

Investigation of drinking- and Nile-water samples of upper Egypt

RM Awadallah*, SS Ismail, MT Abd El Aal and ME Soltan
Chemistry Department, Faculty of Science, Aswan, Egypt

Abstract

Nile- and drinking-water samples which were collected from Aswan to Giza during January, June and August 1987, were investigated. The water temperature, transparency and pH were measured *in situ* and the samples were analysed for the following constituents, i.e. free CO₂ (0,00 to 7,04 mg/0, carbonate (0,0 to 2,0 mg/0, bicarbonate (120 to 160 mg/0, pH (7,00 to 8,45), nitrite (0,00 to 0,10 mg/0, nitrate (0,018 to 0,360 mg/0, phosphate (0,007 to 0,500 mg/0, Ca²⁺ (24,05 to 36,90 mg/0, Mg²⁺ (9,73 to 15,56 mg/0, total hardness (TH) (102 to 112 mg/0, chloride (6,5 to 11,7 mg/0, sulphate (3,5 to 15,5 mg/0, iron (0,00 to 0,11 mg/0, organic matter (0,8 to 5,2 mg/0 and total dissolved solids (125 to 230 mg/0- Ionic dominance patterns did not change within the seasons although Ca, Mg, HCO₃, Cl- and SO₄²⁻ in both Nile and drinking water increased from Aswan to Assiut and then decreased. No pH stratification with depth was observed. The results of both Nile and drinking water are within the reference recommended values. The divisive clustering methods were applied to identify these samples. The results of clustering analysis indicate that with the help of this technique, time variations and the type of water samples could be distinguished. The correlation coefficient values are positive and suggest that good correlations between these items and the cations exist as soluble chlorides, sulphates, phosphates, nitrates, bicarbonates and humates.

Introduction

The purpose of this paper is to document some characteristics of the chemistry of Nile and drinking water of upper Egypt. This paper supplements preliminary limnological (Zidan, 1983; Prowse and Tailing, 1958) and chemical (Hurst, 1950; Klein, 1973) data of Nile basin water.

Nile water is the main drinking-water supply for the Egyptian population. Due to industrial growth in the last 30 years, especially in upper Egypt, the likelihood of contamination has increased. Thus it has become necessary to establish a comprehensive monitoring programme for chemical characterisation of the main water constituents of both Nile and drinking water. To evaluate the water quality of the Nile and drinking water, there is a need to consider the physical and chemical structure of these waters. The area covered stretches about 900 km along the Nile River. In order to investigate the water quality during the different seasons, the samples were collected in January, June and August. The reason for this choice is that January is peak (winter) season for tourism in Egypt and there are about 150 Nile craft (floating hotels) in addition to numerous port motor boats operating in Aswan and Luxor, constituting additional sources of free CO₂, organic matter, oils, fats, nitrate, and phosphate contamination to the Nile water. May is the end of this season and June is the start of the summer season. August is the end of the summer season and it was chosen to represent the water quality after the rate of cruises and craft trips on the Nile had decreased during the summer period with minimal tourism.

Description of the study area

Data presented in this paper were collected from the area between Aswan 24°N and Giza 30°N (Fig. 1). The study stations represent all upper Egypt regions.

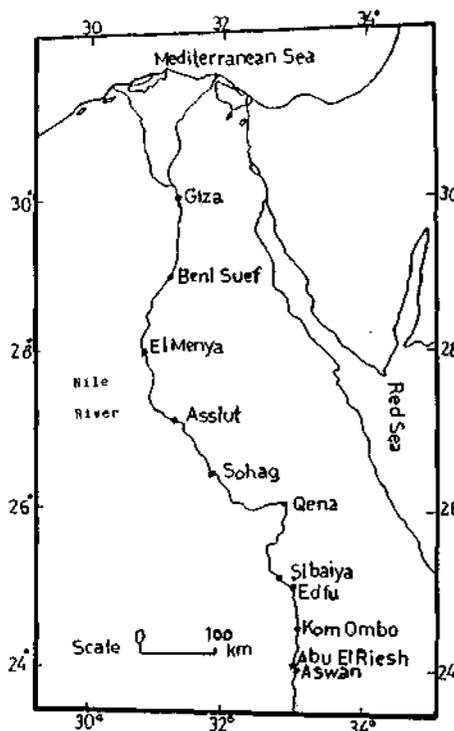


Figure 1
Locations of water sample sites on the Nile River

Methods

Sampling

Filtered Nile-water samples were collected from Aswan City (before and beyond the hotels district, beyond the Isis Hotel, before and behind the Kima Drain-Nile River confluence), Abu El Riesh, Kom Ombo, Edfu, El Sibaiya, Qena, Sohag, Assiut, El

*To whom all correspondence should be addressed.
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