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A Review of Saline Influences on Coastal Mahanadi Deltaic Aquifers

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Abstract: The coastal aquifers of Mahanadi delta are varied and complex with respect to their hydrogeochemistry and commonly the groundwater regimes are referred to as aquifer systems. Not only these hydrostatic units belong to the vast intricate Quaternary deposits of the coastal depression, but also, they seem to have been greatly affected by the basement structural dispositions as well as from the land-sea interactions of geologic past. This is exactly why; the aquifers portray a very chaotic distribution of varied groundwater types both vertically as well as laterally. The lithostratigraphic units are a complex mixture of gravel, sand, silt and clay sediments with a general layered structure across the terrain where the thickness of the individual horizons diminishes with depth. Generally, the sandy and gravelly horizons yield fresh subsurface waters away from the coast on the western side near the hard rock terrains and the aquifer system having proximity with the coast display saline as well as fresh water characteristics. The present paper outlines a review of the saline contamination of these coastal aquifers from the scientific investigations carried out by the various researchers.
Keywords: Hydrogeochemistry, Geospatial, Mahanadi, Saline water intrusion

INTRODUCTION

Odisha portrays vast stretches of coastal aquifers of nearly 480 Km along the eastern coast of India. These are the major store house of groundwater of the state confined in the complex unconsolidated and semi-consolidated sediments placed under varied conditions, in geological time. Hunt for subsurface water has touched down to a depth of 600m in the Mahanadi delta which forms the chief part of the seaside area. The aquifers comprise saline as well as fresh ground water of variable amount and quality. The aquifers happening towards the western parts of the coast near to the hard rock topography are fresh throughout, while those taking place towards the coast (the saline belt) are equally fresh as well as saline. The fresh and saline aquifers are put together in diverse sequences over different portions of the coast. The fresh aquifers are superimposing the saline aquifers in many expanses, while in others it is reversed. A system of alternating fresh and saline aquifers establishes the general setup (Sahu et al., 2018).The fresh and saline horizons owning erratic physical and chemical features, horizontally as well as vertically, are in equipoise over the geological epochs. The salty aquifers are in multitude to the fresh aquifers in the seaside saline strap of Odisha. The ratio of the fresh to saline subsurface layers is approximately 1:4 inside a depth range of 300m (Shukla, 2011). Such a subtle stability is quite susceptible to any large-scale exploitation of the resource without adequate appreciation of the geometry of the water holding horizons and their nature of incidence at a given expanse of the coast. Exploitation of the fresh horizons has constantly been the core issue, be it for domestic, irrigation or industry (Naik, 2018). Though the degree of development of the aquifers across

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Significance of Structural Glaciological Studies on Antarctic Ice Shelves

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Abstract: Polar Regions have caught the global attention not only because of their position and coldness but due to the fact that they govern the global climate pattern to a large extent. The largest ice sheet covering about 98% of the surface area of Antarctica with an average thickness of about 2 km holds a huge amount of fresh water than anywhere else in the globe. This Polar ice sheet flows towards north all around the continent, which turns to ice shelves beyond the grounding line. The breaking of ice shelves around Antarctica such as Wilkins ice shelf and Larsen B ice shelf have become a major climatic issue. Therefore, a slight imbalance in polar climate will directly affect the polar ice shelf dynamics by causing changes in the deformation pattern. Some ice shelves such as the Nivlisen ice shelf shows a structurally complex deformation pattern with a range of foliation, shears, folds, crevasses, etc. These structural fabrics vary in different zones. The satellite imagery studies indicate that the earlier existing structures of some flow units are restricted within a zone by localized lateral shears and longitudinal compression. The dominant structures though oriented parallel to the ice shelf – Schirmacher Oasis margin, folding through longitudinal compression is amplified manifold at the locations away from this margin. In this ice shelf, longitudinal linear surface fabrics are found in the eastern zone, whereas the western zone is more folded and sheared. Studies on the ground are needed to establish the true geometric relationship between different structural fabrics within the ice shelf. The structural glaciological studies both on the ground as well as through satellite imageries are significant to understand their nature and formation of melt-water ponds in these zones that make this area vulnerable for the possible ice-shelf disintegration.

Keywords: Structural glaciology, Nivlisen ice shelf, Schirmacher Oasis, Antarctica, Melt water ponds.

INTRODUCTION

The Polar Regions are the frigid zones of Earth, which are situated at the geographic poles and are completely dominated by cold climatic conditions due to the presence of ice, and snow. The Arctic, in the northern hemisphere, is a frosty ocean bordered mostly by landmasses, whereas Antarctica, in the southern hemisphere, is an icy continent surrounded by oceans. These two Polar Regions have significant climatic interactions with the rest of the Earth. The Arctic is strongly influenced by the atmospheric circulation and the river flows from surrounding landmasses whereas Antarctica is separated from the rest of the planet by the surrounding Southern Ocean. Both the regions influence the climate over a major part of the planet by affecting the processes on the global ocean. A large variety of

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Neomariopteris:an Indian Lower Gondwana Fern

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Abstract: *Neomariopteris,* the most predominant Indian sphenophyll is recorded in the Lower Gondwana basins of India. Different aspects of *Neomariopteris,* the most imperative fern genus of the Indian Lower Gondwana, have been summarized in this article. The speciation and morphology of this genus are also described in detail. Its form, habit, diversity, evolution and extinction are also discussed.
Keywords: *Neomariopteris,* Morphology, Habit, Speciation, Diversity

INTRODUCTION

The genus *Neomariopteris* is instituted by Maithy in the year1974. It belongs to Pteridophyta Division and Filicales Order. The type species of this genus is *Neomariopteris* Maithy, 1974.Ferns are not so common elements of the megaflora of the Indian Lower Gondwana. Fern fronds showing deeply incised or lobed pinnae were earlier described under the genus *Sphenopteris* Brongniart. Three species, viz., *S. polymorpha* Feistmantel (1876), *S. hughesii* Zeiller (1902) and *S. lobifolia* Morris (1845), have been reported from Permian Gondwana of India. Maithy (1974a), on the basis of re-examination of specimens described by Feistmantel (1876, 1881, 1883), Zeiller (1902), Srivastava (1955), Maheshwari & Prakash (1965), Kar (1968), Maithy (1969), Kulkarni (1970) and others opined that the Gondwana fronds differ in certain characters from *Sphenopteris.* In Indian fronds the pinnules are laterally contiguous by their decurrent bases, whereas in *Sphenopteris* the pinnules are laterally free, i.e. non-decurrent and have a cuneate base. The Indian fronds resemble *Mariopteris* in the contiguous pinnules and sphenopteroid venation, but *Mariopteris* has dimorphic leaves. Maithy therefore, proposed a new genus *Neomariopteris* for the Gondwana fern fronds with sphenopteroid venation, decurrent pinnules and winged rachis. In the same year, one month later, Pant and Khare (1974) published a new genus, viz., *Damudopteris* with exactly the same morphological characters as those of *Neomariopteris* Maithy 1974. Since both the authors have chosen the same species, i.e., *Sphenopteris polymorpha* Feistmantel as the genotype for their proposed genera, on the basis of the priority, *Damudopteris* becomes a junior