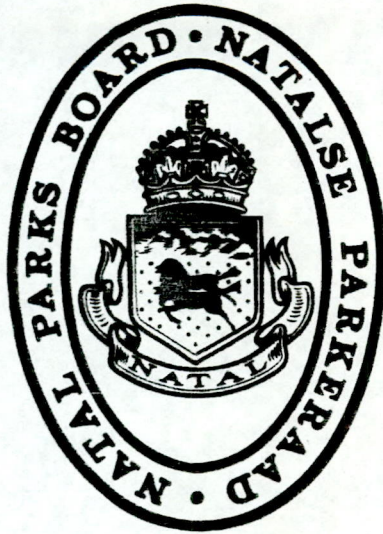


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THE ROLE OF DETRITUS AND MICRO-ORGANISMS IN THE St LUCIA SYSTEM

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Research history

The only research that has any direct bearing on this aspect of the ecology of the St Lucia system is by Taylor (1980) who estimated the amount of faecal material introduced into the lake by hippopotamus. There is no other published work on detritus production, breakdown and significance nor the microbial ecology of the system although a few relevant details may be gleaned from the work of Millard & Broekhuysen (1970), Grindley (1976) and Johnson (1976).

Synthesis of results

The paucity of research results does not permit any real synthesis. Taylor's findings indicated that the present input of organic material into the St Lucia system by hippopotamus amounts to about 733 500 kg per annum. The fate of this material and the significance of this input relative to inputs from other sources is unknown. Submerged and emergent macrophytes would be a major source of detritus but the phytoplankton should also be considered. Grindley (1976) estimated a phytoplankton biomass in the lake in 1967-69 of 400 000 kg and a zooplankton biomass of about 40 000 kg. According to Whitfield (1980) there are no phytoplanktivorous fish in the St Lucia system, this niche being filled by the zooplankton. There are no figures for phytoplankton production nor any information on the ability of the zooplankton to deal with this primary production, an unknown proportion of which thus goes into the detritus food chain. It is interesting to note that Johnson (1976) found the highest mean monthly volumes of phytoplankton during 1973 and 1974 in False Bay and North Lake with intermediate quantities in South Lake and lowest values in the Channel. This suggests that the phytoplankton contribution to benthic detritus varies in different areas of the lake.

Knowledge gaps and possible lines of research

The minimal amount of information on the topic of detritus/bacteria represents a major gap in our understanding of the St Lucia system. As Pomeroy (1980) pointed out "in many ecosystems, both terrestrial and aquatic, as much as 90% of primary plant production goes into the detritus food web". In estuarine environments this figure would probably be higher. This material would

typically be subject to microbial colonisation and breakdown but there are sufficient connections with the grazing food chain for a substantial flow of energy and materials to occur from detritus to terminal consumers. This would be particularly significant in the St Lucia system with its variety of iliophagous fish (Blaber 1978) and penaeid prawns (Joubert & Davies 1966).

A first priority would be to identify the sources of detrital input into the system. Obvious autochthonous sources include fringing, emergent and submerged macrophytes as well as the phytoplankton while allochthonous sources include hippopotamus, incoming rivers and possibly the sea. At this stage there are no data on primary production in or fringing the lake nor on water transport of detrital material so the magnitude and relative importance of these different sources is unknown.

The periodic proliferation of beds of submerged macrophytes and their dying off during salinity changes is well known. The significance of these periodic pulses of detrital material, and their effects on decomposer organisms and the populations of detritivores dependent on them are unknown.

Research is required to investigate the extent of this detrital input under different or changing salinity regimes, the dispersal of this detritus in the system, variations in substrate organic content, rate of detrital breakdown under different or changing salinity regimes, effects of salinity on microbial decomposers and the importance of other factors such as turbulence, wave action and temperature on the recycling process. The results of these investigations could shed further light on the distribution and abundance of the smaller benthic organisms (Benthic Studies : Part 1 in this review) which to date have been considered very largely in relation to salinity.

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