Purari Wara

Map of River

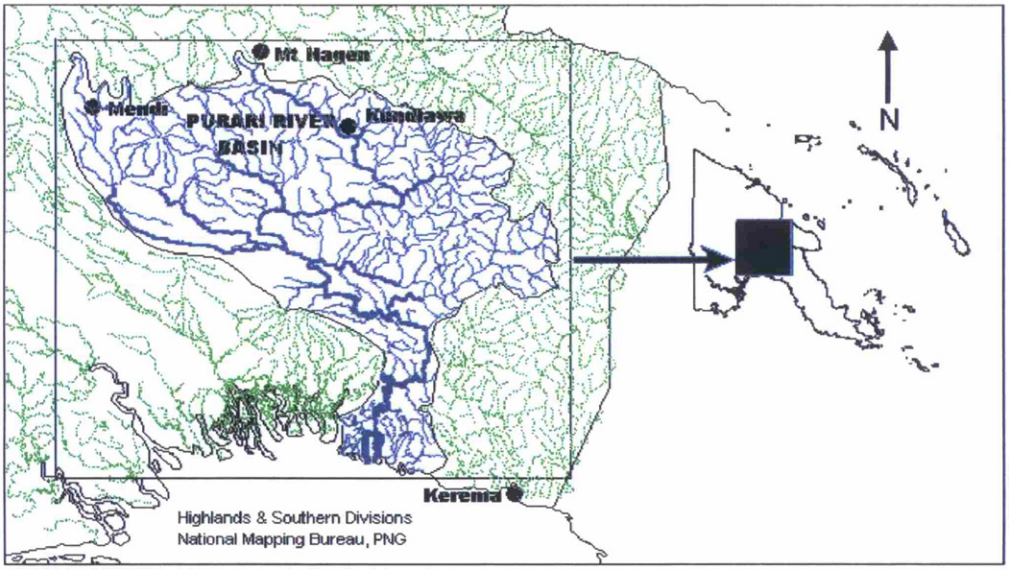


Table of Basic Data

Name: Purari Wara		**Serial No.:** PNG-2
Western Highlands & Gulf Provinces Papua New Guinea	S 5º30'9"~8º0'0"	E 143º30'8"~146º0'0"
Area: 28 738 km^2	**Length of main stream:** 902 km	
Origin: Mt. Hagen 3 000 m	**Highest point:** Mount Whilhelm 4 509 m	
Outlet: Coral Sea	**Lowest point:** Orokolo Bay 0 m (MSL)	
Main geological features: Limestone, volcanolithic sediments		
Main tributaries: Erave 5 330 km^2; Kaugel 4 000 km^2; Aure 180 km^2		
Main lakes: None		
Main reservoir: None		
Main annual precipitation: 8 929 mm at Purari (1963~1990)		
Mean annual runoff: 2 459 m^3/s at Wabo Creek		
Population: 450 000 (1990)	**Main cities:** Mount Hagen, Kundiawa, and Goroka	
Land use: Forest (20 %), coffee plant (20 %), urban (6 %), secondary vegetation (50 %), and others (4 %) (1990)		

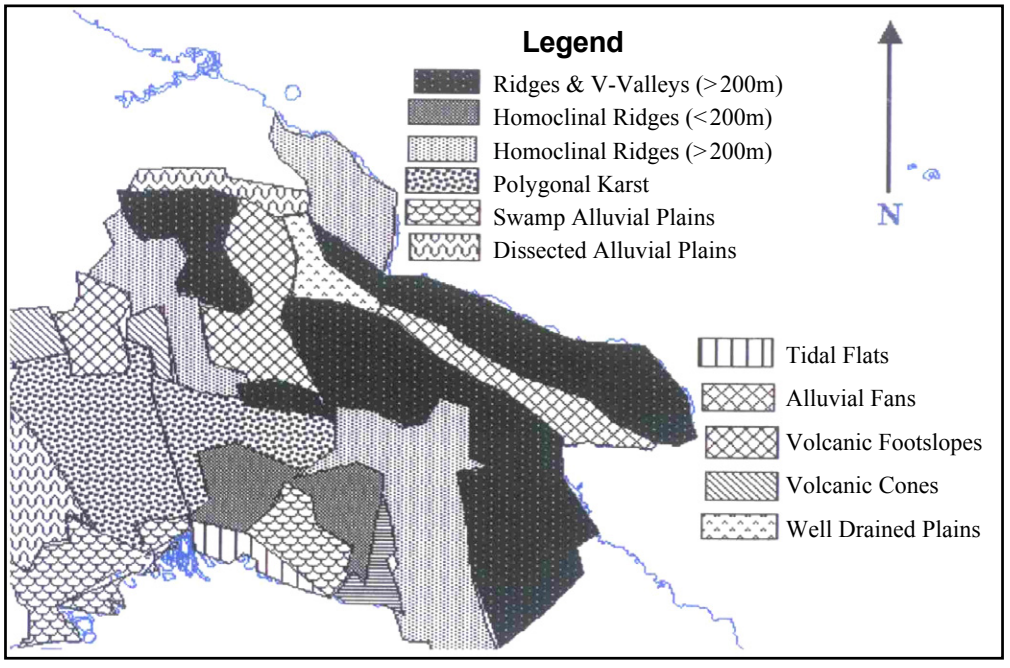
1. General Description

The Purari River is one of the largest rivers which drains the central highlands up in the north and flowing out into the Gulf of Papua in the South. The catchment area is 28 738 km^2 and the length of the channel is 265 km originating from the various tributaries in the central and the Bismarck ranges, (3 000~4 000 m). The average annual precipitation at Wabo is 8 929 mm. The population along this main river system in 1990 was 450 000. There are no major earth works such as dams and channel diversions. The river can be categorized into two: the rapid flowing, high energy tributaries flowing down from the highlands and the gradual flowing flood main river which passes through plains of the Gulf province, and finally discharges into the Gulf of Papua (Coral Sea).

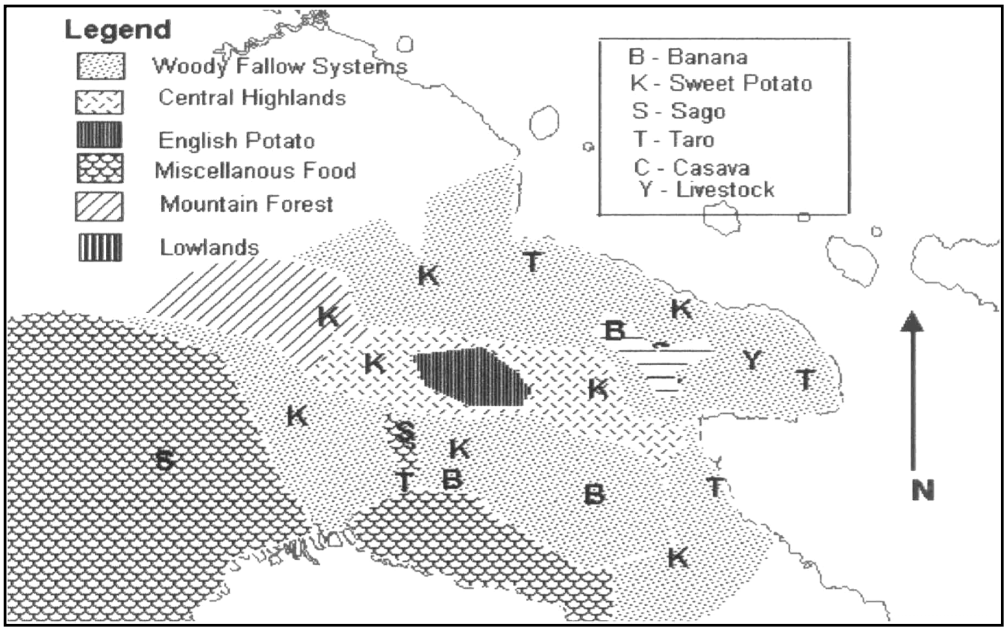
The main river system changes its name three times from Waghi up in the central Highlands to Tua in the middle of its journey and finally to Purari river at downstream of Erave and Tua junction. The upper tributaries flow through 285 km along narrow valleys with very steep sided gorges with the highest mountain of 4 509 m (Mt Wilhem) situated in the northeast, while the second highest mountain with 4 368 m (Mt Giluwe) is situated in the northwest.

2. Geographical Information

2.1. Geological Map



2.2. Land Use Map

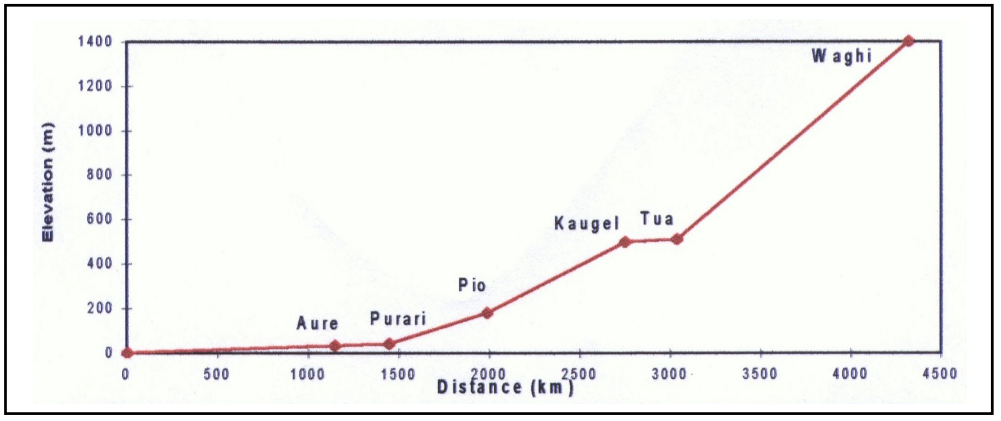


2.3. Characteristic of River and main Tributaries

No.	Name of river	Length [km] Catchment area [km^2]	Highest peak [m] Lowest point [m]	Cities Population (1985)	Land use [%] 1991
1	**Purari** (Main river)	270 28 738	1 589 -		F (20) U (6) A (70) Other (4)
2	**Kaugel** (Tributary)	130 4 000	4 368 -		
3	**Tua** (Tributary)	90 9 750	2 569 -	Kundiawa 200 000	
4	**Auri** (Tributary)	150 1 280	3 357 -		

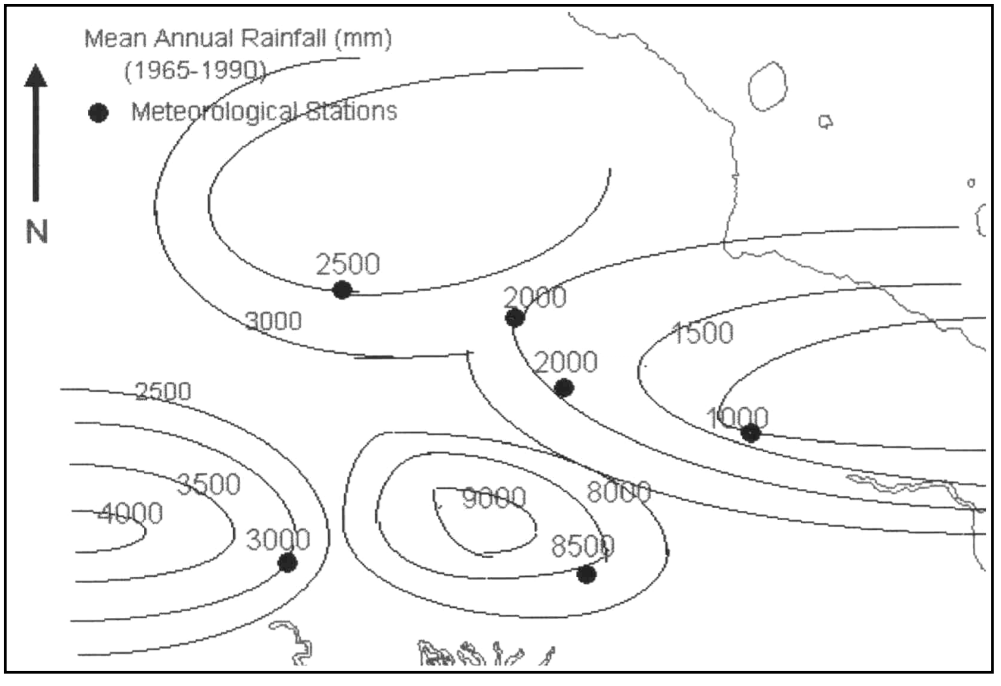
A: Agricultural field (vegetable, grass); F: Forest; O: Orchard; P: Paddy field; U: Urban

2.4. Longitudinal Profiles



3. Climatological Information

3.1. Annual Isohyetal Map and Observation Stations



Based on BWR Rainfall Network 1990

3.2. List of Meteorological Observation Stations

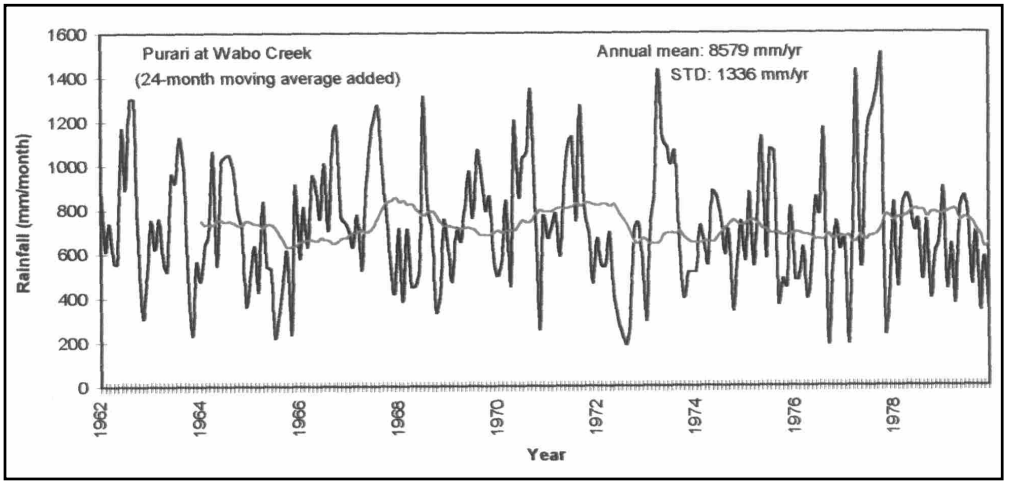
No.	Station	Elevation [m]	Location* (UTM)	Observation period	Mean annual precipitation[1)] [mm]	Observation item[2)]
702710	**Gumants**	2 120	N 9359800 E 192600	1965~1984	2 513	P(TB)
702860	**Muga**	1 830	N 9375200 E 204600	1965~1978	2 104	P(TB)
704300	**Chimbu**	1 400	N 9332600 E 275600	1961~1976	2 204	P(TB)
705090	**Asaro**	1 920	N 9339600 E 308900	1971~1990	1 136	P(TB)
711850	**Auri**	31	N 9219700 E 316900	1970~1990	-	P(TB)
712400	**Purari**	40	N 9226100 E 385000	1962~1989	8 929	P(TB)

* UTM coordinate at local zone
1): 1965~1990
2) P: Precipitation; TB: Tipping bucket with recording chart.

3.3. Monthly Climate Data

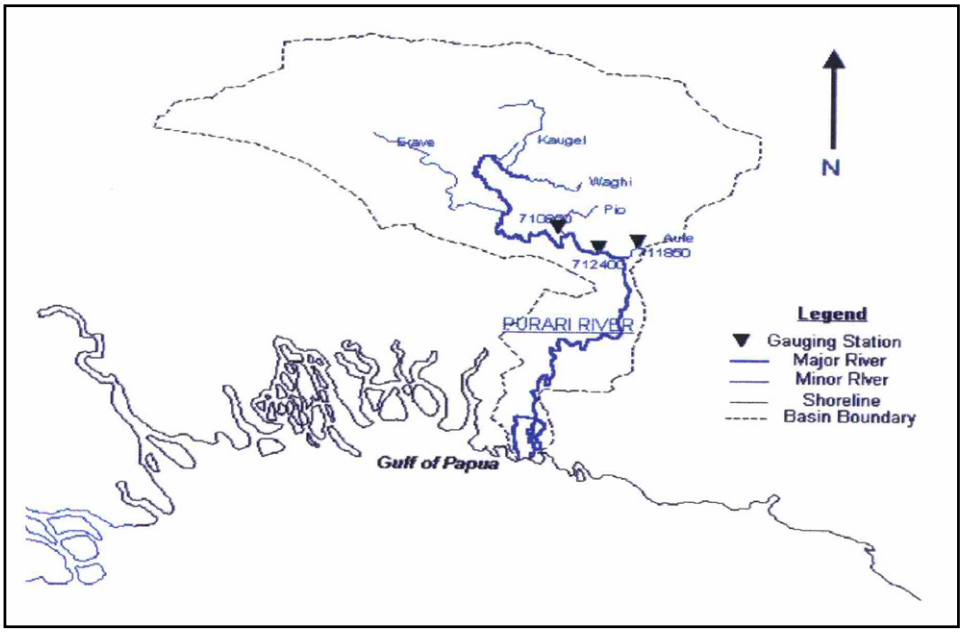
Observation item	Observation station	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual	Period for the mean
Precipitation [mm]	712400	609	601	675	700	767	871	934	861	814	701	514	514	8 929	1962-1989

3.4. Long-term Variation of Monthly Precipitation



4. Hydrological Information

4.1. Map of Streamflow Observation Stations



4.2. List of Hydrological Observation Stations

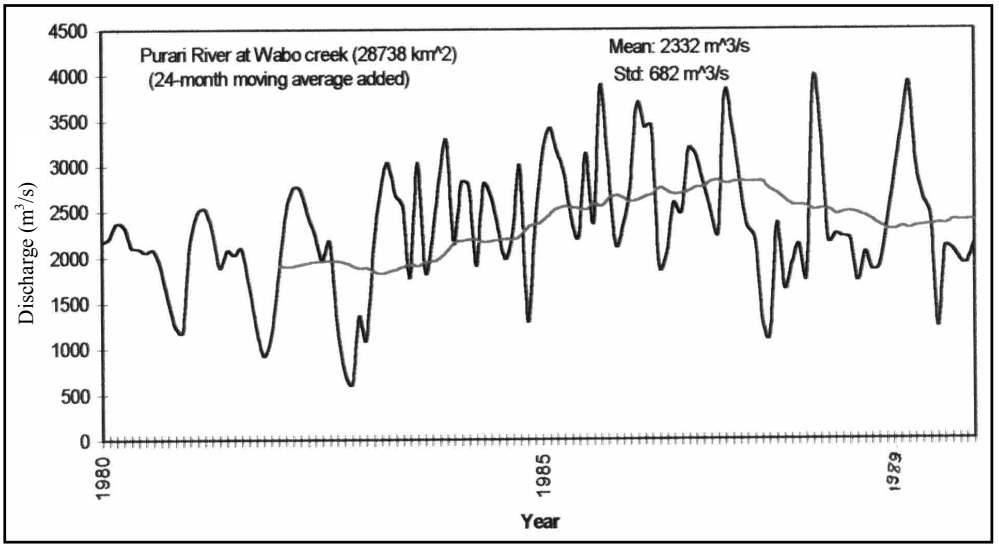
No.	Station	Location (UTM)	Catchment area (A) [km^2]	Observation period	Observation Iiems[1)] (frequency)
703880	**Waghi**	N 9336600 E 162500	4 757	1967~1980	H1, Q
709980	**Kaugel**	N 9296600 E 229000	4 000	1975	H1, Q
708490	**Tua**	N 9385800 E 252300	9 750	1975	H1, Q
710650	**Erave**	N 9226100 E 385000	1 280	1966	H1, Q
712400	**Purari**	N 9226100 E 385000	28 738	1958	H1, Q &P

No.	$\bar{Q}$[2)] [m^3/s]	Qmax [3)] [m^3/s]	$\bar{Q}$max [4)] [m^3/s]	$\bar{Q}$min [5)] [m^3/s]	$\bar{Q}$/A [m^3/s/100km^2]	Qmax/A [m^3/s/100km^2]	Period of statistics
703880	180	671.18	495.35	53.14	3.78	24.34	1975~1980
709980	413	2351.35	1738.74	178.10	10.32	24.11	1975
708490	309	1490.24	1083.00	197.00	3.17	10.32	1975
710650	509	1124.09	863.47	122.20	39.76	21.09	1975
712400	2571	10698.20	6376.65	822.90	8.95	37.20	1958

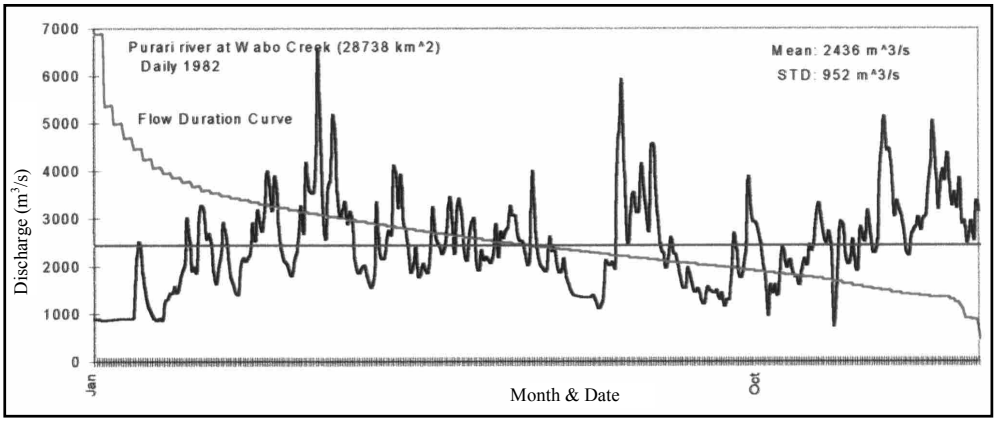
1) Q: Discharge, WQ: Water quality
H1: daily water level

2) Mean annual discharge
3) Maximum discharge
4) Mean maximum discharge
5) Mean minimum discharge

4.3. Long-term Variation of Monthly Discharge



4.4. Annual Pattern of Discharge



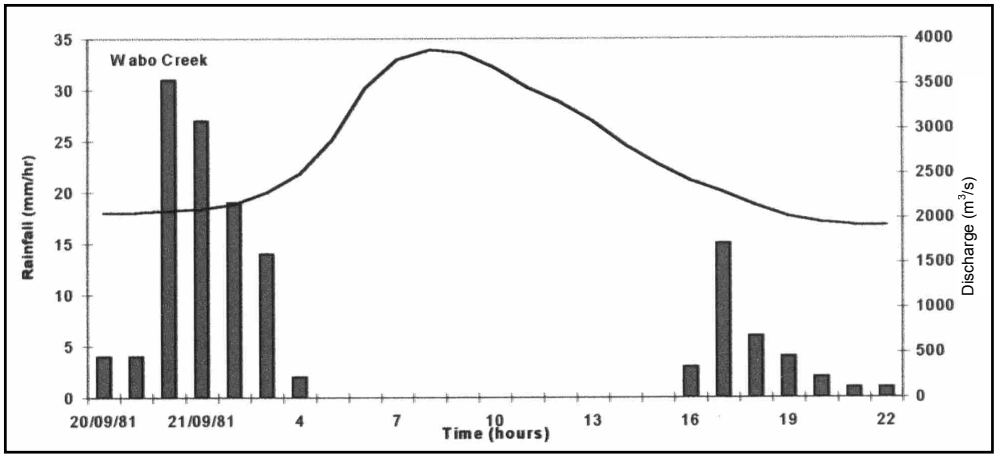
4.5. Annual Maximum and Minimum Discharges

At Wabo Creek [28 738 km^2]

Year	Maximum		Minimum		Year	Maximum		Minimum	
	Date	[m^3/s]	Month	[m^3/s]		Date	[m^3/s]	Month	[m^3/s]
1970	15/10	6 654	06	812	**1981**	23/04	6 015	05	1 348
1971	19/06	6 031	11	801	**1982**	04/12	2 740	11	407
1972	27/12	5 946	09	487	**1983**	03/04	6 656	11	786
1973	23/02	6 767	08	1 067	**1984**	10/10	6 736	11	644
1974	03/06	4 332	08	637	**1985**	08/09	10 696	12	1 354
1975	19/02	6 962	07	770	**1986**	22/04	6 735	12	463
1976	07/04	7 060	08	643	**1987**	06/04	6 248	09	553
1977	08/07	7 730	03	954	**1988**	26/03	7 281	03	842
1978	06/04	5 019	08	755	**1989**				
1979	10/03	5 152	08	916	**1990**				
1980	31/01	5 544	02	1 234	**1991**				

1), 2) Instantaneous observation by recording char

4.6. Hyetographs and Hydrographs of Major Floods



5. Water Resources

5.1. General Description

The Purari River is the third largest river in Papua New Guinea in terms of river channel length and its mean annual discharge. It drains the densely populated central Highlands of Papua New Guinea and drains out in the Coral Sea (Gulf of Papua) in the South. There is no major water resources development such as hydropower development and channel diversions. However, there is a lot of potential because all the tributaries of Purari are high-energy water sources which needs to be harnessed for power generation. It is also good for tourist attraction especially for white water rafting.

There are frequent floods, however, the greatest floods occur during southeast trade winds which is due basically to the monsoonal effects up north in the Asian continent.

The Purari River with its tributaries in terms of water resources development is virtually untouched. The only impacts are the patches of discontinued settlements with their associated anthropogenic effects especially along the narrow river valleys where industries are located. This is where the raw wastes and effluent affect the river system.

6. Socio-cultural Characteristics

The socio-cultural characteristics differ from place to place depending on the cultural beliefs and the background of the area. For instance, up in the Waghi valley of the central highlands the inhabitants of the valley believe that the river spirits can cause illness, especially to the people. While on the other hand the river spirits tend and nurture the village pigs when they roam and forage in the river valley. The villagers also believe that strangers can become sick if they venture into restricted areas within the valley floors. Folklores and legends are common but vary from place to place with the main theme being based around the river system.

The other major socio-cultural characteristic is the type of agricultural activities in the valleys. As the cash economy becomes increasingly predominant, the Waghi valley had suddenly became the agricultural/cash basket. It has sprung up to the base for agricultural industry in the country. In the other downstream valleys, Purari is dotted with patches of settlement with the associated anthropogenic effects on the river system and the surrounding vegetation.

7. References, Data books and Bibliography

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