

# DESCRIPTIVE NOTES ON THE HYDROLOGY OF MAURITIUS

## Introduction

The following brief notes are offered as a basis for a regional description of the hydrology of the island. The surface drainage pattern has been classified into major drainage areas with permanently flowing rivers and minor drainage areas, which lie between the major ones. This is illustrated in Figure 3.1, "Drainage Areas and Flow Gauging Stations"; and in the following text, the capital letters in parenthesis refer to the drainage areas shown on the map.

## Regional Description

The northern part of the island, delimited roughly by an east-west line running through Port Louis Mountains and La Nicolière, is known as the Northern Plain. This is an undulating area of young lavas, which flowed from five gently sloping volcanic cones, as illustrated in Figure 1.5, "Main Craters of Mauritius".

Except for drainage from the northern slopes of the central caldera, which gives rise to the rivers du Tombeau (Y), Citron (Z) and du Rempart North (A), there is little surface runoff in the Northern Plain. There are many wells in the plain and a number of small springs, which are most in evidence in the southeast of the area and at various points around the coast. Most of the springs are now being measured, often contributing to streamflow (which in turn is influenced by irrigation and abstractions) or occurring at the coast where they cannot easily be utilized.

The River du Rempart North (A) rises in the Nouvelle Decouverte area and its headwater represents the major perennial surface flow for that region. The River du Rempart feeds the Nicolière Reservoir and the total annual discharge to the reservoir is estimated at about 6 Mm<sup>3</sup>.

In the Northern area, there are various irrigation networks for irrigation, which are now supplied mainly from La Nicolière-Midlands Reservoirs and partly from the natural flow in the River du Rempart and springs. Nicolière Reservoir receives some 70 Mm<sup>3</sup> from the Grand River South East catchment (E) via "La Pipe-Nicolière" feeder channel. The capacity of Nicolière Reservoir is 5.26 Mm<sup>3</sup> and that of Midlands Reservoir is 25.50 Mm<sup>3</sup>.

Adjacent to the lower, eastern boundary of River du Rempart is the Plaine des Roches minor catchment (AB), which is highly permeable with no surface runoff. Groundwater springs out at the sea near Roche Noires and Bras d'Eau.

The River Françoise North (B) and River du Poste East (C) are fed principally from groundwater originating in the Nouvelle Decouverte area. River du Poste, in addition to its natural flow, receives water from River Françoise (North) via Constance Canal as well as from G.R.S.E via Sans Souci canal.

To the east of River du Poste is the minor drainage area (CD), which is similar to the Plaine des Roches minor catchment (AB).

The next drainage area, River Seche East (D) is also fed from groundwater originating in Nouvelle Decouverte and Quartier Militaire, flowing underground between Fayence and Blanche mountains, to appear at Clemencia as River Seche. A flume has been constructed on the river at Bel Air and flows between zero and 14 m<sup>3</sup>/s have been measured. Flow within the channel represents only a small visible part of the total large volume flowing to the sea. At the lower elevation of groundwater surface, no flow is visible in the channel. The mean flow for the year is 1.5 m<sup>3</sup>/s. Appreciable flows of fresh water can be seen issuing on the shore at Trou d'Eau Douce.

The Grand River South East basin (E) is the largest in the island, covering an area of 164 km<sup>2</sup>. The southern boundary is the massive Bambous Range of old lavas, from which flash flood producing surface run-off is appreciable. However, the main part of the total flow of this river originates in the Midlands area, a large saucerlike region of high rainfall and with groundwater near the surface. The Midlands Dam has been constructed on G.R.S.E in 2002 with a capacity of 25.5 Mm<sup>3</sup> to provide for domestic, irrigation and industrial purposes to the Northern part of the island.

At La Pipe where the catchment area is 24.25 km<sup>2</sup>, the annual runoff averages 65.1 Mm<sup>3</sup>. Water from these upper reaches is used for irrigation and for domestic supply via Nicolière Reservoir and for hydro-power generation from Cascade Diamamouve through a tunnel across Montagne Bambou to the River Champagne Hydro-Electric power station. The Piton du Milieu Reservoir impounds headwaters of River Vacoas and River Bateau for domestic supply.

In the lower reaches of G.R.S.E. there are a few large diversions, which may abstract a combined total in excess of 1.70 m<sup>3</sup>/s for irrigation and factory use. Discharge measurements are being undertaken close to the mouth of the river to determine flow into the sea.

Further south, the rivers des Creoles (G) and La Chaux (H) drain runoff from the high rainfall areas of the central uplands. Their catchments consist largely of young lavas from Curepipe point. Surface and groundwater catchments have different boundaries.

Annual discharge of the River des Creoles is of the order of 108 Mm<sup>3</sup>. In the upper reaches of the catchment (G), Eau Bleue Reservoir takes water from River Eau Bleue, the main tributary of River des Creoles. The water used by the Hydro-Electric power station at Le Val is returned to the river and is again used for Hydro-Electric power generation at Ferney Hydro-Power Station. Water is also being diverted for milling and irrigation purposes.

A gauging station near the mouth of River La Chaux at Beau Vallon was constructed in 1973. The annual discharge is about 56 Mm<sup>3</sup>.

The large minor drainage area (HI) with a catchment of 64 km<sup>2</sup> has scarcely any surface runoff, but large springs near the coast are fed by recharge from the Curepipe Point area and the Rose Belle groundwater region. The available groundwater is being partly tapped for irrigation by sugar estates and domestic purposes.

River Tabac (I) lies on the edge of the same groundwater region and fed principally by groundwater. Water is being utilized for milling and irrigation.

From River du Poste (J) round the south of the island to Black River (R) the drainage is almost entirely surface flow from the old lava massifs of Savanne, Plaine Champagne and the Black River Gorges. The minor drainage area (NP), a small groundwater region near Surinam, is the only exception, deriving its flow partly from groundwater in the Kanaka and Grand Bassin aquifer.

Water is being diverted from River du Poste to Mare Aux Vacoas Reservoir and its annual contribution is of the order of 15 Mm<sup>3</sup>. Mare aux Vacoas Reservoir's annual yield of about 33 Mm<sup>3</sup> is being utilised for domestic water supply. Further downstream water is abstracted from River du Poste for potable, industrial and irrigation purposes. Rainfall on the upper catchment is high, reaching an annual mean of 4000 mm with corresponding high runoff from these rivers. A dam site to store flood water has been identified on River Citron.

The catchment of River Baie du Cap (Q) has an area of 18 km<sup>2</sup> above Chamarel Falls and a mean annual rainfall of 1500 mm and there is a possible dam site on the river at this stretch. Underground flow from the catchment is negligible.

Drainage area (S), River Tamarin falls into two parts. The upper part lies in the south of the central plateau, a saucer like area of younger lavas, partly closed by basement rocks which have a very steep west-ward face. This upper catchment has a high rainfall and there are numerous marshy depressions, three of which have been enclosed to form the reservoirs at Mare aux Vacoas, Mare Longue and Tamarin falls. Water is released from Mare Longue into Tamarind Falls and is used to generate hydro power before its release into River Tamarin at Magenta. Most of the water is then diverted into the irrigation systems, the largest of which is Magenta. The lower part of drainage area (S) consists of the deep Tamarin Gorge which opens on to a narrow, irregular shaped coastal plain.

The drainage area of River du Rempart West (T) is similar to area (S) but the saucer rim enclosing the upper catchment is lower. This has resulted in an overflow of late lavas through a depression between the Du Rempart and St. Pierre mountains. Thus, in addition to surface flow in River du Rempart there is a considerable groundwater flow through the aquifer. This aquifer known as the Curepipe aquifer which emerges from the southwest part of the central plateau to the coastal plain is one of the most productive of the island. Some of this groundwater emerges as springs at levels of 275-300 m, for example at Bassin in area (TU) while a large volume flows to the coastal plain producing springs in the Flic-en-Flac – Medine area (TU) and (U). Marine springs occur a few feet from the shore at Dileau Bouilli near Flic-en-Flac. The ground water from the Pierrefonds tunnel, which is found between the St Pierre and the Corps de Garde Mountains, is used for domestic purposes in the region of Petite Riviere and part of Port Louis.

La Ferme Reservoir (capacity 11.52 Mm<sup>3</sup>) was constructed on the upper reaches of River Belle Isle (U) and receives water from both Trianon Grosses Roches Feeder Canal (W) and La Fenetre Feeder Canal from River du Rempart and River Papayes (T).

To the north of Corps de Garde Mountain, another lava flow over a depression in the rim of basement rocks allows movement of groundwater from the central plateau, and this is the source of the marshes and springs in Petite Riviere and Albion, in drainage areas (V) and (VW). Most of the spring flow in all the above-mentioned areas is used for the irrigation of sugarcane fields.

The Grand River North West (W), with a catchment area of 113.93 km<sup>2</sup> consists for the most part of young lavas. The southern tributaries River Seche and River Mesnil and the eastern headwaters (which lie on the western slopes of the young volcanic cones of Alma and Bar Le Duc) are fed largely by groundwater but the remainder of the area derives most of its flow from surface runoff. This drainage area is well monitored with a reliable hydrometric network consisting of several gauging stations. There is an inter basin transfer of water from River Plaines Wilhems and River Seche via Trianon Grosses Feeder canal to La Ferme Reservoir and from River Terre Rouge via Terre Rouge Canal for irrigation purposes in the western region.

The total volume of water drainage to the sea from area (W) is largely in the form of rapid surface runoff during the wet season and cannot be utilized without storage, which is limited to a very small capacity within the drainage area. A dam site has been identified on River Terre Rouge at Bagatelle to improve the Port-Louis water supply system.

Further north, after the small surface runoff catchments (X) and (XY) on the seaward side of the caldera, the River du Tombeau (Y) and its neighbour River Citron (Z) drain the seaward slopes of the north western part of the caldera. Runoff is derived mostly from surface flow, although there are also small local springs. Water is transferred from La Nicolière Reservoir to River Calebasses (Y) and to River Citron (Z) for irrigation purposes.