

## **Hydrographic mapping of rivers of Arunachal Pradesh**

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The State of Arunachal Pradesh, also called as the Land of the Rising Sun, has a picturesque geographic position wherein it enjoys the presence of a robust biodiversity and ecological richness. Multiple tributaries of the mighty Brahmaputra river conjoin together forming different river valleys here. This study analyses the presence of these rivers and presents the threats and challenges that the ecology is facing due to climate change and other anthropologically aggravated events.

*Keywords:* Brahmaputra River, Subansiri River, Arunachal Pradesh

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### **INTRODUCTION**

The State of Arunachal Pradesh (the State) is also referred to as the land of the rising sun (Wangkheirakpam, 2003). The State is located in the eastern most part of India. It holds geo – strategic importance and is located between Bhutan, China and Myanmar. Administratively, the State is fragmented into several districts and each district holds a district headquarters (Ramya, 2013). Geographically, the State can be segmented on the basis of river valleys and continuous mountain ranges. With every district, comprising a number of rivers, the State offers immense potential to become a powerhouse of clean energy, maintenance of ecological balance and boosting environmental stability (Poff & Hart, 2002). Despite of the natural resources with which the State has been

blessed, there is a limited availability of good quality literature about the flow of these rivers, their origin, their destination, their catchment areas, their drainage patterns, their interaction with the environmental ecology, how they affect the lives of the people and how their health is affected by actions of the people.

### **RESEARCH OBJECTIVES**

The present study has been conducted with the objective of understanding the potential of the rivers flowing through the State of Arunachal Pradesh. The idea is to map out their flow process documenting their drainage pattern. The corresponding objective is to understand the threats and challenges these rivers are facing due to different factors such as natural causes and anthropogenic reasons.

## RESEARCH METHODOLOGY

The present research was carried out in accordance with a self-prepared research plan and outline. A detailed guide map was prepared in the beginning of the research which enabled the researcher to execute this research in a well-coordinated and planned manner. Initially, an understanding was made about the State of Arunachal Pradesh. It was decided that it is imperative to gain a district by district understanding of the State in order to conduct a quality research. Therefore, a lot of data and information was gathered through the secondary sources. Initially, it was planned to gain primary evidence as well by physically visiting the State, however due to the spread of COVID-19, the research was carried out remotely. The secondary sources referred to include a variety of research papers, articles, case studies, web pages, reports, specialists' comments etc. The preferred data sources from where the research data was gathered were reports published in the public domain. Maps provided in the public domain by Survey of India were referred to in order to gain deeper understanding about the State. The aggregate number of such quality material that was referred to for the present research was 57. These materials provided the researcher a comprehensive understanding about the historical aspects, geographical information, environmental sensitivity with

respect to the State. Thereafter, the next steps involved in the research were about identifying the rivers flowing across the State. Since there are multiple rivers that flow in the State, it was decided to segment them on the basis of their catchment and the drainage areas. The rivers were thereafter segmented into Major Rivers and Minor Rivers. These include:

Major Rivers - Brahmaputra River, Kameng River, Subansiri River, Diban River, Lohit River, Noa Dihing River.

Minor Rivers - All other rivers flowing in the State.

Thereafter, the Major Rivers were studied in detail. This detailed study included identifying and understanding the origin of the river, the flow of the river, the districts in which the river flows, the catchment area drawn by the river, the ecological diversity supported by the river, the details of the projects going on the river, the number of tribes living near to the river. Once such kind of information was accumulated for all the rivers, a summarized table and chart was prepared in order to look at the information at one glance. Thereafter the same process was repeated for the Minor Rivers. Since the minor rivers make a relatively small drainage, sufficient literature was not available on them. The unavailability of any adequate literature resulted in limited research upon the Minor Rivers comparatively.

Thereafter, the researcher tried to identify the impact of existing infrastructure projects over the cultural life and ecological balance. Detailed assessment was made on such projects. It was found that most of the distinct parts of the state are situated in a geographically complex terrain where accessibility is a challenge. Therefore, already existing data sources were given more priority. The next step of the research was to identify the origin of the river and their sources. This was considered to be a challenging task due to the presence of overarching mountain chains and river valleys. However, the task of locating the origin of the major rivers was facilitated with the assistance of the geo tagging techniques available over the internet. Regarding the minor rivers, it has to be stated here that they have many interlinking network rallies which made the research process quite challenging. The research had to be extended in order to understand them in detail and to draw meaningful conclusions relevant for the purposes of this research.

### **RESEARCH ANALYSIS**

The research started with the analysis of the lifeline of the North East India – River Brahmaputra. The river finds its origin in the Tibetan plateau and flows in the direction parallel to the Himalayas (Mukherji et al., 2015). It is known by the name of Yarlung

Tsangpo. After flowing through the western, south western and north eastern direction in a criss-cross manner, the river takes a sharp U-turn bend from the natural syntaxial bend of the Himalayas at the Namcha Barwa (O'Connor et al., 2015). Thereafter the river enters the Territory of India, in the State of Arunachal Pradesh, in the District of Upper Siang. The name of the district has been named upon the name upon which the river is called i.e. Siang (Dai, 2009). The River brings a massive amount of silt, sediments and deposits and forms the lifeline of multiple variety of flora and fauna. The river flows in a braided channel and is joined by a number of tributaries. It thereafter flows through the Lower Siang District (Bayley, 1991). Ultimately entering the plains, the river passes through the city of Passighat and thereafter it enters the State of Assam in the district of Dhemaji from where it is known as the river Brahmaputra (Thakur, 2011). It thereafter flows through Assam plains and enters Bangladesh where it ultimately joins the River Ganga, and flows thereafter as the river Padma (Chandi et al., 2012). It thereafter enters the Bay of Bengal. Thus, the mighty river is joined by a number of tributaries, which may again be called as the major tributaries or the minor tributaries. The north east India is the region of Himalayas, plains and the criss crossing rivers. The research study analyses that

there exists a predominant pattern in the flow of these rivers (Giordano et al., 2005). Since the Himalayas are forming the outward extension of the country and the Plains of Assam and Meghalaya have developed in to an Oval shape or an almond shaped, any river flowing or originating from the Himalayas it is bound to flow through the plains of Assam (Han, 2018). The river forms the lifeline of millions of people and supports the agricultural activities, industrial sector, oil and gas operations and therefore forms to be a crucial component of the growth driver of the country.

River Kameng - When passing across the State of Arunachal Pradesh in West – East direction, the first major river tributary appears to be the River Kameng. The river originates near to the Gorichen mountain and forms a part of the Eastern Tawang (Srivastava, 2009). After flowing through a considerable area, it appears to be forming a part of the boundary between the West Kameng and the East Kameng Districts (He & Tsukuda, 2003). It ultimately passes through the District of Pakke Kasseng and after flowing through the State of Assam, it joins the River Brahmaputra. The river appears to be the life supporting channel of multitude of people. It is conjoined by a number of smaller tributaries and supports (Dai, 2009) the Eagle Nest Wildlife Sanctuary, the Sessa Orchid Sanctuary, and the Pakke Tiger Reserve through

which the Pakke river passes through and joins the river Kameng.

River Subansiri - The next river tributary that appears to hold a significant position in the State is the River Subansiri. The river although has the tributary origin in the Tibet, it is ultimately joined by a number of tributaries in the State and from where it gathers its true potential. The river is also the largest tributary of the River Brahmaputra. The drainage network of the River passes through multiple districts such as the Kurung Kumey, from where the Kurung River and the Kumey river joins the River Subansiri. After flowing majorly through Upper Subansiri district, the Lower Subansiri district and the State of Assam, it joins the river Brahmaputra through the city of Lakhimpur. The river holds significant potential by acting as a bridge between the Eastern Arunachal Pradesh and the Western Arunachal Pradesh (Corbet & Hill, 1992).

River Dibang - Going in the eastern direction, the research came across River Dibang which supports the world famous Dehang Debang Biosphere reserve (One of the 118 Biosphere reserves of India). It flows through the Dibang Valley and is joined by a number of tributaries flowing through the districts of Upper Dibang, Lower Dibang and ultimately merging with the river Brahmaputra.

River Lohit - The next significant river is the River Lohit. This river originates from the Eastern Tibetan Hills and enters the Anjaw District of the State of Arunachal Pradesh. It meanders through the district headquarters of Hawai (Thakur, 2011). It later passes through the District Lohit where it enters the plains area through the Parsuram Kund. It thereafter flows through the district of Namsari where it supports the presence of the Golden Pagoda, and enters the State of Assam merging with the River Brahmaputra (Dai, 2009).

River Noa Dihing and River Burhi Dihing - Dihing means a big river. Therefore, the Rivers Noa Dihing and Burhi Dihing finds a mention in this research. Noa Dihing arises from the Eastern most part of the Himalayas in the Changlang district of the State of Arunachal Pradesh. It flows through the Namdapha National Park and thereafter merges with the River Lohit (Srivastava, 2009). However, another off-shoot river is the River Burhi Dihing which after passing through Assam districts of Tinsukia and Dibrugarh merges with Brahmaputra.

The major rivers are segmenting the State into different river valleys. Geographically the State may get fragmented on the basis of the river valleys of the rivers Kameng, Subansiri, Siang, Dibang and Lohit. The minor tributaries

either supports the flow of these rivers or the growth of the river Brahmaputra.

## CONCLUSION

Rivers are the arteries which provide the life sustaining blood flow and make our planet really habitable. While there had been a literary interest in researching about river flow in different parts of the world, there had been few studies for the North Eastern region of India. This study was able to successfully research about multiple major and minor rivers flowing through the State of Arunachal Pradesh.

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