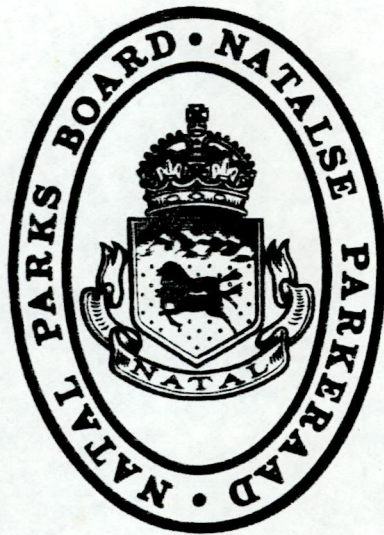


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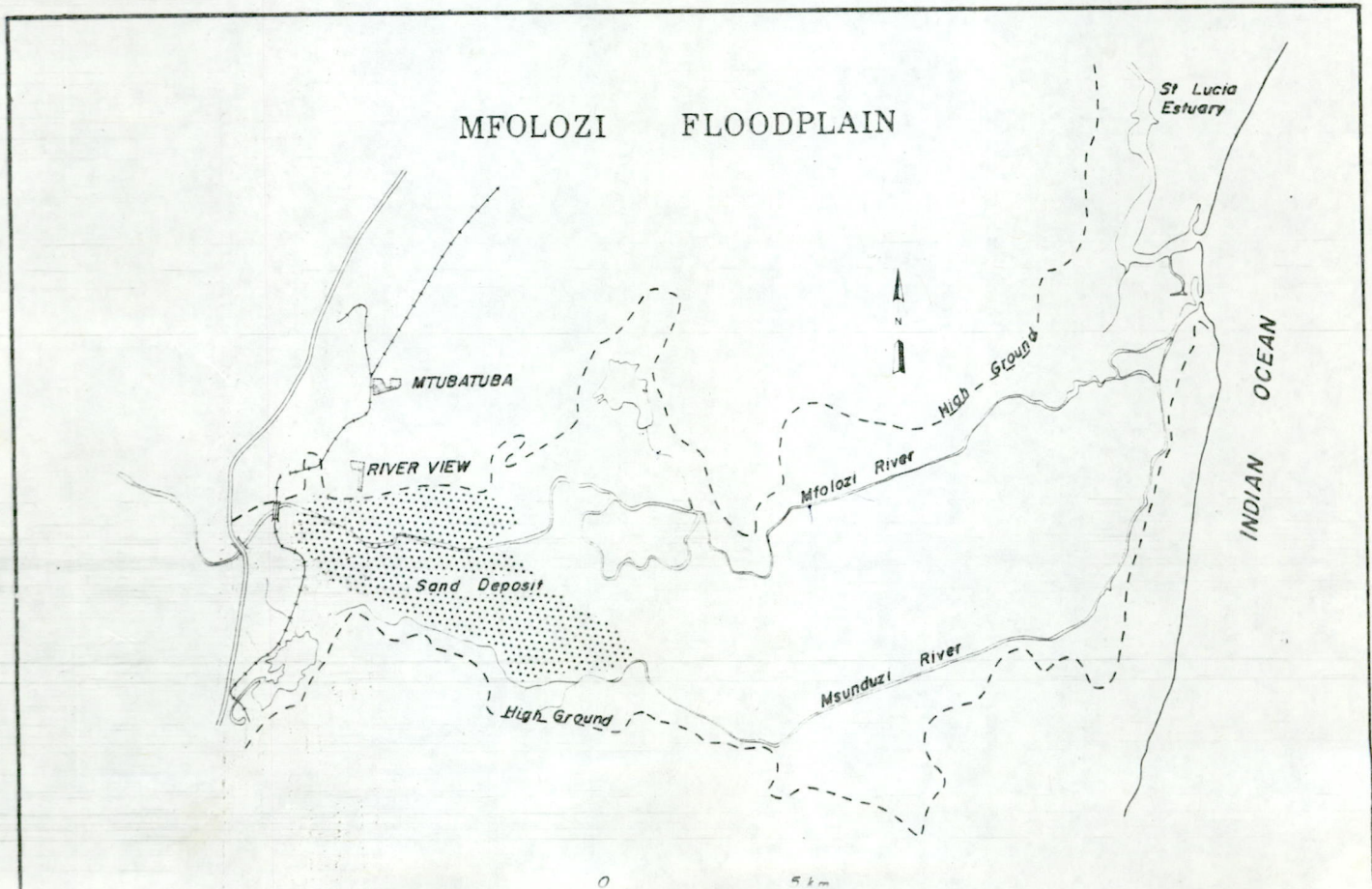
# DEPARTMENT OF ENVIRONMENT AFFAIRS

DIRECTORATE OF WATER AFFAIRS

DIVISION OF PLANNING SERVICES

## MFOLOZI FLOODPLAIN: ECOLOGICAL INVESTIGATION:

FIRST REPORT: MARCH 1984



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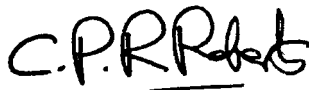
DIRECTORATE OF WATER AFFAIRS

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MFOLOZI FLOODPLAIN: ECOLOGICAL INVESTIGATION:

FIRST REPORT

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March 1984

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MFOLOZI FLOODPLAIN: ECOLOGICAL INVESTIGATION: FIRST REPORT MARCH 1984

SUMMARY

The flood on the Mfolozi River which resulted from tropical cyclone Domoina on 31 January and 1 February 1984 is the largest in living memory. In hydrological terms, the event is classified as an extreme one approaching the maximum flood expected from the catchment. The Mfolozi flats consists of a floodplain some 30 km long and 7 km wide and varies between 20 m and 2 m above sea-level. The floodplain was subjected to regular flooding in the past.

The 1984 flood in the Mfolozi River resulted in an extensive sand deposit on the sugarcane lands in the upper reaches of the Mfolozi flats. The depth of the 2 500 ha sand deposit is generally over 1 m and is as much as 2 m.

The objectives of this investigation were to:

- (a) determine the boundaries of the irreparably sand damaged area on the Mfolozi floodplain.
- (b) ascertain the ecological implications of the sand deposit on the natural and made-made environments.
- (c) study the socio-economic effect of the damaged area on the Umfolozi Co-operative Mill and surrounding area.
- (d) recommend a future management strategy for the Mfolozi floodplain and particularly the sand damaged area.

It was found that:

- (i) the area covered with sand to a depth of 0,5 m and more can be considered as irreparably damaged.
- (ii) the sand deposit in its present state constitutes an ecological danger to the Mfolozi/Msunduzi Rivers as well as to the estuary of Lake St Lucia. In addition the sand deposit is also a potential threat to the adjacent farms. The stabilisation of the sand by suitable vegetation is considered essential.
- (iii) the withdrawal of 2 500 ha from the Umfolozi Co-operative Sugar Planters Ltd Mill will reduce the cane throughput by about 20% and will have an adverse effect on the viability of the Mill.

(ii)

- (iv) the sand damaged area should be managed as a natural floodplain which would act as a sediment filter protecting downstream farms and Lake St Lucia.

In order to implement these findings the following matters are recommended:

- (a) The sand damaged area should be expropriated at current nominal value and an ex gratia payment added to make up the total compensation package to a reasonable market value of the land in an undamaged state. The estimated cost implication of this measure will be R20 to R25 million.
- (b) The sand damaged area should be placed under the control of the Directorate of Forestry who would reclaim the area and manage it as a natural floodplain. The revegetation of the sand deposit is estimated to cost R3,4 million and will take about 4 years. Adequate funding will be required for this purpose.
- (c) Where possible suitable compensatory land should be made available so as to improve the viability of the Mill. No further allocation of sugarcane lands on the Mfolozi flats beyond that recommended by the 1983 Interdepartmental Committee should be allowed. Sugarcane potential in the Mill operating area exists also in KwaZulu.
- (d) Several further detailed studies are recommended as well as a greater impetus to the Mfolozi River Catchment Management Plan.

1. PURPOSE OF THE ECOLOGICAL INVESTIGATION

In the press release of 6 March 1984 issued by the Minister of Environment Affairs and Fisheries regarding flood relief by the State in the area stricken by the cyclone Domoina, mention was made of an ecological investigation which would be undertaken on the Mfolozi floodplain.

Indications were that some 2 500 ha of agricultural land in the Mfolozi floodplain have been irreparably damaged by extensive sand deposits. Representations had been directed to the Government for the expropriation of this land. Before a decision could be taken in this regard, the ecological investigation was required. The reduction of the sugarcane supply area to the Umfolozi Co-operative Mill was of concern.

The report of the Working Group of the Special Cabinet Committee of 27 February 1984 identified the above sand deposits as a potential wind blown sand problem which could threaten the ecology of Lake St. Lucia. Stabilisation of the sand by vegetation was considered essential.

The objectives of this investigation were therefore to:

- (a) determine the boundaries of the irreparably sand damaged area on the Mfolozi floodplain.
- (b) ascertain the ecological implications of the sand deposit on the natural and made-made environments.
- (c) study the socio-economic effect of the damaged area on the Umfolozi Co-operative Mill and surrounding area.
- (d) recommend a future management strategy for the Mfolozi floodplain and particularly the sand damaged area.

## 2. INVESTIGATIONAL PROCEDURE

The study area was inspected by helicopter on 22 March 1984 by the persons named in Annexure A.1. Discussions were held both before and after the field inspection. Further background information was gathered during informal discussions with representatives of the Department of Agriculture and the local community during the evening of 22 March 1984. On 23 March 1984 further discussions were held with representatives of the Umfolozi Co-operative Sugar Planters Ltd (UCOSP), as shown in Annexure A.2.

The documents shown in the list of references provided additional information.

The draft report was submitted to the persons indicated in Annexure A.3. for comment. Further information was gathered on 30 March 1984 from the persons indicated in Annexure A.4.

## 3. FINDINGS

### 3.1 Past flooding events and damage

Being located on a floodplain, the Mfolozi flats and the sugarcane lands thereon have been subjected to numerous floods in the past with varying degrees of flood damage. The 20 000 ha Mfolozi floodplain is relatively level and is about 30 km long and has an average width of 7 km. The height above mean sea level varies from 20 m at the upstream end to 2 m near the coast. The whole of the eastern portion of the flats is lower than 5 m above sea level. Figure 2 shows the agricultural development on the Mfolozi flats in 1975.

The Mfolozi Catchment Planning Committee was formed in 1983 because of the concern about the degradation of the catchment and it represents both the RSA and KwaZulu. The prime aim of the Committee is "to develop a strategy of the co-ordinated development of the Mfolozi Catchment in order to improve the quality of life of all inhabitants with initial emphasis on conservation of water and soil". Some 52% of the 9 830 km<sup>2</sup> catchment falls in KwaZulu and the remainder in Natal.

Some of the effects of previous flooding have been repaired by inverting the soil on some farms to depths of up to 2 m to reinstate fertility and mix sand deposits left after flooding with the in situ soil. Costs incurred in this process have been as high as R4 000/ha. This is a slow and costly process and can only be done once. Coetsee (1979) summarised the numerous investigations by consulting engineers, the Hydrological Research Unit of the University of the Witwatersrand, Interdepartmental Committees and also examined the implications of a flood control dam. The largest flood since 1890 was in 1963 with an estimated flood peak of 8 500 m<sup>3</sup>/s and a total flood volume of 1 000 million m<sup>3</sup>.

Flood damage, both from the effects of long-duration inundation of cane by water and sand deposits were reported, but were not of sufficient magnitude to preclude continued farming operations. Improvements to the capacity of the Mfolozi River by dredging by the UCOSP reduced flood damage for the more regular floods. The capacity of the Mfolozi Channel was between 1 200 and 1 300 m<sup>3</sup>/s; above this flow the river would breach the retaining levees and would flow southwards to the lower lying Msunduzi River (See Fig. 1). The return period of this overtopping flood is about 3 years and the normal floodline of the inundated area is shown in Fig. 1. The 10-year flood has a peak discharge of about 2 500 m<sup>3</sup>/s and its floodline will be a little higher than the 3-year floodline.

## 3.2 Flood damage in 1984

### 3.2.1 Flood magnitude

The history of tropical cyclone Domoina on 31 January and 1 February 1984 is well recorded and will not be repeated herein except to relate the flood magnitude and level to past events. Provisional estimates by the Division of Hydrology give the flood peak as 13 000 m<sup>3</sup>/s and the flood volume a 3 000 million m<sup>3</sup>; other investigators rate the peak at 22 000 m<sup>3</sup>/s (SA Sugar Association (1984)). The flood return period is ranked as an extreme event lying between the Regional Maximum Flood (determined from

historic South African and world-wide observed extreme floods) and the Probable Maximum Flood which is considered to be the upper bound of a flood in a given drainage basin. The 1984 flood level was about 3 m higher than that in 1963.

### 3.2.2 Flood damage

The flood damage can be divided into three categories from the railway bridge at the upper reaches of the floodplain down to the sea viz:

#### (a) First reach

In this reach the extensive sand deposits of about 2 500 ha in area are to be found. Figure 3 is an aerial photograph of the sand damaged area which was kindly supplied by the SA Sugar Association (SASA). Certain important features have been annotated on this figure. These deposits arise from the reduced water velocities on the widening floodplain and there is an hydraulic sorting of particles, the coarsest being deposited first. The situation is also further aggravated by a constriction in the floodplain (see Fig. 1) which probably caused some increase in the water levels and a further decrease in velocity. Van Heerden (1984a, 1984b) discusses the geomorphological processes which were evident and these are to be found in any sediment delta system such as that which occurs in natural systems or man-made ones such as reservoirs.

The depth and extent of these sand deposits is being determined by the Experiment Station of the SASA on behalf of the UCOSP. An initial report has been produced SASA (1984) and a further one is expected during late April 1984. The first indications are that the sand depths are in excess of 0,5 m and as much as 2 m in places. Some 2 500 ha is affected and this represents a total sand volume of about 50 million m<sup>3</sup>. This sand contains only about 1% silt and 1% clay and is considered unsuitable for agricultural purposes. The SASA is also producing criteria upon

which the classification of irreparably damaged land can be based. Once the above information has been produced, an accurate assessment of the irreparably damaged areas can be made. The Department of Agriculture should be requested to review the above assessment.

The Mfolozi River took a new course in this reach and breached southwards to the lower lying Msunduzi River, scouring a new channel as shown in Figs. 1 and 3. The river has been diverted back into its old course by the embankment shown in Fig. 3.

(b) Second reach

In this reach, shown in Figs. 1 and 3, the fields have been covered with silt deposits up to about 0,5 m depth. These deposits arise from the reducing longitudinal velocities to a point where finer silt particles settle. In the past these silt deposits have been highly beneficial as the silt has a high nutrient level and record crop yields usually followed such flooding events. There has been additional crop damage, however, due to the drowning effect of the floodwaters. In the lower portions of this reach there are silt deposits of shallow depth on the canefields. The damage in this reach is therefore repairable and cane will have to be re-established.

(c) Third reach

This reach consists of the undisturbed swamplands as well as the Mfolozi/St. Lucia mouths. It was of interest to observe that there was little flood damage to the natural swamp; this observation was also reported by the Natal Parks Board (NPB) officers in respect of the Mkuzi swamp to the north of Lake St. Lucia.

The mouth of the Mfolozi/St. Lucia system has undergone considerable change and all man-made structures have been swept out to sea. Significant erosion occurred on the south bank

around the Maphelane resort (Grobler 1984). Further erosion from future floods could endanger the future of the campsite. There is a considerable widening and deepening of the Mfolozi/St. Lucia mouth which benefits the St. Lucia system and will improve the drainage from the sugar farms on the Mfolozi floodplain. The Chairman of the St. Lucia Technical and Ecological Committee stated that they were studying the situation and had commissioned several organisations for the work. As salinity levels in Lake St. Lucia would remain low for several years, there was sufficient time to review a new management strategy for the lake system.

The above discussion reveals that the greatest damage has occurred in the first reach which has been covered with sand and most stress will be placed on this zone in this report as it appears that other flood damaged areas can be reinstated.

### 3.2.3 Investigations underway/completed

The following relevant surveys have been completed or are in progress:

- (i) Aerial photography with survey flood marks: Directorate of Water Affairs: Completion by 6 April 1984 (weather permitting). This survey can be used to plot contour plans of the floodplain if required.
- (ii) Aerial photography: SASA: Completed 1 March 1984 (See Fig. 3).
- (iii) Hydrological studies: Directorate of Water Affairs: Completion of data processing by July 1984.
- (iv) Geomorphological study by Dr I. van Heerden of Specialist Offshore Surveys Pty Ltd on behalf of NPB: Completed.

- (v) Study of the Mfolozi/St. Lucia mouth by the National Research Institute for Oceanology of the CSIR on behalf of St. Lucia Technical and Ecological Committee: Completion September 1984.
- (vi) Cross-sections of St. Lucia by Directorate of Water Affairs: May 1984.
- (vii) Extent of sand deposit: SASA for the UCOSP: end April 1984.
- (viii) Definition of irreparably sand damaged land: SASA Completion end April 1984.
- (ix) Study of coastal processes by Specialist Offshore Surveys Pty Ltd on behalf of the St. Lucia Technical and Ecological Committee: Completion September 1984.

Investigations (vii) and (viii) will be of value for the accurate definition of the irreparably sand damaged area and future management of the affected area.

### 3.3 Ecological impact of the sand deposits

The impact of the sand deposit on the natural and man-made environment is examined below.

#### 3.3.1 Impact on river system and Lake St. Lucia

It was found that in its present unstabilised form, the sand deposit constitutes a threat to the above systems as sand can be blown or washed into the two rivers and be transported to the mouth of Lake St. Lucia where it will have adverse effects on the lake. The deposit of sediment in the rivers also has financial implications as it would have to be dredged out to restore lost discharge capacity. Dredging in the Mfolozi River is undertaken by UCOSP while the Natal Provincial Administration is responsible for dredging the mouth of St. Lucia.

### 3.3.2 Impact of sand deposit on adjacent farms

The greatest hazard is that from wind blown sand which would result in damage to sugarcane due to sand blasting effects. Prevailing winds are generally NE and SW and for about 5 - 7% of the time have a speed in excess of 30 km/h which is the critical speed above which the sand will be blown. In addition the sand encroachment into adjacent and presently repairable lands will increase the sand damaged area. The problem arises when the cane puts out new replacement roots into the sand and the lower roots in better class deeper soils die off. In subsequent seasons the cane production reduces because of the poor soil medium.

### 3.3.3 Ecological impact: conclusion

It is concluded that the present sand deposit holds a threat both to the natural and man-made environments. It is therefore of vital importance that this deposit be stabilised by suitable vegetation.

### 3.3.4 Socio-economic environmental implications

A thriving local economy has developed around the fertile Mfolozi floodplain and the UCOSP Mill at Riverview.

Riverview consists of the Mill and residential area while commercial activity is centred on the adjacent town of Mtubatuba. The 1980 population census for urban Mtubatuba is.

Whites	760
Coloureds	160
Asians	60
Blacks	240

These figures reflect only urban population and the non urban population will increase the numbers significantly.

The Mill serves the area from Kwambonambi in the south to Mkuze in the north. About 70% of the crop was produced from 9 000 ha of land on the Mfolozi floodplain (UCOSP 1984a).

The viability of the Mill has been reduced by the past drought and led to a confidential study by the Department of Agriculture on its viability. If some 2 500 ha or some 28% of the Mfolozi floodplain is regarded as irreparably damaged then this could reduce cane throughput of the mill by about 20% (UCOSP 1984a). This could have serious implications for the long-term viability of the Mill unless alternate areas are made available for cane to make up for this loss of cane producing area.

The Mill employs a White staff of 125 and 940 Black workers. If the Mill is no longer viable, it is unlikely that the remaining cane produced could be transported economically to any other Mill. The Co-operative and Mill supports some 255 White and 4 190 Black breadwinners or a total of some 13 770 persons (dependents included). Mtubatuba and its business infra-structure is largely dependent upon the success or otherwise of the Co-operative (UCOSP 1984a).

It is thus very important to the local economy that the Mill remains a viable proposition. The allocation of suitable additional land for cane production within the Mill area should be given a high priority.

### 3.4 Control measures

#### 3.4.1 Land ownership

The affected sand damaged area of about 2 500 ha on the floodplain is in the hands of private owners and some 26 properties are involved. The swampland to the east of the sugarcane lands is State land under the control of the Directorate of Forestry. There have been numerous investigations in the past regarding the allocation of this State land and reference should be made to the 1983 Interdepartmental committee report on this topic. Figure 1 shows the recommended limit

of agricultural development on the Mfolozi flats as defined by the 1983 Interdepartmental Committee. There has been continuous pressure in the past on the State to allocate unused State land on the Mfolozi flats to agriculture.

### 3.4.2 Control of windblown sand

The Directorate of Forestry is the State agency which is primarily responsible for wind blown sand control. The Regional Director of the Zululand Forestry Region considered that the area could be stabilised within a period of about 4 years provided that adequate funding, manpower and equipment were to be provided. (See Table 1).

TABLE 1: Sand stabilisation programme and costs

Year	Area (ha)	Unit cost R/ha	Total cost R	Remarks
1	400	2 000	950 000	Includes wind screens
	100	1 500		
2	600	1 300	780 000	
3	700	1 200	840 000	
4	700	1 200	840 000	
Total	2 500	1 370	3 410 000	

The estimated average unit cost would be about R1 370/ha and the total cost of the 2 500 ha would be R3,41 million. The Directorate of Forestry is well established in the area and will make use of their present supervisory personnel, infrastructure and equipment e.g. trailers, four-wheel drive light delivery vehicles and other equipment. The only additional requirements are one 5 ton four-wheel drive truck with sand tyres and a 50 kW four-wheel drive tractor.

### 3.4.3 Flood control dam

A multi-purpose dam near the confluence of the White and Black Mfolozi Rivers has been considered for many years, but is unlikely to be built before the turn of the century. One of the functions of the dam would be for flood control. Although a dam with a proposed capacity between 400 and 900 million m<sup>3</sup> would attenuate more frequent flood peaks (up about 1 in 20 years return period) it would have had a negligible effect on the 1984 flood. The dam would trap about 98% of incoming sediment and the 1984 flood would have reduced the capacity of the reservoir significantly. The trapping of sediment would also have certain adverse effects on the farming operations and the lower swamps as the replenishing silts would be deposited in the reservoir.

It was therefore concluded that because of the uncertainties regarding the proposed dam, it should not be taken into account when planning the strategy of the floodplain redevelopment.

### 3.5 Implications of alternative management strategies of sand damaged area

The Special Cabinet Committee (1984) in their report highlighted three approaches towards the sand damaged area viz:

- (a) Ex gratia payment
- (b) Expropriation
- (c) Expropriation and provision of replacement state land

The implications of each of these measures in terms of a long-term management strategy for the Mfolozi floodplain is discussed.

In determining a compensation/relief package for owners affected in areas irreparably damaged, cognizance should be taken that many owners have lost everything and not just a small portion of the farm as is the case in other areas.

### 3.5.1 Ex gratia payment

The payment of the R5 500/ha for irreparably damaged land will yield a total sum of R13,75 million for the 2 500 ha area. Although it will compensate the owners in some measure for their losses, the area will be left in its present state and will pose an ecological threat as discussed in paragraph 3.3. The owners will have no incentive to invest this money or make any effort, in reinstating the area. It is doubtful whether the provisions of the Soil Conservation Act could be applied in this case to enforce reclamation as most of the owners have lost the major part of their properties and would not have the necessary financial resources. The group which met on 22 March accordingly came to the conclusion that payment of an ex gratia amount only was not in long-term public or ecological interests.

### 3.5.2 Expropriation

It was recognized that normally the State does not like to usurp matters of private enterprise, unless the matter is in the public interest and/or if it is beyond the capacity of private enterprise. In this case, the ecological working group considered that the sand damaged area met both criteria. The primary reason for the expropriation would be for sand stabilisation and for the implementation of a long-term management strategy of the affected area; the latter topic is discussed in paragraph 3.6.

In terms of the Expropriation Act, the State may only offer an amount based on the value of the property in its existing condition. The present value of the land is low and only a nominal amount could be offered. In order to compensate the owners in the spirit of the flood relief programme, a combination of a nominal expropriation amount plus an ex gratia amount could be considered; this ex gratia amount would have to be derived specially for the sand damaged area. In this way the State would obtain control of the affected area and the owner would receive an equitable flood damage compensation package. This possibility was discussed without any fixed commitment on 23 March with representatives of the UCOSP and some of the affected owners who indicated that they were in favour of the approach.

Should the damaged area be expropriated, then certain farms will be left with uneconomical remaining areas on the fringes of the sand damaged areas. Indications are that a production of less than 7 000 t cane/annum is considered uneconomical. In this case, as is normal policy the whole of the farm would have to be expropriated. The undamaged area could be leased to the Co-operative in the short-term so that it could undertake any flood damage repairs. In the long-term it could be consolidated into economical units or with adjacent properties. These measures would be important as it is most essential that the viability of the sugar mill be maintained.

In terms of this proposal the owners would be expropriated only and no compensatory land would be provided. It would not be necessary to expropriate the sugar quota provided that the owner could purchase other suitable land within the operating area of the same mill or could sell the quota. The SASA places a value of about R700/ha on the sugar quota.

The UCOSP indicated a real gross value of the sand damaged area as R13 400 per ha in a telex to the Minister of Environment Affairs and Fisheries of 21 February 1984. This amount included a sum of R4 050/ha for the member's share in the mill and R1 420/ha as the value of proximity to the mill in terms of the Rörich Transport Committee formula. It should be pointed out that if the owner re-established he would retain the share in the mill. The General Manager UCOSP at the meeting of 23 March indicated that they were revising their initial estimate of 21 February 1984 in conjunction with the cane growers and submitted a revised estimate in telex form on 28 March and a full submission on 30 March.

The UCOSP(1984c) gave the yields of six typical sand damaged farms with areas varying from 102 to 120 ha on a 20 year long-term basis as well as the formula used by the Rörich Committee of the average of the best 4 years out of the last 7 years. Table 2 summarises the information and notice should be taken of the range in yields between properties. These yields are compared with property U148 in the Lower Mfolozi flats which was sold in 1983 and are of the same order of magnitude.

TABLE 2: Summary of production statistics of six typical sand damaged farms and farm U148 sold in 1983

Item	Unit	Average over last 20 years			Rörich Committee basis (av. of 4 best out of last 7 years)		
		Range		Average	Range		Average
		Min	Max		Min	Max	
<u>Sand damaged farms</u> (U4, U6, U7, U8, U10, U78)							
Sugarcane yield	t/ha/a	69	91	82	71	101	84
Sucrose yield	t/ha/a	7,4	9,7	8,7	8,2	11,3	9,4
<u>Recent farm sale</u> (U148)							
Sugarcane yield	t/ha/a	-	-	84	-	-	90

None of the farm houses or other major buildings are located on the floodplain and are on separate high lying properties. Discussions with the UCOSP on 30 March revealed that the owners would wish to retain ownership of the properties on which farm houses are located even though the sugarcane production property is expropriated.

In the revised estimate which was based on a farm (U148) sale in 1983, a value of R10 194/ha was derived. To this the UCOSP added R1 298 for the average proximity value (varies between R760 and R1 900/ha for the six typical properties) in terms of the Rörich Transport Committee formula thus deriving R11 492 or say R11 500/ha as being representative of a valuation which would place the owners of expropriated land in the same position as they were prior to the flood. Being on the lower Mfolozi flats UCOSP considered that the

farm U148 had no proximity value to the mill as the transport cost is virtually the same as the benefit to be gained from the Rörich transport formula. The above property included a house and adjusting for this value and the above sugar quota, the authors of this report derive an upper bound value of R10 000/ha for caneland. Based on lower yields and less benefit from proximity to the mill, a lower bound value of R8 000/ha was ascertained.

It is apparent therefore that great care will have to be taken with the determination of an equitable combination of ex gratia and expropriation payment and agricultural economists will have to be involved in the process.

For comparative and budgetary purposes it is assumed that the above compensation package will amount to between R8 000 and R10 000/ha, which yields a total sum of R20 to R25 million. Actual valuations of the individual properties should be based on a long-term sugarcane yield (say 15 years), the value of the sugarcane quota and its proximity to the mill.

### 3.5.3 Expropriation and compensatory land

This alternative depends to a large extent on the availability of replacement State land. The UCOSP indicated several areas of State land on the Mfolozi flats which they considered suitable for cane production. Some of these areas are in the eastern swamp lands presently controlled by the Directorate of Forestry and their allocation for agriculture is not recommended due to the high risk of flooding, poor drainage and further destruction of a wetland area. (See Fig. 1 for the recommended limit of agricultural development on the lower Mfolozi flats). The provision of alternative land in the milling area of the UCOSP will assist in the question of the viability of the mill. The Interdepartmental Committee on the Allocation of State Land (1983) should be used as a guideline for determining whether such suitable areas exist; some of the recommendations of the above committee have to be adjusted in the light of the recent flooding of the flats as some areas are no longer

suitable for allocation. The Interdepartmental Committee (1983) indicated that some 230 ha of vacant State land on the Mfolozi flats under the 10 year-floodline and 385 ha bordering on the Mfolozi flats would be suitable for sugarcane production; these areas fall far short of the loss of the 2 500 ha sand damaged area.

No additional State land under the 10 year floodline on the Mfolozi flats should be allocated to private individuals for sugarcane farming; consideration could be given to leasing the 230 ha mentioned above to the UCOSP at their own risk. The UCOSP expressed an interest in the 2 145 ha Papinicolou lease to the north of the lower flats. The Natal Parks Board on 30 March considered that this area should be conserved as it contains the valuable Dukuduku coastal forest and little of this type is conserved at present. The control of the bulk of this area is being transferred at present to the Directorate of Forestry for conservation and only a limited area already under sugarcane will be retained for agricultural purposes.

It is understood that suitable sugarcane production areas in the operating area of the mill exist in KwaZulu. An off-channel irrigation dam has been considered for this purpose. The cane quotas could be purchased from the owners of the sand damaged farms by KwaZulu.

The remarks regarding expropriation in paragraph 3.5.2 will apply to this case; the value of compensatory land where applicable will have to be taken into account.

### 3.6 Alternative management strategies of the Mfolozi floodplain

The ecological working group examined various alternative strategies for the future management of the Mfolozi floodplain and in particular the sand damaged area. It was recognised that both the natural and man-made systems had to be considered and a strategy which was in harmony with nature and which would optimise the resources of the Mfolozi floodplain should be sought. Farming operations on the floodplain can be divided into areas of high and lower risk against

flooding as well as damage from sediment deposits. The first reach of the river is clearly one of high risk and is generally no longer suitable for agriculture. The ecological working group considered that a natural floodplain should be allowed to develop in this sand damaged area which would act as a natural sediment filter in improving water quality. The natural tendency for such a delta is for it to grow in size and to move gradually downstream as a result of increasing velocities on the floodplain as the buildup of sediment occurs. The time scale of this process is, however, one of geological scale and would not significantly affect the farming operations in the lower part of the flats for the foreseeable future. Certain parts of this area (e.g. depressions) would become wetlands. This management strategy would have benefits to the agricultural development in the second reach and to the swampland and Lake St. Lucia in the third reach.

In the first reach certain man-made features will be evident such as access tramways to the other farms as well as the proposed usage of the new channel scoured by the Mfolozi River for surplus flows down to the Msunduzi River. The UCOSP indicated that the Msunduzi River capacity should be increased by dredging, but prior to implementation of this measure a careful ecological and river mechanics study will have to be made. Weiss and Midgley (1976) acting as consultants to the UCOSP, advised against channelisation of the Msunduzi due to the flat slope and high cost of significant improvements of discharge capacity. Some dredging will still be required in the future in the Mfolozi River and at Lake St. Lucia as the additional floodplain will be effective as a sediment trap<sup>n</sup> only for flood flows in excess of the channel capacity.

It was considered that the Directorate of Forestry is the correct agency to control the sand damaged area, to stabilise the sand and to manage it as a floodplain and wetland. On 30 March, the Natal Parks Board officials asked that their organisation be given a chance to submit their case as they also have conservation interests in the area e.g. Lakes Teza and St. Lucia. Because certain aspects of the redevelopment of the sand damaged area would directly affect the

UCOSP, local farmers and the Natal Parks Board, certain rights for roads, tramlines, channels, drains, etc. would have to be granted to the parties concerned to continue with their business and conservation operations. In order to avoid a conflict situation, it is felt that the UCOSP, the Department of Agriculture and the Natal Parks Board should also have an input in the planning of the area. As an example of a possible conflicting situation, the UCOSP indicated that there might be some small pockets of land within the area which could in time be reclaimed for sugarcane production by the Co-operative at its risk. This suggestion could create future problems because of the high risk of further flooding and the difficulty in managing isolated areas within a vast sand deposit. The ultimate responsibility for any decision will rest, however, on the controlling organisation.

### 3.7 Further studies

The following further studies were identified.

#### 3.7.1 Boundary of the sand damaged area and irreparable area

The exact boundary of the sand damaged area and the irreparable area is being ascertained by the SASA (refer to paragraph 3.2.2(a)). The results of the survey should be available by the end of April 1984 and should be reviewed by the Department of Agriculture.

#### 3.7.2 Socio-economic study

The effect of the reduced sugarcane production area on the mill and Mtubatuba town should be evaluated. The confidential investigation by the Department of Agriculture on the mill viability is an important contribution in this regard.

#### 3.7.3 Long-term management of the Mfolozi flats

The expropriation of the sand damaged area should form the first phase of the long-term management strategy of the Mfolozi flats as discussed in paragraph 3.6. An in-depth ecological study should be

conducted to ascertain the minimum boundaries of a stable ecological unit which will meet the environmental requirements of the wetland system; this might imply expropriation of agricultural land in the future or not renewing leases of State land when they expire. The Natal Parks Board for example indicated a possible connection between the nature conservation area at Lake Teza and the sand damaged area.

#### 3.7.4 Sugarcane production potential in KwaZulu.

This potential should be studied as sugarcane production in KwaZulu within the operating area of the Mill will increase the viability of the Mill.

#### 4. RECOMMENDATIONS

The ecological working group, in compiling these recommendations, recognised that both the natural and man-made environment had to be taken into consideration. These proposals attempt to maximise the use of the natural resources of the Mfolozi floodplain. The recommendations which follow from this investigation are:

##### 4.1 Disposal of the sand damaged area

The investigation showed that the 2 500 ha sand damaged area has no further agricultural potential and it is recommended that it be expropriated by the State. It is estimated that the cost of expropriation will amount to R20 to R25 million.

##### 4.2 Future use of the expropriated area

It is recommended that the area be developed and managed as a natural floodplain to serve the purpose as a sediment filter thus improving water quality to the benefit of the lower farms as well as the swamps and Lake St. Lucia.

##### 4.3 Management of the sand damaged area

The exposed sand deposit poses a direct ecological threat to the Mfolozi and Msunduzi Rivers and the mouth of Lake St. Lucia as well

equipment. The estimated cost is R3,4 million and the revegetation should take about 4 years. The Directorate of Forestry is the most suitable agency for this function. Because the management of this floodplain will affect the lower farming operations and Lake St. Lucia, it is essential that the Umfolozi Co-operative Sugar Planters, local farming associations, the Department of Agriculture and the Natal Parks Board have a meaningful input in the planning thereof. Pressures to re-establish cane in future years within this area should be resisted.

#### 4.4 Area to be expropriated

The exact boundaries of the expropriated area should be determined from the sand deposit survey which is being conducted by the SA Sugar Association (SASA) as well as the criteria of irreparably damaged land which is being developed by the SASA, and should be reviewed by the Department of Agriculture. At present it appears that land covered by more than about 0,5 m should be classified as irreparably damaged.

#### 4.5 Flood damage relief compensation package

It is recognised that those owners affected by the sand damaged area should receive special consideration because in most cases the whole of the farm is affected or the remaining undamaged portion is no longer a viable farming unit. It is recommended that the land be expropriated in terms of the relevant act at its present low value, but that an ex gratia amount be paid so that the total compensation amount will reflect a reasonable market value of the land in its undamaged state. The sugarcane quota should not be expropriated. The market value of the individual properties should be based on the actual long-term (15 years) sugarcane yields in the past, sugarcane quota and the proximity of the property to the mill.

#### 4.6 Viability of the UCOSP

In order to maintain the viability of the Co-operative Mill it is recommended that suitable compensatory State land be supplied to the affected owners and this would be taken into account in the compensation package discussed in paragraph 4.5. It is further recommended that the undamaged and reclaimable expropriated land mentioned in paragraph 4.5 be leased in the short-term to the Co-operative at their own risk for re-establishment purposes. Consideration can be given to the consolidation of these areas into economical units or with adjacent properties. There is sugarcane production potential in KwaZulu which would enhance the viability of the Mill and this should be investigated.

#### 4.7 Compensatory State land

The 1983 Interdepartmental Committee on the allocation of vacant State land on the Mfolozi flats should be used as a guideline for determining suitable areas although the recent flood has adversely affected some of the areas previously considered suitable. The Interdepartmental Committee established that 230 ha of land on the Mfolozi flats under the 10-year floodline and 385 ha adjacent to the flats would be suited for cane production. These areas fall far short of that required to replace the damaged 2 500 ha. Consideration could be given to the leasing of the 230 ha of land on the Mfolozi flats to the UCOSP at its own risk. The UCOSP has proposed development of further portions of the swamp in the lower part of the floodplain for sugarcane and it is recommended that these pressures for development be resisted.

#### 4.8 Further studies

A number of studies have already been completed while others such as the extent of sand deposits, aerial photography of the area with surveyed flood marks, economic viability of the mill will assist in the implementation of the above recommendations, if approved. It is recommended that the following studies be initiated:

- (a) The boundaries of the sand damaged and irreparably damaged areas are being ascertained by the SASA. The Department of Agriculture should review the findings of this study.
- (b) Socio-economic study of the Co-operative and Mtubatuba.
- (c) Ecological study of the minimum size of floodplain area required for the improvement of water quality and stabilisation of farming activities to make them less prone to flood damage from sediment deposits.
- (d) Determination of suitable areas of alternative or (e.g. in KwaZulu) compensatory State land for sugarcane production.

#### 4.9 Catchment plan

Greater impetus should be given to the Mfolozi Catchment Plan as the state of the catchment directly affects water and sediment yields.

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## ANNEXURE A

## MFOLOZI FLOODPLAIN: ECOLOGICAL INVESTIGATION

## A.1 Field inspection and meeting 22 March 1984

<u>Name</u>	<u>Designation</u>	<u>Organisation</u>
C.P.R. Roberts	Chief Engineer (Planning Serv)	Directorate Water Affairs, Pretoria
P.D. Pyke	Principal Engineer (Planning Serv)	Directorate Water Affairs, Pretoria
C.H.B. Theron	Assistant Director	Department of Agriculture, Pretoria
N. de Waal	Regional Director	Directorate of Forestry, Eshowe
J.A. George	Irrigation & Drainage Specialist	SA Sugar Association Mt. Edgecombe
R.H. Taylor	Regional Scientist	Natal Parks Board, St. Lucia
P.S. Goodman	Regional Scientist	Natal Parks Board, North Zululand
H. van der Walt	Drainage Manager	UCOSP

A.2 Discussions with Umfolozi Co-operative Sugar Planters (UCOSP)  
23 March 1984

<u>Name</u>	<u>Designation</u>	<u>Organisation</u>
C.P.R. Roberts	Chief Engineer (Planning Serv)	Directorate Water Affairs, Pretoria
P.D. Pyke	Principal Engineer (Planning Serv)	Directorate Water Affairs, Pretoria
P. Hildyard	Director (Natal Region)	Dept. of Agriculture Pmb.
P.N. Badenhorst	Director (Financial Asst.)	Dept. of Agriculture Pretoria
D.M. Scotney	Deputy Director (Natal Region)	Dept. of Agriculture Pietermaritzburg
D.M. Rix	Asst Director (Coastal Region)	Dept. of Agriculture Pinetown
C.H.B. Theron	Asst Director (Soil Protection)	Department of Agriculture, Pretoria
N.A.A. Alberts	Officer (Financial Asst)	Department of Agriculture, Pretoria
M.F. Jordaan	Liaison Officer (Agr Credit Board)	Department of Agriculture, Pretoria
I. Bales-Smith	General Manager	UCOSP
D.E. Heaton Nicholls	Chairman	UCOSP
C.W. Dottridge	Financial Manager/Secretary	UCOSP
I.G. Wiseman	Vice Chairman	UCOSP
U.G. Groom	Director	UCOSP
R.T. Morkel	Director	UCOSP
M.E. Kirkland	Director	UCOSP
P.M. Wattam	Director	UCOSP
B.C. Liesenberg	Chairman	Monzi Farmers Association
L. Proksch	Chairman	Mtubtuba Farmers Association
H.B.W. Hulett	General Manager	St. Lucia Sugar Farms