a capacity of 400 Mts. Serves between Kosti and Malakal
El Mugren	One pusher that can load up to 100 Mts. And two barges having a capacity of 500 Mts. Total Capacity is 600 Mts. Serves between Kosti and Malakal
River Engineering Transport “Meyroue” Pusher	One pusher that has two barges with a total capacity of 900 Mts. (One flat top fuel barge with a capacity of 300 Mts for fuel storage and 100 Mts. for cargo that makes a capacity of 400 Mts.) And the second barge has a capacity of 400 Mts. The pusher deck itself has a capacity of loading 100 Mts. This makes the total capacity of 900 Mts. Serves between Kosti – Malakal Route.
Jonglei State (Malakal Pusher)	One pusher that has a loading capacity of 110 Mts. in the deck of the pusher. This company has no barges of its own. They operate by hiring barges from the River Transport Corporation or from Navy and Peace and Development Company. The pusher has a capacity of pushing a barge of 450 Mts. They serve between Kosti and Malakal.
Hussen /A/Rahman Adilan (El Mushir Pusher)	One Self – Propelled Barge flat top and fuel tank. Total cargo capacity is 500 Mts. They also operate by hiring two barges from RTC. The pusher has the capacity to push 1400 Mts. The pusher is well equipped and it serves the areas Kosti, Malakal, Nassir, Juba and Bentiu.
Pusher’s For Peace and Development, Kosti	Company has a total of six pushers, six barges having a capacity of 950 Mts. and six flat top barges with the capacity of 750 Mts. Each and all in good condition.
Shankin River Transport (LATJOR)	They have two pushers operating in the Nile. Latjor’s one pusher can push 600 Mts. and the other Bang pusher has two small barges from RTC – one with a capacity of 300 Mts. and the other with a capacity of 150 Mts. The pusher itself has a loading capacity of 100Mt. They serve at Kosti – Malakal Route.

8.3 Rates of river transport on major routes

The rates of river transport are almost the same with RTC and the private operators. The service rendered by the private operators is limited to Kosti – Malakal route due to security problems.

Table 5. Barge Routes and their destination costs

River Route and Destination	Type of cargo	Rate per Metric Tone	Equivalent in USD
Kosti – Malakal	Food Items	Between 5000 to 5500 SD/Mt	Between 19.16 to 21.07/Mt
	Non Food Items	Between 6000 to 7000 SD/Mt.	Between 22.99 to 26.82/Mt
Kosti – Juba	All types of cargo	28,700 SD/Mt	109.96 USD/Mt
Kosti – Nassir	All types of cargo	7500 SD to 10,000 SD/Mt.	28.74 USD to 38.31/Mt
Kosti – Tonga	All types of cargo	6000 SD/Mt.	22.99 USD/Mt
Kosti – Old Fanjak	All types of cargo	7000 SD/Mt.	26.82 USD/Mt

Source: River Transport Corporation and Private Operators

9. RIVER PORT ASSESSMENT

9.1 Kosti River Port

Major River Ports are Kosti and Juba on the White Nile, and Karima on the Main Nile, but smaller landing ports are being served along the routes by RTC. The RTC maintains the

Regional Head quarters for the southern reach and permanent establishments at Kosti, Renk Malakal and Juba.

Kosti is the northern terminal dry cargo port of the southern reach connected by rail and asphalt road to Khartoum, Port Sudan and other major towns of Sudan. It has a strategic importance because of the rail link and connection to tarmac road with the main port of entry i.e. Port Sudan.

The port has main quay, and the length of the port is 800 meters long shoreline, 115 meters of which is vertical quay wall of masonry construction, equipped with mooring rings and with a track of cargo handling cranes. There are rail tracks, which have been passing along the quay wall at either of the sheds. But they are all out of service now and need rehabilitation.

Kosti is an important centre to the river transport because it could allow the smooth forwarding of cargo from other modes of transport like road and rail. Kosti will remain mainly a transition or transshipment point for goods originating from Port Sudan and Khartoum. With Kosti as a junction, railway and river transport complement each other rendering each other feeder services for goods either from Port Sudan or from Khartoum. The stretch between Khartoum and Kosti is served by both rail and road.

The dockyard executes repair work on boats and engines of a smaller and medium range and the spare-parts required are ordered from Khartoum. The workshop is ill-equipped with old machines, which makes the availability of spare- parts difficult.

There are three main petrol company depots that can provide fuel for the port in Kosti. The proximity of the port to the railway line makes transshipment operation easy, but the railway line needs to be maintained.

9.2 LOADING AND DISCHARGE OPERATIONS

As there is no other mechanical equipment available for vertical lifts or horizontal transports, all the discharging of cargo from barges is handled manually by labor gangs and the consignor is responsible to the off-loading of barges. Due to this reason it takes considerably long time to off-load cargo from the barges. The following equipment are available but are not in working condition and need repair.

- Mobile CraneOne unit
- Floating Crane.....One unit

The normal working hours in all RTC managed ports is from 6.00 am to 2.00 pm for outdoor staff and from 6.30 am to 2.30 pm for indoor staff with one-hour breakfast break between 9.00am and 10.00am. Cargo handling may continue on overtime if required and approved by the RTC management.

But nowadays stevedores and ports are not functional all the time because there are no regular trips. So they wait idle for long time and any time a barge arrives everybody will gather around to provide service and earn some money.

9.3 CONTAINER HANDLING FACILITIES/ PORT EQUIPMENT

Cargo handling operations in all river ports of Sudan are at present done manually owing to the fact that no crane and no mechanical equipment is in working condition. No river port is equipped with container-handling facilities or other cargo handling facilities. There is no port equipment in working condition. Those, which have been functional before are now standing still and rusted. The type of equipment that would facilitate and speed up discharge would be:

- Shore cranes,
- Mobile cranes and rail cranes
- Forklifts and conveyor belts
- Rehabilitation of the quay and the jetties

9.4 STORAGE FACILITIES

In general there are no warehousing facilities alongside the river Nile at Kosti that can accommodate significant amount of cargo. Even the warehouses that are available are very old, have very limited capacity and some of them are totally damaged and are in bad condition.

PORT	NO.OF STORES	CAPACITY IN TONS	TOTAL CAPACITY	AVAILABLE OPEN AREA
KOSTI	4	100	400	6000 Square Metre.
MALAKAL	2	25	50	-
JUBA	2	100	200	1500 Square Metre.

In Kosti out of the four warehouses two having a capacity of 200MT are used by the military. In addition there are other two warehouses having capacity of about 500 MT that are completely out of use. These two warehouses need complete rehabilitation to be functional. These warehouses date back to the 1950's.

9.5 FEES, TAXES

At present there is no fee or tax levied in relation to the river ports because the River Transport Corporation provides no service.

9.6 SECURITY MATTERS

The river transport service has been curtailed by the prevailing insecurity problems in the South. So this mode of transport cannot be used at its full potential if there is no peace and security. Recently however there are indications as to the improvement of security situations in the South.

As per WFP's Khartoum status report the Sobat Corridor Barge has successfully completed its mission in October 2003. This successful story is an indication that the security situation is gradually improving along these corridors.

9.7 NAVIGATIONAL CONSTRAINTS

The following navigational constraints/ concerns should be noted in assessing current and future capacities of barge operations:

- **Cataracts** - the major obstructions of navigation in the River Nile are the six cataracts between Halfa and Khartoum and thus cut-off the most suitable means of transport between Egypt and Sudan.
- **Water level:** The White Nile and The Blue Nile are the main rivers that meet in Khartoum to make the River Nile. Fortunately, these two Niles are free from cataracts, but some sections of these rivers and some of their tributaries suffer from drops in water level during the dry season, which restricts navigation in that period.
- **Water Hyacinth:** Water Hyacinth in the southern region affects the smooth running of navigation, especially during the rainy season. The accumulation of the hyacinth slows down the speed of the push tugs and some times damages the propellers of the tug. It has totally blocked the navigable waterway through the River Jur that stretch to Wau.
- **Other Constraints** - Moving sands in small areas some times make it difficult to operate the service during the night. There are also some sharp bends, which need careful attention.

10. SUMMARY

1. Sudan has a very limited transportation infrastructure, which poses one of the greatest barriers to the country's socio-economic development. The limited road networks (3,599 Km asphalt and 2,611 Km gravel roads) combined with 4,789 Km of narrow gauge railways (40% of which is out of service at present) makes river transport one of the most important mode of transport in the country. The Nile is the most important river that provides the main mode of transport from the north to the south in the absence of roads and rail network to the south.
2. The significance of river transport can be viewed in light of different factors. The economic advantage, availability of great potential for river transport, limited capacity of roads and rail networks and absence of other links to the south, relative need of less investment capital before use, enabling access to beneficiaries residing along the river and its potential to be used immediately makes the river transport more significant for Sudan than other modes of transport.
3. At present four modes of transport are used by WFP for food delivery in the Sudan: air, road, and to a lesser extent river and rail. In the absence of road networks and in view of the insecurity prevailing throughout southern Sudan, WFP uses air transport more frequently.

Where roads are possible, security considerations prevent use of surface transport thus further exacerbating the use of airdrops and airlifts. This makes the entire operation in Sudan expensive.

4. With peace in the Sudan, WFP's operation in the South is expected to increase demanding effort to gradually shift from air to surface transport. This leaves the river transport as the best and the only mode of transport that can be used immediately.
5. Sudan has a great river transport potential due to the fact that 60% of the Nile River and its tributaries flow through Sudan. However like the other modes, river transport is not yet developed to its full potential and is not in a position to meet neither existing nor future demands. It shares the same common problems like the other transport infrastructures, such as finance, lack of skilled manpower, lack of maintenance and facilities, and lack of spare parts.
6. The River Transport Corporation and other private operators provide river transport in the Sudan. The available capacity is limited and cannot be relied upon. There is very limited capacity of Pusher Tugs and barges both by the River Transport Corporation and by Private Operators. The river transport service is provided currently by Pushers and barges, which are few in number and in very poor condition; they are completely worn out and very old. They cannot meet future demands and they cannot be relied upon to exploit the advantages from the existing potential of river transport. Hence even if the use of river transport is highly recommended, the limited capacity that is available in Sudan is an important issue that needs to be addressed. The existing port and jetty capacity need to be up-graded. Rehabilitation of the quays and jetties is required, and purchase of cargo handling equipment and facilities is also a concern to efficiently use river transport. In view of overcoming the existing problems of capacity, the following recommendations are provided to WFP so that the river transport potential is fully utilized as part of its strategy to reach the hungry with required assistance in a timely and cost effective manner:
 - WFP should run its own river transport fleet by employing its own pusher tugs and barges. This would enable WFP to use river transport efficiently and meet future demand at the cheapest cost.
 - The operation would be more effective if WFP has its own cargo handling equipment that can be used for loading and off-loading cargo at least in selected ports of high operational density.
7. The current state of river transport calls for donor/private sector investment to assist in the development and upgrading of equipment and facilities for better use of this important and cheap mode of transport to reach beneficiaries residing in remote areas of the South and deliver humanitarian relief.
8. Companies have been contacted to provide offers and quotations of Pusher Tugs and barges (see below). A German-based company quoted a price of USD 1,150,000 for a Pusher Tug; and offers are expected from other contacted companies. The contacted companies have experience on the type of pusher tugs and specifications used on the River Nile. The

companies have long experience working with the River Transport Corporation and can be contacted. There is capacity to manufacture barges in the Sudan. All the barges of the RTC have been imported from Norway and assembled here. One company quotes an all-inclusive price of \$200,000 for a barge with capacity of 470 Tons. This price would be less if parts (material) is imported from abroad and assembled in the country.

Contacts of Companies approached:

1. Depot & Factory Equipment Co.Ltd.(Sudanese Company)
Shamam Engineering – Industrial Area – Khartoum North (Given offers of \$200,000 for a barge of 470 tons capacity – an all inclusive price)
Tel. +249 13 31 31 59 & 31 40 53
Fax: +249 13 31 40 54
WEB: www.defshen.com ; E-mail: defshen_2@yahoo.com
2. Rhein International (Representative)
Germany, Cologne, 50939
Olberg St. 79
Tel:+49 221 41 81 07
Mob:+49 163 42 76 969
3. Damen Shipyards Gorinchem
Laurence Winkel, Africa Area Director
P.O.Box:1,4200 AA Gorinchem (Holland)
Phone:+31(0)183- 639214
Fax:+31 (0)183-632189
Africa@damen.nl
E-mail:info@damen.nl
Website:www.damen.nl
4. Fassmer GMBH and Co.Kg.
Industrie Strasse 2,
D-27804 Berne /Motzen, Germany
E-mail :harald fassmer@fassmer.de
Internet :www.FASSMER.DE
Tel: 0049-4406-942-110/ Mobile:0049 172 2760648
Fax: 0049-4406-942-4110