Chindwin River

Map of River

Chindwin River Basin

Scale 1:3000000
Table of Basic Data

<table>
<thead>
<tr>
<th>Name: Chindwin River</th>
<th>Serial No. : Myanmar-1</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Location:</strong> Sagaing Region</td>
<td><strong>21° 30’ ~ 27° 15’</strong></td>
</tr>
<tr>
<td><strong>Catchment Area:</strong> 110 350 km²</td>
<td><strong>Length of main river:</strong> 900 km</td>
</tr>
<tr>
<td><strong>Origin:</strong> Saramali Mountain</td>
<td><strong>Highest point:</strong> 3796 m</td>
</tr>
<tr>
<td><strong>Outlet:</strong> Ayeyarwady River</td>
<td><strong>Lowest point:</strong> 57 m</td>
</tr>
<tr>
<td><strong>Main geological features:</strong> sand-stones of different hardness, clay with gypseous veins, shales and limes-stones</td>
<td></td>
</tr>
<tr>
<td><strong>Main tributaries:</strong> Myittha, Yu-Wa, U-Yu</td>
<td></td>
</tr>
<tr>
<td><strong>Main Reservoir:</strong> -</td>
<td></td>
</tr>
<tr>
<td><strong>Mean annual precipitation:</strong> 670 mm ~ 3740 mm (1967-2009)</td>
<td></td>
</tr>
<tr>
<td><strong>Mean annual runoff:</strong> 4750 m³/s at Monywa (1967-2009)</td>
<td></td>
</tr>
<tr>
<td><strong>Population:</strong> 5535035 (2004)</td>
<td><strong>Main cities:</strong> Hkamti, Htamanthi, Homalin, Mawlaik, Kalewa, Kalaymyo, Mingin, Monywa</td>
</tr>
<tr>
<td><strong>Land use:</strong> approximately 120 000 acres of cultivated land. About 90 % of the basin is thickly forested by valuable species of wood.</td>
<td></td>
</tr>
</tbody>
</table>

1. **General Description**

The Chindwin river basin is located in the North Western part of Myanmar. The Chindwin river is the third largest river in Myanmar. The Chindwin basin is located in Sagaing Region, where Meteorological & Hydrological data are available at the stations along this river, such as Hkamti, Homalin, Mawlaik, Kalewa and Monywa, which are situated between 21° 30’ and 27° 15’ N Latitude and between 93° 30’ and 97° 10’ E Longitude.

The source of Chindwin radiates from the Kachin plateau. The second highest mountain in Myanmar, Saramali with the elevation of 12553 ft, is also located on the upper Chindwin catchment area. Since it passes through the mountainous region there are numerous streams, flowing into the Chindwin river. These streams are small tributaries of the Chindwin river.

The upper part of Chindwin river is known as Tanai Hka that flows in north direction in its upper reach before entering into the Hukaung Valley, the Upper Chindwin Lowlands. Very clearly, rapids and water falls could often be seen along the river stretch within the 850 km water course from origin to Mawlaik. The large tributaries of Chindwin river are U Yu, Yu-wa and Myittha. Four miles below Homalin receives an important tributary on the left bank- the U Yu river, which rises in the Myitkyina district. On the right bank it receives the Yu-wa at Yu-wa and the Myittha at Kalewa, from which it receives the drainage of the Chin hills.

The main stream is navigable by light vessels throughout the year; in the rainy season the vessels ply up to Homalin. The basin of Chindwin river is, in general, a mountainous forested terrain with the only exception of its lowest southern part which is a vast plain. The highest mountains are to be found to the West and North of basin where they reach 10 000 feet more. From the East the watershed passes a mountain chain of 3000-5000 feet high. The source of the river, which in its upper reaches before entering the Hukawng Valley, bears the name of Tanai Hka, flowing at the height of 7000 feet, then within the distance of 80 miles it goes down to the height of 700 feet and enters the Hukawn Valley. The Chindwin river joins with the Ayeyarwaddy river near Myingyan situated in the central dry zone.
General Climate and land use

The major contribution of rainfalls in the Chindwin basin is from rainfall over the catchment. The heavy rainfalls are generally caused by monsoon trough and strong monsoon. The average annual rainfall over the catchment varies from 670 mm to 4200 mm. The Chindwin river basin is contributed mainly by tertiary continental sediments. Among them more frequently found are sandstones of different hardness, less frequent are clay with gypseous veins, shales and limes-stones. The width of the river varies from 300 to 10 000 feet. Chindwin catchment area covers 110350 km². The Chindwin basin has approximately 120 000 acres of cultivated land. About 90 % of the basin is thickly forested by valuable species of wood.

2. Geological Information

2.1 Soil Type Map

![Soil Type Map]

Legend
- Chromic Cambisols
- Cotena of Luvisols on Slopes & Vertisols in Depres
- Eutric Cambisols
- Eutric Gleysols/Dystric Gleysols
- Eutric Gleysols/Humic Gleysols
- Ferralic Cambisols
- Ferric Acrisols
- Nitosols
- Rhodic Ferralsols
- Xanthic Ferralsols
- other

Scale 1:1000000
2.2 Characteristics of River and Main Tributaries

<table>
<thead>
<tr>
<th>No.</th>
<th>Name of river</th>
<th>Length (km)</th>
<th>Catchment area (km²)</th>
<th>Height peak (m)</th>
<th>Lowest point (m)</th>
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<tbody>
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<td>110350</td>
<td>3796</td>
<td>57</td>
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<td>2.</td>
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<td>24225</td>
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<td>3.</td>
<td>Yu-Wa (Tributary)</td>
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<td>2260</td>
<td>119</td>
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<tr>
<td>4.</td>
<td>U-Yu (Tributary)</td>
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<td>11150</td>
<td>1650</td>
<td>123</td>
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</tbody>
</table>

2.3 Longitudinal Profiles

![Longitudinal Profiles Diagram](image)

3. Climatological Information

3.1 Annual Isohyetal Map and Observation Stations

![Isohyetal Map](image)
### Monthly Climate Data

#### Monthly Mean Temperature (°C)

<table>
<thead>
<tr>
<th>Stations</th>
<th>Jan</th>
<th>Feb</th>
<th>Mar</th>
<th>Apr</th>
<th>May</th>
<th>Jun</th>
<th>Jul</th>
<th>Aug</th>
<th>Sep</th>
<th>Oct</th>
<th>Nov</th>
<th>Dec</th>
<th>Period for the Mean</th>
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<td>18.9</td>
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#### Monthly Mean Precipitation (mm)

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<th>Mar</th>
<th>Apr</th>
<th>May</th>
<th>Jun</th>
<th>Jul</th>
<th>Aug</th>
<th>Sep</th>
<th>Oct</th>
<th>Nov</th>
<th>Dec</th>
<th>Period for the Mean</th>
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<td>1197</td>
<td>769</td>
<td>491</td>
<td>225</td>
<td>26</td>
<td>6</td>
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<td>16</td>
<td>40</td>
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<td>341</td>
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<tr>
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<td>86</td>
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<td>132</td>
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<td>119</td>
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#### Monthly Relative Humidity (%)

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<th>Apr</th>
<th>May</th>
<th>Jun</th>
<th>Jul</th>
<th>Aug</th>
<th>Sep</th>
<th>Oct</th>
<th>Nov</th>
<th>Dec</th>
<th>Period for the Mean</th>
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<td>73</td>
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<td>91</td>
<td>89</td>
<td>87</td>
<td>83</td>
<td>81</td>
<td>82</td>
<td>1966-2000</td>
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<td>Homalin</td>
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<td>69</td>
<td>66</td>
<td>72</td>
<td>86</td>
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<td>88</td>
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<td>81</td>
<td>82</td>
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<tr>
<td>Kalewa</td>
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<td>67</td>
<td>53</td>
<td>52</td>
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<td>85</td>
<td>86</td>
<td>83</td>
<td>83</td>
<td>82</td>
<td>1968-2000</td>
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<tr>
<td>Monywa</td>
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<td>59</td>
<td>48</td>
<td>50</td>
<td>61</td>
<td>69</td>
<td>71</td>
<td>75</td>
<td>78</td>
<td>78</td>
<td>75</td>
<td>72</td>
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</table>

#### Monthly Evaporation (mm)

<table>
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<tr>
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<th>Mar</th>
<th>Apr</th>
<th>May</th>
<th>Jun</th>
<th>Jul</th>
<th>Aug</th>
<th>Sep</th>
<th>Oct</th>
<th>Nov</th>
<th>Dec</th>
<th>Annual</th>
<th>Period for the Mean</th>
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<tbody>
<tr>
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<td>140.0</td>
<td>172.2</td>
<td>159.4</td>
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<td>84.0</td>
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</table>
Monthly Temperature

Monthly Precipitation

Long-term Variation of Monthly Precipitation
4. Hydrological Information

4.1 Map of Streamflow Observation Stations

4.2 List of Hydrological Observation Stations

<table>
<thead>
<tr>
<th>No.</th>
<th>Station</th>
<th>Location</th>
<th>Catchment area (A) [km²]</th>
<th>Observation period</th>
<th>Observation items 1)</th>
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<tbody>
<tr>
<td>1</td>
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<td>26° 0'0&quot;</td>
<td>95° 4'2&quot;</td>
<td>1972-2009</td>
<td>H, Q</td>
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<tr>
<td>2</td>
<td>Homalin</td>
<td>24° 5'2&quot;</td>
<td>94° 5'5&quot;</td>
<td>1973-2009</td>
<td>H, Q</td>
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<td>3</td>
<td>Mawlaik</td>
<td>23° 3'8&quot;</td>
<td>94° 2'5&quot;</td>
<td>1972-2009</td>
<td>H, Q</td>
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<tr>
<td>4</td>
<td>Kalewa</td>
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<td>5</td>
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<td>H, Q</td>
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</table>

<table>
<thead>
<tr>
<th>No.</th>
<th>2) Q max [m³/s]</th>
<th>3) Q min [m³/s]</th>
<th>4) Q max / A [m³/s/100km²]</th>
<th>5) Q max / A [m³/s/100km²]</th>
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<td>109</td>
<td>8.36</td>
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<td>27550</td>
<td>19935</td>
<td>649</td>
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</table>

1) H: water level, Q: discharge, Q is obtained from rating curve.
2) Mean annual discharge.
3) Q max: Maximum discharge.
4) max: Mean maximum discharge.
5) min: Mean minimum discharge.

Monthly Mean Flow
[Graph showing discharge (m³/s) for different locations in Myanmar from January to December. The locations include Hkamti, Homalin, Mawlaik, Kalewa, and Monywa. The graph indicates a peak in discharge during the summer months, with a significant decrease in the winter months.]
4.3 Long-term Variation of Monthly Discharge Series
4.4 Annual Pattern of Discharge Series (2009)

4.5 Unique Hydrological Features
4.6 Annual Maximum and Minimum Discharges

Station: Monywa

<table>
<thead>
<tr>
<th>Year</th>
<th>Maximum¹</th>
<th>Minimum²</th>
<th>Year</th>
<th>Maximum¹</th>
<th>Minimum²</th>
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<tr>
<td></td>
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<td>[m³/s]</td>
<td>Date</td>
<td>[m³/s]</td>
<td>Date</td>
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<td>1967</td>
<td>7-10-67</td>
<td>17740</td>
<td>22-4-67</td>
<td>775</td>
<td>1989</td>
</tr>
<tr>
<td>1968</td>
<td>15-7-68</td>
<td>25450</td>
<td>24-3-68</td>
<td>757</td>
<td>1990</td>
</tr>
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<td>25-7-69</td>
<td>20130</td>
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Hyetographs and Hydrographs of Major Floods (1991)

![Hyetographs and Hydrographs of Major Floods (1991)](image-url)
5. Water Resources

5.1 General Description

Chindwin catchment area covers 110350 km². The basin of Chindwin river is, in general, a mountainous forested terrain with the only exception of its lowest southern part which is a vast plain. The Chindwin basin has approximately 120 000 acres of cultivated land. About 90 % of the basin is thickly forested by valuable species of wood. Generally, floods arise from the source of the river and the flood waves move down stream, causing damage to the crops and properties. Major floods generally occur from July to September. Potential surface water resource of Chindwin river basins is 149.7 km³/year and there are 4 Under Construction Hydro Electric Power Projects which are Htamanthi, Shwesaryay, Manipu and Myitthar.

5.2 Major Flood and Drought experiences

No major drought has been experienced in Chindwin River basin in the past.

Major Flood at Hkamti

<table>
<thead>
<tr>
<th>Date</th>
<th>Peak discharge [m³/s]</th>
<th>Rainfall [mm], Duration</th>
<th>Meteorological cause</th>
<th>Dead and missing</th>
<th>Major damages (Districts affected)</th>
</tr>
</thead>
<tbody>
<tr>
<td>26. 6.78</td>
<td>17140</td>
<td>911, 21-6-78 ~26-6-78</td>
<td>Vigorous Monsoon</td>
<td>-</td>
<td>Hkamti</td>
</tr>
<tr>
<td>13. 7.91</td>
<td>19720</td>
<td>1478, 2-7-91~19-7-91</td>
<td>Vigorous Monsoon</td>
<td>-</td>
<td>Hkamti</td>
</tr>
<tr>
<td>12. 7.97</td>
<td>19460</td>
<td>1496, 2-7-97~15-7-97</td>
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<td>-</td>
<td>Hkamti</td>
</tr>
<tr>
<td>5. 7.03</td>
<td>17650</td>
<td>1162, 25-6-03~5-7-03</td>
<td>Vigorous Monsoon</td>
<td>-</td>
<td>Hkamti</td>
</tr>
<tr>
<td>21. 7.04</td>
<td>17770</td>
<td>1465, 7-7-04~21-7-04</td>
<td>Vigorous Monsoon</td>
<td>-</td>
<td>Hkamti</td>
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</table>
5.3 Water Quality
The values of pH for rain water at Monywa (2004 & 2005)

<table>
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<th>Date of Measurement</th>
<th>pH</th>
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<tbody>
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<td>9-4-2004</td>
<td>6.8</td>
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<tr>
<td>15-5-2004</td>
<td>6.9</td>
</tr>
<tr>
<td>8-6-2004</td>
<td>5.9</td>
</tr>
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<td>13-7-2004</td>
<td>8.1</td>
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<td>7.7</td>
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<td>28-4-2005</td>
<td>7.7</td>
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<td>7.5</td>
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6. Socio-cultural Characteristics
The Chindwin River is a river in Myanmar and the major tributary of the Ayeyarwaddy River. It runs through misty-blue mountains and charming towns and villages, proudly running through a region of abundant natural resources and fertile meadows. The Chindwin Valley is a place of deep jungles and lofty mountains.

Temperatures fall to freezing point in winter on Pakkoi and Naga mountain ranges where coldness remains in summer. Winter temperatures falls as low as 4 °C in northern low lands. In Monywa, temperatures rise as high as 43 °C in summer and falls to 10 °C in the cold season.
Principal agricultural crops are paddy, wheat, maize, millet, groundnut, sesame, cotton, pulses. Timber extraction work is the principal industry as valuable teak forests are widespread in the basin. In the Chindwin basin live Myanmars, Kachins, Chins, Nagas, and Shans.

Sagaing Region of Chindwin Basin has over 3 million acres of total cultivated area. Paddy is cultivated on 1.4 million acres and other crops are on 1.5 million acres. Others are alluvial-land cultivation, garden farms and hillside cultivation.

Capital of Sagaing Region is Sagaing, a town boast for its belonging of World’s third biggest bell (Minngun Bell). Sagaing Hill, Kaunghmudaw Pagoda, Minngun, Monywa Powun Hill, Phowin, Htamanthi Wild life sanctuary, Nyaungkan Bronze Age Archaeological Site, Twinn Hill, Kyaukka Lacquer ware village are famous in this area.

7. References, Databases and Bibliography
Department of Meteorology and Hydrology: Meteorological and Hydrological Data
Agricultural Atlas of the Union of Myanmar by Food and Agriculture Organization of the United Nations, (2004): Land use, Land cover and Geological information