



VISTAS IN GEOLOGICAL RESEARCH

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Cladophlebis: a Fern in the Dinosaur World

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Abstract: *Cladophlebis* is a Mesozoic osmundaceous genus (restricted to sterile fronds) with a wide range of environmental tolerance. The genus is reported by many authors from the Gondwanaland countries including India. Different aspects of *Cladophlebis* have been summarized in this article. The speciation, morphology and palaeoecology of this genus are also described.

Keywords: *Cladophlebis*, Mesozoic, Morphology, Speciation, Palaeoecology

INTRODUCTION

The genus *Cladophlebis* was first defined by Brongniart in the year 1849. It belongs to Pteridophyta division and Osmundales Order. The type species of this genus is *Cladophlebis albertsii* (Dunker 1846) Brongniart 1849. The genus *Cladophlebis* is characterised by high variability of morphological characters and a worldwide distribution from the Upper Palaeozoic to Mesozoic.

Systematic Description (Taylor *et al.*, 2009)

Division: Pteridophyta

Order: Osmundales

Family: Osmundaceae?

Genus: *Cladophlebis* Brongniart 1849

Type species: *Cladophlebis albertsii* (Dunker 1846) Brongniart 1849

MORPHOLOGY AND SPECIATION

The fronds are bipinnate with alternate pinnae attached at an angle of $\sim 70^\circ$. The sterile fronds have lanceolate pinnules up to several millimeters long, which are slightly flared at the point of attachment. The pinnae can be attached to the rachis oppositely, sub-oppositely, alternately, or sub-alternately i.e. in various forms of overtopping viz. catadromic, transitional and anadromic (Fig. 1) (Zimmermann and Schneider, 1967). Pinnules have varied shapes even on the same frond: elongated, oblong, falcate, lanceolate, obovate and so on. The pinnule margins are entire but many species have dentate, lobed, crenate or serrate margins. In some specimens, the margins of the pinnules are slightly folded back (Harris, 1961; Bodor and Barbacka, 2008; Barbacka and Bodor, 2008; Taylor *et al.*, 2009).

The genus *Cladophlebis* contains numerous species distinguished on morphological differences. Based on the characteristic venation and shapes of pinnules, Raciborski (1894) distinguished 15 taxa of *Cladophlebis*: *C. aurita* Raciborski 1894, *C. bartonecii* Raciborski 1894, *Cladophlebis* cf. *nebbensis* (Brongniart) Nathorst 1876, *C. denticulata* (Brongniart) Fontaine 1889, *C. huttoniana* Raciborski 1894, *C. insignis* (Lindley et Hutton) Raciborski 1894, *C. recentior* Raciborski 1894, *C. recentior* var. *dubia* Raciborski 1894, *C. solida* Raciborski 1894, *C. subalata* Raciborski 1894, *Cladophlebis* sp. (an forma *Cl. recentioris*) Raciborski 1894, *Cladophlebis* sp. indetermin., *C. tchihatchewi* Schmal. *similis* Raciborski 1894, *C. whitbiensis* Brongniart 1849, and

Hydrogeological Framework and Groundwater Assessment of Keonjhar and Patna Blocks, Keonjhar District, Odisha, India

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Abstract: Hydrochemistry and groundwater quality assessment studies of Keonjhar and Patna Blocks, Keonjhar subdivision of Keonjhar District, Odisha, India were carried out to assess its suitability for various purposes. Altogether 99 samples were collected in pre and post monsoon periods for assessment of various physico-chemical parameters. The analytical results were compared with that of BIS (2012), to assess the suitability of groundwater for drinking, agricultural and industrial purposes. The groundwater of study area is suitable for irrigation and industrial purposes. There is no tendency of corrosive and incrustation in both pre and post monsoon periods. The results reveal that the groundwater in most of the places is good for drinking purposes except in few places with respect to pH, TH and F. Four major hydrochemical facies namely, Ca-HCO₃, Na-HCO₃, Ca-Cl, and Mg-Cl are present. Out of which Ca-Cl is predominant.

Keywords: Hydrogeochemistry, Hydrogeochemical facies, Piper diagram, Keonjhar District

INTRODUCTION

The water is very important for survival of life. The quantity as well as quality of water is most important for day to day life. The variations in monsoon rainfall and shortage of surface water have put people in crisis in parts of Keonjhar district of Odisha in non-monsoon period. Unscientific development of groundwater, less recharge and less than annual average rainfall over the year cause declination of water table. Thus, the present study was carried out to assess the quality of groundwater with respect to chemical properties in Keonjhar and Patna blocks in Keonjhar subdivision in Keonjhar district of Odisha (Fig. 1). The scientific method of development and management of groundwater quality with respect to physico-chemical parameters along with study of hydrogeochemistry is the need of the hour to depict its suitability for domestic, agricultural and industrial purposes.

STUDY AREA

The study area belongs to Keonjhar Sadar and Patna blocks, Keonjhar subdivision of Keonjhar district of Odisha. It lies in the central part of the district and part of the northern upland of Odisha. The total geographical area is around 1251 sq. km. and bounded by north latitude 21°30' and 21°52' and east longitude 85°18' and 86°00' and falling in the Survey of India Toposheet nos 73G/10 and 73G/14. The area enjoy sub-tropical monsoon to tropical climate.

GEOLOGY AND HYDROGEOLOGY

The study area has varieties of rock types belonging to Singhbhum Granite, occupies great batholithic mass of a several hundred square kilometer from Chaibasa in the North and to Keonjhar in the South.

Assessment of Physico-Chemical Status of Groundwater Samples of Pallahara Block, Angul District, Odisha, India

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Abstract: Groundwater quality plays an important role in drinking and irrigation purposes of an area. It also plays a vital role in groundwater protection and quality conservation for future generation. Now-a-days, excessive exploration of groundwater, use of fertilisers and pesticides in agricultural land impact the quality of groundwater. In the present study, an attempt has been made to assess the quality of groundwater in Pallahara block, Angul District, Odisha. Altogether 110 number of water samples were collected during post-monsoon 2017 and analyzed for various physico-chemical parameters like pH, conductivity, TDS, turbidity, total hardness, carbonate, bicarbonate, calcium, potassium, chlorides, magnesium, iron, sulphate, nitrate etc. Suitability of groundwater for drinking purpose is evaluated by various schemes and water quality standards. Various classifications show that the present status of groundwater is suitable for drinking purpose except few locations. Piper diagram, Gibbs diagram are plotted to estimate the facies and rock- water interaction of the study area.

Keywords: Physico-Chemical parameters, Piper diagram, Gibbs' diagram

INTRODUCTION

Groundwater is one of the most important and precious natural resource. Groundwater is very essential for survival of all living organism. Its quality is vital concern for human beings from the cradle of the civilization. Groundwater, especially in comparison with surface water is one of the most critical sources of water supplies in different parts of the world and is much clean and free from pollution than surface water (Akinbile and Yusoff, 2011). Rapid growth of population, increasing demand for water, industrialisation and use of fertilizer and pesticides cause a severe threat to the quality of groundwater. So, there is always a need for concern over the protection and management of groundwater quality.

STUDY AREA

Pallahara is a sub-division in Angul District of Odisha. It lies between north latitudes 20° 58' and 21° 38' and east longitudes 85° 00' and 85° 30' and falls in the survey of India Toposheet number 73G/3 (Fig. 1). It is 91 kms away from the district headquarter Angul. The Rengali reservoir is present in the west and Malyagiri Forest Range is in the south-west of Pallahara. Pallahara is one of the sub-divisional headquarters in Angul District. People of the area normally utilize the groundwater for cultivation, domestic and drinking purposes. Hence, it necessitates the assessment of quality of groundwater of the study area.

Ice Flow and its Thermodynamics in the Ice Shelves of Antarctica

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Abstract: This article reviews the literature on research carried out on the thermodynamics of the ice flows in ice sheets of Antarctica and the current scenario of the ice flow dynamics. It also summarizes the future perspectives of the thermodynamics study of the ice flows. To investigate the thermal regime and overall configuration of a polar ice sheet with respect to changing environmental conditions various efficient ice sheet models, including time dependence and full thermo mechanical coupling, have been developed. These models are discussed in this article.

Keywords: Thermodynamics, Ice sheet, Antarctica, Ice flows, thermo mechanical coupling.

INTRODUCTION

An ice shelf is a thick floating platform of ice that connects to the landmass where a glacier or ice sheet flows down to a coastline and onto the ocean surface. The boundary between the floating ice shelf and the ice (grounded on bedrock) that feeds it is called the grounding line. The thickness of ice shelves ranges from about 100 to 1000 meters. These are formed when ice from an enormous ice sheet slowly move into the cold ocean through glaciers and ice streams. So instead of melting it floats on the surface and grows larger as glacial ice behind it continues to flow into the sea. Ice shelves grow when they gain ice from land, and occasionally shrink when icebergs calve off their edges from their seaward front. This mechanism of snow accumulation on the upper surface and melting from the lower surface helps them maintaining a dynamic stability. A shelf front expands forward for decades between major calving events.

Ice flow and its thermodynamics are strongly related in the polar ice sheets. The viscosity of ice is dependent on the temperature to a large extent. So that for a given stress, when temperature change about 10 K occurs in the ice sheet the strain-rates change by an order of magnitude, thus becomes a major factor which controls the flow characteristics of the polar ice shelves thereby controlling the shape of larger ice sheets.

STUDIES WITH SPECIAL EMPHASIS ON CREEP INSTABILITY MODEL

The temperature and ice flow interaction is associated with a positive feed-back mechanism with regard to the sudden global climatic changes. Sometimes under favourable circumstances this feed-back loop of the increasing ice temperature - increasing strain rates - increasing dissipation becomes unstable and it may lead to a situation where discharge of a large amount of continental ice into the ocean occurs