

## Destruction of the *Phoenix/Hibiscus* and *Barringtonia racemosa* Communities at Richards Bay, Natal, South Africa

P. J. WEISSER\* and C. J. WARD\*\*

### ABSTRACT

The destruction of the *Phoenix/Hibiscus* and *Barringtonia racemosa* Communities described by Venter in 1972 on the southern shores of Richards Bay is reported. The cause was the artificial opening of a new mouth about 5.5 km south of the original mouth, which increased tidal range and salinity. These swamp communities occupied a narrow band about 6 ha in area behind the *Bruguiera gymnorrhiza* Community. An estimated 95% of the communities was affected and only on the landward border were some isolated remnants of species such as *Acrostichum aureum*, *Hibiscus tiliaceus* and *Phoenix reclinata* detected. Young stands of *Phragmites australis*, seedlings of *Bruguiera gymnorrhiza* and *Avicennia marina* and epipelagic algae are recolonizing the affected area.

### INTRODUCTION

The construction of Richards Bay Harbour resulted in the Richards Bay Lagoon (28°49' S and 32°05' E) being divided into a harbour zone and a natural sanctuary by the construction of a berm wall and the opening of a new mouth for the nature reserve during 1975. Begg (1978) reports on the many abiotic and biotic changes occurring after the habilitation of the

Mgobezeleni Lake (near Sodwana Bay) following the construction of a bridge that impeded tidal flow and caused the swamps to be flooded.

During studies on Natal estuaries (Ward, MS) and on the conservation priorities between Richards Bay and Mlalazi Mouth (Weisser, MS) the vegetation of the southern shores was remapped, sampled with eight relevés and compared with findings of Venter (1972),



FIG. 1.—Remnants of *Phoenix/Hibiscus* and *Barringtonia racemosa* Communities on southern shore of Richards Bay destroyed by increased tidal range and salinity following opening of new mouth at Richards Bay. In background landward side of *Bruguiera gymnorrhiza* Zone.

harbour. This work focuses on one of these changes affecting vegetation.

Tree mortality along the Zululand Coast has been described previously. Breen & Hill (1969) reported on a mass mortality of mangroves of the Kosi Estuary (Natal) in 1965 following natural closure of the mouth for five months. Bruton & Appleton (1975, in Begg, 1978) described the death of a mangrove swamp at

who studied the vegetation before the harbour development.

### RESULTS

During mapping, the almost complete destruction of 6 ha of the *Phoenix/Hibiscus* and *Barringtonia racemosa* Swamp Communities (*sensu* Venter, 1972) in the Richards Bay Sanctuary Area was observed. Dead trees of up to 12 m tall were found and most of the trunks of the bigger trees were still upright (Fig. 1). At high spring tide water completely flooded the dead forest.

The opening of the new mouth in 1975 about 100 m

\*Botanical Research Institute, Department of Agriculture and Fisheries, Private Bag X101, Pretoria, 0001.

\*\*University of Durban Westville, Department of Botany, Private Bag X54001, Durban, 4000.



TABLE 1.—Eight relevés of the *Bruguiera gymnorrhiza* and *Phoenix/Hibiscus* Communities in the study area. The values correspond to Braun-Blanquet cover-abundance estimates (Braun-Blanquet 1964). The plots 25 m<sup>2</sup>, were approximately level, with muddy substrate and usually with stagnant water (dated 1980.11.20–24)

Relevé No.	429	428	427	441	442	443	446	445
Total cover %	80	50	60	10	6	15	70	7
<i>Bruguiera gymnorrhiza</i>	5	4	4	1				1
<i>Avicennia marina</i>			+		r			
<i>Phragmites australis</i>				2	2	2	4	+
<i>Acrostichum aureum</i>							2	1
<i>Phoenix reclinata</i>							1	1
<i>Barringtonia racemosa</i>								+

away from the *Phoenix/Hibiscus* and *Barringtonia racemosa* Communities clearly resulted in the death of these communities. It caused the pre-harbour development tidal range of 0,35 m to increase to 1,63 m in April 1977 (Begg, 1978) and the water salinity to increase, consequently the death of the plants may be attributed to a combination of these two factors. A few, isolated survivors and resprouting plants of *Phoenix reclinata* and *Acrostichum aureum* were found to occur near the southern corner of the bay, on slightly higher parts farthest from the sea (Table 1, relevé 445). A plant that has lately increased in the affected area is *Phragmites australis* which, in places, forms dense stands between the dead trunks and debris (Fig. 2 and Table 1, Relevés 441, 442, 443, 446). *Bruguiera gymnorrhiza* seedlings and *Avicennia marina* saplings were observed to be colonizing the area (Table 1, Relevés 441 & 445). This suggests a landward extension of the Mangrove Community. Open parts of the destroyed zone were colonized by epipellic (= growing on mud) algae.

Venter (1972) described the *Phoenix/Hibiscus* Community prior to its destruction as occupying a small zone immediately behind the *Bruguiera gymnorrhiza* Community at the south-eastern shore of Richards Bay. Landward it bordered on the

*Barringtonia racemosa* Community (see Fig. 3 in Venter 1972) and on primary or secondary Dune Forests. It was a dense thicket formed mainly by the palm *Phoenix reclinata*, *Hibiscus tiliaceus* and the fern *Acrostichum aureum*. Other species present were *Rapanea melanophloeos*, *Ficus trichopoda*, *F. capensis*, *Syzygium cordatum*, *Bruguiera gymnorrhiza* and *Avicennia marina*. The last two species were in poor condition and were probably remains of the neighbouring *Bruguiera gymnorrhiza* Community which, in the course of time, was apparently displaced by the *Phoenix/Hibiscus* Community.

Climbers were *Mikania cordata*, *Ipomoea cairica*, *I. congesta*, *Dioscorea sylvatica* and *Rhus nebulosa*, the first two species being particularly common. Field layer species recorded were *Acrostichum aureum*, *Nidorella auriculata*, *Phragmites australis*, *Typha latifolia* subsp. *capensis*, *Cyperus alternifolius*, *Scadoxus magnificus* and *Blumea lacera*.

Many *Phoenix reclinata* trees were cut by Zulu people living nearby to tap the sugar-rich sap. The damaged plants coppice freely from the base to form dense thickets.

The *Barringtonia racemosa* Community was quantitatively studied by Venter (1972), who took samples at three places nearby: at Mzingazi Lake, west



FIG. 2.—View across part of destroyed zone. In this area *Phragmites australis* and *Bruguiera gymnorrhiza* adapted well to changed conditions and are now increasing.



of Richards Bay town, and on the southern shores of Richards Bay. He found a community of high density in the canopy layer (1 245 plants ha<sup>-1</sup>) which had a basal cover of 131,2 m<sup>2</sup> ha<sup>-1</sup>. The habitat was muddy and covered with water. *Barringtonia racemosa* was predominant with an importance value of 57,5, followed by *Syzygium cordatum* with 12,6. Other common canopy species were *Voacanga thouarsii*, *Bridelia micrantha* and *Macaranga capensis*. In the understory, *B. racemosa* was also dominant with other species being *Tarenna pavettoides* and *Schefflera umbellifera*. The density was 975 plants/ha. Climbers were common, especially the ferns *Stenochlaena tenuifolia* and *Phymatodes scolopendria* with *Smilax kraussiana* and *Canthium gueinzii*. The field layer was dominated by seedlings of *Barringtonia racemosa*. Other species present were *Canthium gueinzii* and *Scleria angusta*. Epiphytes were scarce. Only *Microsorium punctatum*, *Cyrtorchis arcuata* and *Ficus craterostoma* (hemi-epiphyte) occurred.

It was not possible to establish to what degree this description truly represents the vegetation of the area destroyed, as some samples for Venter's analysis were taken outside the study area (e.g. Mzingazi Lake). However, *Voacanga thouarsii* and *Rauvolfia caffra* would seem to have played a more dominant rôle in the study area. *Nephrolepis biserrata* was observed as an epiphyte low down on stems of dead trees.

The death of the *Phoenix/Hibiscus* and *Barringtonia racemosa* Communities in the Richards Bay Sanctuary owing to the opening of the new mouth was an unforeseen penalty that was paid for the opening up of the Richards Bay Harbour and is an example of how infra-structural developments may affect even areas that were specifically set aside as natural sanctuaries.

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#### UITTREKSEL

*Verslag word gelewer oor die verwoesting van Phoenix/Hibiscus en Barringtonia racemosa gemeenskappe (ongeveer 6 ha) aan die suidkus van Richardsbaai. Dit is veroorsaak deur die skepping van 'n kunsmatige uitloop ongeveer 4 km suid van die oorspronklike monding. Die getygreense en die soutgehalte van die water is hierdeur verhoog. Hierdie moerasgemeenskappe het 'n smal strook agter die Bruguiera gymnorrhiza gemeenskap in beslag geneem. Ongeveer 95% van die gemeenskappe is beïnvloed. Geïsoleerde oorblyfsels van spesies soos byvoorbeeld Acrostichum aureum, Hibiscus tiliaceus en Phoenix reclinata is in die gedeelte van die strook naaste aan die land gevind. Die geaffekteerde gebied word nou ingeneem deur jong groepe Phragmites australis asook deur Bruguiera gymnorrhiza en Avicennia marina saailinge en epipeliese alge.*

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