Chapter – II

GEOGRAPHICAL PROFILE OF THE STUDY AREA

The Watershed of the Upper Tuivai River is located between latitudes 23.45° N to 24.30° N and longitudes of 93.15° E to 93.45° E. It covers a total geographical area of 871.95 km² consisting parts of the four sub-divisions of Churachandpur district in Manipur. These four sub-divisions of Churachandpur are Henglep, Churachandpur, Thanlon and Singhat sub-divisions. The area is characterized by uneven terrains, exhibiting typical characteristics of mountain range. The general slope of the land is very steep of 35% slope. The hill ranges are aligned in a north-south direction, the highest elevation at 2018 m is in Kangkap Lhang in Thanlon and the lowest elevation at 627 m is near Tuilaphai village in Henglep sub-division. The drainage system of the area is mostly perennial. The main river is Tuivai which is drained by five rivers namely- Tuila, Tuivai, Tuili, Tuilak and Tuima. As per the 2011 census, the study area consists of 65 villages and as many as 27, 257 people lives in the upper Tuivai watershed. The density of the dwellings is 31 persons per km².
Fig. 2.1: Location of the study area
2.1 Physiography

Fig. 2.2: Slope Map of Upper Tuivai
Relief:

The whole of the watershed area is covered with rough and uneven terrain, exhibiting typical physical characteristics of mountain range. The general slope of the land is very steep. It is a hilly terrain where approx. 90% of the watershed area is very steep slope (> 35%), the hill ranges are aligned in a north-south direction, the highest elevation of 2018 metres is found in Kalpak Lhang in Thanlon and the lowest elevation of 672 metres is near Tuilaphai Village in Henglep, so the average altitude is 1205 metres above mean sea-level (Fig.2.2). Nearly leveled area is found only along the flow of Tuivai in the Kentui-Tuili-Singtam Sub-Watershed (3C2F6h) i.e. in the central part of the Upper Tuivai. Gently sloping (3-5% slope) are found in the pockets of K.Tuiliphai and Phailien in the western and the eastern side along Buksao, Simbuk to New Munpi; but a long and narrow stretch of gently sloping is also found along the floodplain of Tuila River from Tuilaphai in the north to Chetui Lui in the south. Moderately sloping (5-10% slope) is found in Tuiliphai and Munpi in the north and in the narrow strip in the southern side, and also on the eastern side between Singhat and Muallum and kaikongbuo. Moderately steep to steep slopes (15-35% slope) are found throughout along the Lungthul Enkhovung to Likhai in the south, Sinzang and Phaipheng in the north, Tanglan and Tonglon in the eastern side of the central area. Therefore, the hill attains greater elevations in the
north and slopes towards the south and further extended southwards as to Mizo Hills. According to geologists, these hill ranges belong to the Surma-Barail ranges.

**Drainage:**

![Drainage Map of Upper Tuivai Watershed](image)
The Upper Tuivai River constitutes of five important rivers namely; Tuila, Tuivai, Tuili, Tuilak and Tuimawith numerous *luis* and *vachas*. The Tuivai River originates in the southern hills of Churachandpur district of the state of Manipur. The river drains Singhat range and is joined by tributaries like Tuila, flowing from north to south joins Tuivai, near Zabellei in Simtam Sub-Watershed (3C2F7a). It flows west, turns south and then west, disappearing into Mizoram for a short period of its course. It then turns north and ultimately joins the Barak River or *Tuilong* at Tipaimukh. The study area is the Upper Tuivai River Basin and is divided into 10 sub-watersheds. All these sub-watersheds are fed by numerous *Luis* and *Vachas*. *Lui* is perennial and often overloaded with rain water and sediments during monsoon season but scanty flow during dry season. *Vachais* the first order and may or may not be perennial but also seasonal, depending on its source like springs. The drainage pattern is of parallel type in the western part of the study area especially in the Pamjal sub-watershed, trellis type in the western side but is of dendritic to sub-dendritic in the eastern side. The four main rivers of Tuivai i.e. Tuila and Tuivai joins to form Tuivai River to the west of Zabellei of Singhat subdivision, and Tuili joins Tuivai between Mongmoul and Vokbol, and Tuilak-Tuima joins Tuivai River to the north of Thuangtom. Then it takes a westward direction and the Tuivai River is joined by Tuili River at the
Tuilaphai Sub-Watershed (3C2F7g):

Fig. 2.3(a): Drainage Map of Tuilaphai Sub-Watershed

Tuilaphai Sub-Watershed (3C2F7g): It originated from a spring near Ponlien. Khovadung Lui, one of the main tributaries originated from a spring in Monglham. Mimva Lui, Sel Lui, Dongdung Lui, Mongken Lui, Singlai Lui, Lit Lui and Kholon Lui are the main tributaries joining from the west; and Aieng Lui, Chalpi Lui, Bongmol Lui and Leino Lui are the main tributaries joining from the east. The drainage pattern is of dendritic type. Important villages are Ponlien, Monglham, Thinghangjang, Phaisat, Phiran, New Pangsgang, Old Pangsgang, Tuilaphai, Thenjang, Gangpijang, Nalphung, Vungbuk, Boljang, Sabol, etc.
Tuilum-Dumdei Sub-Watershed (3C2F7f):

![Drainage Map of Tuilum-Dumdei Sub-Watershed](image)

**Tuilum-Dumdei Sub-Watershed (3C2F7f):** Tuilum Lui is a long tributary originating from Shingmun and flows towards the southeast, later join by Gamgi Lui and meet Tuila at Dumdeiphai; and Songtal and Dumdei are the short tributaries that flow and join Tuila River in the west. The eastern tributaries are Zongek Lui originating from the springs from Mongjang, Hengkot and Songpi which later join by Galjang Lui and Takvom Lui and drains to Tuila to the northeast of Dumdeiphai. Vekui Lui joins Toktol Lui, later by Chokchol Lui and joins Tuingam Lui and meet Tuila at near Hengmol. It is of dendritic type. Important villages are
Shingmun, Thingkeu, Munpi, ponpi, Hengmol. Hengkot, Mongjong, Molken, Kaikongbu, Phaimol, Buksao, Simbuk, Muallum, etc.

**Singtam Sub-Watershed (3C2F7a):**

![Drainage Map of Singtampaojang Sub-Watershed](image)

**Fig. 2.3(c):** Drainage Map of Singtampaojang Sub-Watershed

**Singtam Sub-Watershed (3C2F7a):** Tuila River continues to meander as it flows to the foothills. The drainage pattern is of dendritic pattern. The main tributary is Chetui Lui. In this watershed, Tuila and Tuivel Rivers joins and form Tuivai River, near Zabellei. Important villages are Tanglon, Tanglon D, Tuijang, Singtam, Thenjol, Zabellei, New Munpi, etc.
Likhai Sub-Watershed (3C2F7e):

**Fig. 2.3(d): Drainage Map of Likhai Sub-Watershed**

**Likhai Sub-Watershed (3C2F7e):** Bungpi Lui and Likhai Lui are the two main tributaries, the former originating from the western side of Singhat, flows westward and meet Tuivai near Moulkot. Likhai flow towards the south and meet Tuivai near Khuaithum. Important villages are Singhat, Moukot, Tangpizol, Moulzin, Likhai, Khaithuam, etc.
Tuivai Sub-Watershed (3C2F7e):

Fig. 2.3(e): Drainage Map of Tuivai Sub-Watershed

Tuivai Sub-Watershed (3C2F7e): Tuivai flows from the extreme south of the study area and meander till it reach Tuila in the north and formed the main Tuivai River, near Zabellei. The western Luis are short whereas the eastern ones are longer namely, Tengkol Lui, Ngasuan Lui and Gasuan Lui. Important villages are Boulkot, Hengtom, Sialsi, etc.
Tuiliphai Sub Watershed (3C2F7d):

![Image: Drainage Map of Tuiliphai Sub-Watershed]

**Fig. 2.3(f): Drainage Map of Tuilphai Sub-Watershed**

**Tuiliphai Sub Watershed (3C2F7d):** The eastern tributaries are short whereas the western tributaries are long. Thingsagui originates from Aina and joins Tuili River to the north of K.Tuiliphai. Thampi Lui meet Tuili at Tuiliphai, Seldah Lui joins Luipi Lui and meet Tuili River to the south of Tuiliphai. Important villages are Aina, Lungchang, K. Tuiliphai, Phaipheng, Tuiliphai, etc.
Pamjal Sub-Watershed (3C2F6j):

**Fig. 2.3(g): Drainage Map of Pamjal Sub-Watershed**

**Pamjol Sub-Watershed (3C2F6j):** The main tributary Pamjal Lui originates from the south of Kalpak Lhang (2018m), flow west and turns south near Pamjal and drains to meet Tuivai in the extreme west of Tuivai River in the study area. The others are Suagpeh Lui, Tuikoi Lui and Gamgi Lui joins together to form Khuai Lui, Temtat Lui, Kolleng Lui and Tatjam Lui originating from the spring near Kailam. They drain into Pamjal Lui. Important villages are Pamjol, Singjang, Mongon, Kailham, etc.
Phailien-Phungchongjang Sub-Watershed (3C2F6k):

Fig. 2.3(h): Drainage Map of Phailien and Phungchongjang Sub-Watershed

Phailien-Phungchongjang Sub-Watershed (3C2F6k): The western tributaries such as: Kolpak Lui is joined by Zangte Lui and meet Tuili River at Phungchongjang, Tuiting Lui, Chal Lui Vong Lui join Tuili River between Phungchongzang and Phailien and joins Tuili River almost at right angle. The others are Thiek Lui, Tuitung Lui, Saibul Lui, Bogo Lui and Bawk Lui. The eastern luis are also Patkam Lui, Hai Lui, Hopi Lui, Koipi Lui join together to form Phualleng Lui and meet Tuili River to the south of Phailien. Important villages are Kalpak lhang, Phungchongjang, thiekbung, Phailon, Mongmual, Vokbol, Bualmun, etc.
Kentui-Tuili Sub-Watershed (3C2F6h):

Fig. 2.3(i): Drainage Map of Kentui-Tuili Sub-Watershed

**Kentui-Tuili Sub-Watershed (3C2F6h):** The Tuivai River runs in the heart of this watershed. In the north, it is drained by Tuili River, Kentui Lui and Singtam Lui. In the south, it is drained by Tuima River and other numerous luis. Important villages are Mualkui, sai-um, Mongmual, Singtom, Shelbu, etc.
Tuima-Tuilak Sub-Watershed (3C2F6f):

Fig. 2.3(j): Drainage Map of Tuima-Tuilak Sub-Watershed

Tuima-Tuilak Sub-Watershed (3C2F6f): This watershed is drained by two rivers namely Tuilak and Tuima Rivers. The eastern tributaries of Tuilak River are very short whereas the western tributaries are numerous ranging from a short to long one. Thouvai Lui and PumlongLui are the two main western tributaries of Tuilak River. Tuima is also drained by numerous tributaries. Tuilak River, after flowing to the north for a long distance, takes west turn between Tuilakphai and Shelbu,
and joins Tuima near Thuangtom. Later, it flows towards the north and meet Tuivai at the crest of the horse shoe shaped. Important villages are Lungthul-Daijang, Lungthul-L, Lungthul-Dongjam, Lhungthul-EThangthuam, tuima, Tuilakphai, Chiangpi, etc.

Soil:

Fig. 2.4: Soil Map of Upper Tuivai Watershed
Based on the NBOS & LUP, the state of Manipur comes under the Warm Per-humid agro-eco region (Fig. 2.4). However, at micro-level it can be divided into two distinct sub-eco regions with the thermic and hyperthermic temperature regimes. The soils have been mapped, described, analysed, characterized and classified into two agro-sub regions. In the study area, 68% of the total geographical area comes under the first category i.e. Warm Per-humid agro-eco zone with thermo ecosystem, except the eastern side along the highway and the tip of the southern side, where the second category, warm per humid agro-eco zone with hyperthermia ecosystem of 32% are found.

Warm per humid agro-eco zone with thermo ecosystem: soils are derived from shale and sandstone and these are found to occur mostly on the hills of the varying slopes. Soils occurring along the gently sloping foothills are deep in general but are vulnerable to sheet and rill erosion hazards. These are well drained with grayish brown to yellowish brown in colour. These comprise Umbric Dystrocrepts, Typic Haplohumults and Ultic Hapludalfs. Soils on the steep to very steep hill slopes are very much susceptible to erosion. As such these soils are deep under thick vegetative cover and otherwise they are shallow with exposed stratified grey coloured shale and slate layers. These soils are acidic to different level ranging from moderately acidic to slightly acidic with high organic matter content.
Soils of warm per humid agro-eco zone with hyperthermic ecosystem: soils of the region are heterogenous in nature and developed on gently sloping narrow valleys and strongly to moderate steep side slopes of hills with moderate to severe erosion hazards. These are well to excessively drain. The texture varies from fine to loamy skeletal and classified as umbric Dystrocrepts, Typic dystrocrepts and Typic Haplohumults. These soils are moderately to strongly acidic, humus rich, and have low base status. Soils developed in narrow valleys are deep, poorly drained, fine in texture with slight erosion hazard.

**Climate:**

The climate prevailing here does not differ much from what is found in other hilly areas of Manipur. During the summer months the area is under the influence of the south-west monsoon and during the winter months under the influence of the north-east monsoon. The rainy season begins with the onset of south-west monsoon and continues till the month of September. The average annual rainfall is of 1800 mm. The average temperature ranges from 5°C to 35°C. During the winter months too, the minimum temperature is always not below 0°C. Often there are frosts and mornings are foggy till the days are well advanced. Humidity is very high with a maximum of 100% and the minimum as low as 24%, and ranging from 67 to 100% humidity. However, in recent times, due to the impact of climate change there has been and irregularities and fluctuations over time.
Natural Vegetation:

Plate 1: *Downslope of Lungthul Village in Tuima-Tuikak Sub-Watershed*

The entire area is covered with forests of different variety mostly of tropical moist evergreen forest types. The hilly terrain nature, the rainfall and other climate conditions prevailing is conducive for a large and rich range of dense vegetation. Very dense type of forests is found in Keilam Wild Life sanctuary and in Sinjawl in the Thanlon sub-division. It also supports an abundant growth of many valuable trees, bamboo and grasses. Evergreen and semi evergreen forest occupies 2984.14 ha which is just 3.4% of the study area. Tree Clad Area occupies 50943.28 ha i.e. approx. 59% of the study area (Fiq. 2.5).
2.2. Economic Aspects

Land use:

Fig. 2.5: Land Use/Land Cover of Upper Tuivai Watershed
Based on the Satellite Imagery of 2006 (Fig. 2.5), the area under Agricultural Land- Crop Land- Kharif Crop is 2,280.14 hac., which is 2.65% of the study area. Built-Up Area is 417.24 hac. and is just 0.47%. The highest area under land use is Tree Clad area-Open, which is 33,031.69 hac. and is 38% of the study area. This is followed by Tree clad Area-Closed of 17,911.59 hac. i.e. 20.55%. The area under evergreen and semi evergreen forest in the study area does not occupy much as the Evergreen and semi-evergreen (Closed) occupies 17,12.56 hac. i.e. 1.96% and evergreen and semi-evergreen (open) occupies 1,271.85 hac. i.e. 1.45%.

Agriculture:

Plate 2: Paddy field at the foothill in Tulum-Dumdei Sub-Watershed
Agriculture and their related activities provide the most dominant place in the economy of the people. All the people are directly engaged in agricultural operations. Rice and maize are the two most important agricultural products. Rice is cultivated on the slopes of the hills through two methods, namely jhum cultivation and wet paddy cultivation. Rain is the only source of water for such cultivation and production is low. Among the food grains the most important is rice or paddy, followed by maize and millets. Ginger, linseeds, rapeseeds, sesames and cotton are important cash crops in jhum fields. Among the vegetables cabbage, alocasia, squash, soyabean, pumpkin, potato, cucumber, yams, tapioca, chillies, ginger, beans, onions, are cultivated. In the mixed cropping, soil exhausting crops e.g. rice, maize, millets, cotton, etc., and soil enriching crops, e.g. leguminous plants are grown. The soil and climate of the area is very conducive for a healthy growth of a variety of fruits and vegetables and other edible forests products. Chillies, ginger, turmeric, tapioca, brinjal, tomato and other leafy vegetables like cabbage, mustard, etc. Orange plantations are also taken up in many villages in Munpi, Tanglon-T and Tanglon-DVillages. Apple orchards are also taken up in Lungthul areas of Tuilak-Tuima Sub-Watershed. Other important fruits are papaya, banana, guava, etc. Amla is also grown in plentiful in all parts of the study area. Livestock are an important part of their culture and they are reared
principally for food. Important livestock are pig, cattle, buffaloes, goat, sheep, dog, ducks and chickens. Being hilly, fishing is not important occupation yet the rivers and the numerous natural streams are the home of a variety of delicious fishes. The catches are however small and limited for local consumption only.

In very recent time, Guite Road and NH-150 are the two roadways within the study area. NH-150 has been developed by the Border Roads Organisations and plays an important role in the development of transport and communication. Trucks remain the main transporter of goods and passengers although very few buses and smaller four wheelers ply to transport passengers. Some district roads in the area under study are jeep able mostly in the dry season and the inter-village road are in a pathetic condition where only Shaktiman truck can still ply with difficulties. During the rainy season, most of the roads become muddy and suffer from frequent landslides. But most of all, the roads connecting the interior villages are still very poor.

The recent development of telecommunications has also started making an impact in the lives of the people like the use of mobile phones but the network or connectivity still remains poor.
2.3. Social and Cultural Aspects

The people settling here belong to Kuki-Chin group belonging to Mongoloid race. They practiced shifting cultivation which has been handed down from generation to another generation without much change in its system.

Table 2.1: Decadal growth of population 1991 - 2011 Census of the Upper Tuivai Watershed

<table>
<thead>
<tr>
<th>Sub-Divisions</th>
<th>No of Villages</th>
<th>No of Households</th>
<th>Number of people</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>1991</td>
</tr>
<tr>
<td>Thanlon</td>
<td>12</td>
<td>735</td>
<td>2656</td>
</tr>
<tr>
<td>CCpur North</td>
<td>15</td>
<td>659</td>
<td>3602</td>
</tr>
<tr>
<td>CCpur</td>
<td>10</td>
<td>420</td>
<td>2239</td>
</tr>
<tr>
<td>Singhat</td>
<td>28</td>
<td>1752</td>
<td>10222</td>
</tr>
<tr>
<td>Total</td>
<td>65</td>
<td>3566</td>
<td>18719</td>
</tr>
</tbody>
</table>

The above Table 2.1 shows the number of villages, households and the three decadal population representation of the Upper Tuivai. As per the 2011 census, the study area consists of 65 villages and as many as 27,257 people lives in the upper Tuivai watershed. The density of the dwellings is 31 persons per km$^2$. In 1991, as many as 18,719 people were living in the study area and after a decade it has gone up to 21,199 people. And in 2011, it rose to 27,257 people. Thus, we see that the growth rate in this study area
is not high. This may be due to the fact that there is an out migration of the people from the study area as reported in interview during field work.

Table 2.2: Male and Female Population of the Upper Tuivai Watershed

(Census 2011)

<table>
<thead>
<tr>
<th>Sub-division</th>
<th>No of Villages</th>
<th>Total pop</th>
<th>Male</th>
<th>Female</th>
</tr>
</thead>
<tbody>
<tr>
<td>Thanlon</td>
<td>12</td>
<td>6245</td>
<td>4615</td>
<td>2560</td>
</tr>
<tr>
<td>CCpur North</td>
<td>15</td>
<td>5050</td>
<td>2025</td>
<td>1890</td>
</tr>
<tr>
<td>CCpur</td>
<td>10</td>
<td>2748</td>
<td>1397</td>
<td>1328</td>
</tr>
<tr>
<td>Singhat</td>
<td>28</td>
<td>13214</td>
<td>4223</td>
<td>4081</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>65</strong></td>
<td><strong>22119</strong></td>
<td><strong>12260</strong></td>
<td><strong>9859</strong></td>
</tr>
</tbody>
</table>

Based on the Table 2.2, there is an increase of 13.24 per cent from 1991 and 28.6 per cent from 2001 respectively. The rate of population growth is similar to the growth rate of the whole district. The sex ratios in all the sub-divisions of the study area are 555 in Thanlon, 933 in Henglep, 950 in Churachandpur and 966 in Singhat. The sex-ratio is abnormally unfavourable in Thanlon sub-division whereas, the rest of them are unfavourable.

It is inhabited by the Kuki-Chin tribes namely of Vaiphei, Gangte, Zou, Hmar, Thadou, Paite and Simte. These tribes share common ethnicity and belonged to the Tibeto-Burman group. Their culture,
traditions, dialects are more or less the same. There exists strong family bond in their society which plays an important role in their day to day lives. The introduction of western education and religion has greatly changed their society. However, there is a strong sentiment to return to their roots and preserve their culture and tradition. This is evident on villagers of the study area who regarded jhum cultivation as an inalienable part of their culture and tradition.

Both the proportion of male and female workers remains high in the study area because of the exclusively agrarian type of economy who preserved a strong rural way of life. The size of the active population in relation to total is determined not only by pure demographic factors such as age structure, but it is greatly influenced by economic and social considerations. Therefore, any adult in the family participate in the work force.

In the hills, people live in big and small villages generally situated on the hilltops or the spurs on the rugged topography. One has to walk a considerable distance from one village to another. Settlements in hill region are often distributed along the sides of small cultivable land. The general feature mostly found is of dispersed type of settlement. The rugged topography and the diversity of its landscape resulting in diffusion of arable land, abundance of rainfall and socio-cultural factors such as relative
insecurity of villagers in the past, fragmentation into large number of groups and clans are the main factors responsible for the dispersed settlement in the hills where nearly half of the total number of villages in the study area have population less than 200 persons. Besides, hamleted types of settlement are also present in Churachandpur North sub-division, Singhat sub-division and Churachandpur sub-division. Generally, the principal settlement patterns found in the district are linear, amorphous, radial, rectangular type, star-shaped pattern and semi-circular pattern. Linear pattern are found all along the highway that link the Churachandpur town with rest of the T.D. Blocks. This linear pattern is evidently because of the development of roads and also the need to easy communication.

Plate 3: Chiangpi Village in Tuima-Tuilak Sub-Watershed
Amorphous type of settlement is very common throughout the interior parts. The villages are usually dotted with numerous hamlets, all being very small rectangular without arrangement but linked with the church building or the village chief’s house by village paths within the village boundary. Such loose distribution of settlement link with central site only by crude paths may be termed as ‘amorphous pattern’.

Most of the habitations are on hill tops away from the river banks however, recent development in settlement pattern has developed and that there is an agglomeration of two or more villages near the highway or near the intersection of a river and highway or in most cases bordering the nearest village to the main road.