LIMPOPO River Basin

Fact Sheet 1

The Limpopo River flows over a total distance of 1,750 kilometres. It starts at the confluence of the Marico and Crocodile rivers in South Africa and flows northwest of Pretoria. It is joined by the Notwane river flowing from Botswana, and then forms the border between Botswana and South Africa, and flows in a north easterly direction. At the confluence of the Shashe river, which flows in from Zimbabwe and Botswana, the Limpopo turns almost due east and forms the border between Zimbabwe and South Africa before entering Mozambique at Pafuri. For the next 561 km the river flows entirely within Mozambique and enters the Indian Ocean about 60 km downstream of the town of Xai-Xai.

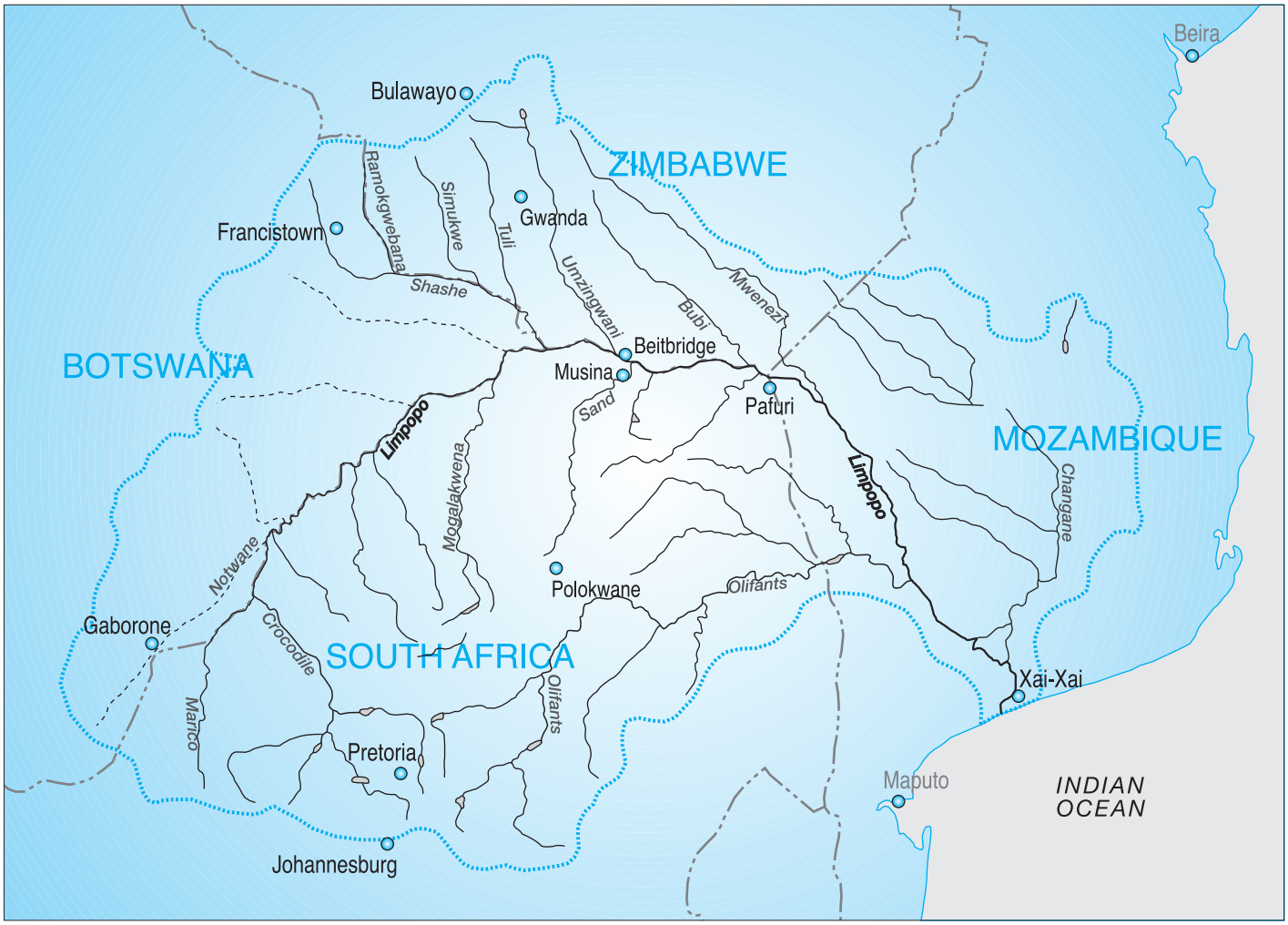
The Basin The Limpopo river basin is almost circular in shape with a mean altitude of 840 m above sea level. It lies between latitudes 22°S - 26°S and longitudes 26°E - 35°E. The total surface area drained by the basin is estimated at about 415,000 sq km.

The Limpopo basin covers almost 14 percent of the total area of its four riparian states – Botswana, South Africa, Zimbabwe and Mozambique. And of the basin's total area, 44 percent is occupied by South Africa, 21 percent by Mozambique, almost 20 percent by Botswana and 16 percent by Zimbabwe.

Drainage Network The Limpopo river has a relatively dense network of more than 20 tributary streams and rivers, though most of these tributaries have either seasonal or episodic flows. In historical times, the Limpopo river was a strong-flowing perennial river but is now regarded as a weak perennial river where flows frequently cease. During drought periods, no surface water is present over large stretches of the middle and lower reaches of the river.

The Crocodile river is the largest of the Limpopo tributaries in terms of both its catchment area and volume

Proportion of the Limpopo river basin covered by each riparian state



of flow, draining an area of 29,600 sq km. The Crocodile joins the Marico river some 250 km from its source to form the main stem of the Limpopo river. However, the Hartbeespoort dam commands a large portion of the total catchment runoff for the Crocodile river.

The Notwane river is another major and important tributary of the Limpopo river. It rises on the edge of the Kalahari in Botswana, flowing in a north-easterly direction until it reaches the Limpopo river about 50 km downstream of the confluence of the Crocodile and Marico rivers. The Notwane river has a catchment area of 18,053 sq km.

The other tributaries of the Limpopo river are the Bonwapitse and Mahalapswe rivers, which rise in Botswana and flow in a mainly easterly direction to the Limpopo river, draining a combined catchment area of 42,090 sq km. The contribution to flow in the Limpopo river from these two rivers is appreciably lower than the tributaries draining from South Africa. There is normally no surface runoff during the winter months in these rivers.

The Matlabas, Mokolo and Lephalala rivers are three of the main right-bank tributaries in a downstream sequence, joining the Limpopo river upstream of the Sterkloop/Seleka Farm flow gauge. These rivers flow in a mainly northerly direction, draining a combined area of about 36,180 sq km. The flow pattern in these tributaries is very irregular as a result of low rainfall and appreciable transmission losses. Normally there are long periods of no flow during winter months.

Other major sub-catchments of the Limpopo include the Shashe river, which rises in Botswana and has the Ramokgwebana, Simukwe, Shashani and Tuli rivers as its tributaries. The Umzingwani river is another major tributary of the Limpopo, draining a catchment area of about 12,600 sq km.

Other sub-catchments of the Limpopo river include the Lotsane, Motloutse, Bubi, Nzhelele, Sand, Mwenezi, Olifants, Luvuvhu, Shingwedzi, Letaba, Changane and Mogalakwena river catchments.

Topography The basin consists largely of undulating terrain between ranges of hills and mountains. The northward flowing (South African) tributaries of the Limpopo river have incised deep gorges through the hills and mountain ranges that are visible as erosional remnants. Elsewhere, the river valleys are broad and flat-bottomed with river channels that are slightly or moderately incised into the surrounding parent material.

The upstream portion of the Limpopo is characteristically flat with kopjes and small hills rising not more than 200 m above the general level and occasional elongated ridges of more resistant strata forming the only local relief. The relief is more pronounced in the south-eastern corner where the quartzites of the Transvaal Sequence, which form the ridges of the Magaliesberg and the Witwatersrand, have been deeply incised by the river to depths of up to 600m. The Waterberg Plateau forms another area of more pronounced relief on the eastern side of the central portion of the basin.

Large portions of the central and western parts of the Limpopo basin (especially in the Shingwedzi and Letaba sub-catchments) have very little or poor drainage, and are usually considered to be endorheic (internally draining). These areas are often marked by the formation of saltpans or clay-bottomed pans where rainfall collects and evaporates. These areas are generally subjected to mechanical (physical) weathering processes, in contrast to the predominance of chemical weathering processes in the wetter headwater regions of most tributaries.

The Mozambique portion of the Limpopo basin consists of gently undulating terrain with numerous small tributary streams and pools forming part of the Changane drainage system. This tributary rises close to the Zimbabwe-Mozambique border, meanders across the Mozambique coastal plain and joins the Limpopo river very close to its mouth on the coast near the town of Xai-Xai. A belt of heavy textured soils connecting the Limpopo and Incomati river systems suggests that the Limpopo previously also entered the Indian Ocean via Maputo Bay.

A continuous belt of coastal sands of varying width occurs adjacent to the coast. The eastern border of these coastal sands is characterised by a series of high dunes generally parallel to the coast which normally attain their highest elevations just inland of the high water mark. Behind these dunes occur depressed areas with barrier lakes and related dunes.

Geological Features The prominent geological features of the Limpopo river basin are the Limpopo Mobile Belt (where considerable mineralization has taken place), the Kalahari Craton, the Archaean Craton, the Karoo system and the Bushveld Igneous Complex.

Consolidated Quaternary age sediments are present in upstream Limpopo, not only in the form of the ubiquitous Kalahari sands which conceal much of the bedrock to varying depths, but also in the form of flood-bank alluvium. Silt, sand and gravel are present both within the river channels and adjacent to the river where broad floodplains have accumulated. Notable accumulations of coarse sand are present in the channels of the Shashe and Motloutse tributaries.

In the southern (South African) portion of the basin, the Bushveld Igneous Complex forms an extremely important geological feature, and contains a very large proportion of the region's mineral wealth. The geological features of this area consist mostly of basic mafic and ultramafic intrusive rocks, accompanied by extensive areas of acidic and inter-

mediate intrusive rocks. At the southern and eastern periphery of this area, large dolomite and limestone formations occur, accompanied by extensive mineralization along their contact zones.

In the southern portion of the basin, the extensive, carbon-rich sedimentary rocks of the Karoo system contain enormous economic reserves of coal and are the site of intensive coal-mining activities in South Africa.

The lower Limpopo basin is characterised by extensive erosion plains, gently dipping coastward. The coastal belt is characterised by a dune area with an average width of 30 km, but extending to 100 km in some places. The lower Limpopo basin consists largely of unconsolidated and consolidated sedimentary rocks with granitic intrusions exposed as erosional remnants in the landscape.

Soils The dominant soil types of the basin are moderately deep sandy to sandy-clay loams in the south, grading to shallower sandy soils in the north and deeper sandy soils in the west and east. The deeper loam soils are extremely important for agricultural activities and support extensive irrigation developments along many of the tributary rivers in South Africa, such as the Crocodile river catchment. A few extensive areas of black vertisols in the southern parts of the basin also support important agricultural developments.

Deep layers of wind-blown Kalahari sands cover large areas of the western portion of the Limpopo basin, while the sandy soils of the eastern (Mozambique) portion are derived from old, unconsolidated marine sands. These sandy soils support important hardwood timber resources.

The valley bottom soils along all of the tributary rivers and the Limpopo main channels are generally of colluvial or alluvial origin and support extensive areas of commercial and subsistence agriculture. In contrast, hilly or steeply sloping areas have fragile, shallow, stony soils with little agricultural potential. In the endorheic areas, most soils have a relatively high sodium and clay content.

Climate The climate of the basin varies spatially from being arid in the west through semi-arid and temperate areas in central zones to semi-arid in the east, with a few sub-humid pockets in the centre.

Three wind systems have been identified as having a strong influence on the basin's climate. These are the tropical cyclones from the Indian Ocean; the southeasterly wind systems that bring rainfalls from the Indian Ocean; and the Inter-Tropical Convergence Zone (ITCZ), which in some years moves sufficiently far southwards to influence rainfalls in the northern parts of the basin.

Air temperatures across the basin show a marked seasonal cycle, with highest temperatures recorded during the early summer months and lowest temperatures during the cool, dry winter months. Rainfall is also highly seasonal, falling predominantly as intense convective thunderstorms during the warmer summer months.

The severe droughts observed during the early 1990s and the recent exceptional floods in the Limpopo valley illustrate the extreme variability of rainfall and runoff in the basin. This variation has significant effects on aquifer recharge.

Biodiversity The Limpopo river basin is endowed with a variety of biological resources, ranging from crawling insects to large mammals such as the elephants and from non-vascular to vascular plants. Some of the biological resources found in the basin are endemic, and others are migratory. (Table 1) Unfortunately, there are no known records of species numbers, number of endemics, and species density exclusively for the Limpopo river basin.

Conclusion Despite the huge biological and physical resource base, the Limpopo river basin largely remains a grey area in terms of knowledge. A lot that is attributable to the basin is based on extrapolations. This is a worrying fact given that the basin is the most developed in southern Africa with significant mining and manufacturing concerns. The basin is highly developed, with four percent of its area having been built-up.

Number of Species for certain categories in each country as per World Resources 2000-2001 statistics

	Total Mammal Species	Total Bird Species	Total Reptile Species	Total Amphibian Species	Total Plant Species
Botswana	164 (5)	386 (7)	157 (0)	38 (0)	215 (0)
Mozambique	179 (13)	498 (14)	167 (5)	62 (0)	5692 (57)
South Africa	255 (33)	596 (16)	315 (19)	108 (9)	23420 (1875)
Zimbabwe	270 (9)	532 (9)	153 (0)	120 (0)	4440 (73)

Brackets indicate numbers of threatened species

Sources for further information

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See also the CEP partners listed below.

Selected references

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See also the SADC Protocol on Shared Watercourses

RAPID ENVIRONMENTAL APPRAISAL OF THE LIMPOPO RIVER BASIN

The Limpopo River Basin Factsheets are produced as part of the Rapid Environmental Appraisal of the Limpopo River Basin, and drawn from the technical report prepared for the SADC Water Sector by

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Other products in addition to fact sheets are a technical report, summary booklet and a "virtual library" of bibliographic and contacts information accessible through internet at www.sardc.net/imercsa/limpopo

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COMMUNICATING THE ENVIRONMENT PROGRAMME (CEP)

This study of the Limpopo river basin is related to the Communicating the Environment Programme (CEP), a regional partnership which seeks to inform, motivate and empower people at all levels of environmental decision-making in southern Africa, from the individual and NGOs to the private sector and governments, to take positive actions to counter environmental degradation and move towards sustainable development paths by providing them with clear, objective and meaningful information on the environment. The partnership is also to facilitate understanding and communication between environmental groups, stakeholders and decision-makers. The CEP partners produce state of the environment reporting for the SADC region, and have also produced books on water, on biodiversity of indigenous forests and woodlands, and on the Zambezi river basin. The longstanding CEP partnership of the SADC Environment and Land Management Sector (ELMS), IUCN-The World Conservation Union Regional Office for Southern Africa (ROSA) and SARDC's, I Musokotwane Environment Resource Centre for Southern Africa (IMERCSA), has been expanded to include the SADC Water Sector and the Zambezi River Authority.