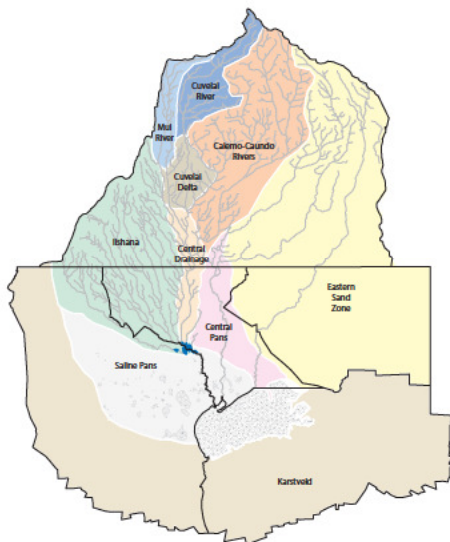


Surface water of the Cuvelai-Etoshia Basin

Drainage zones

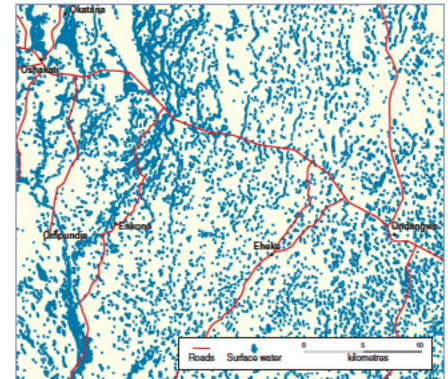
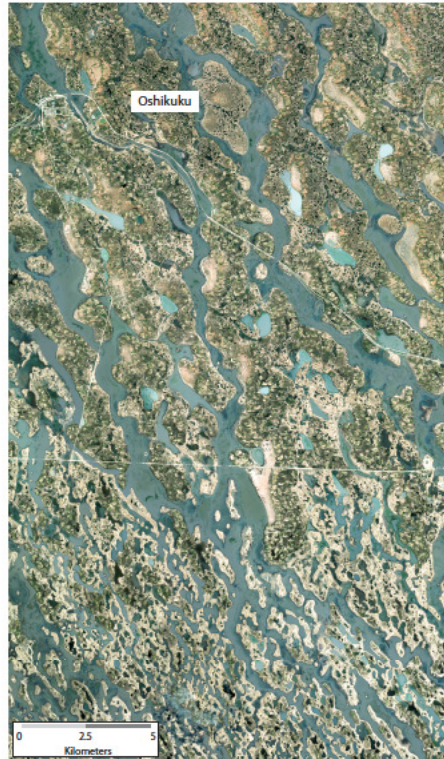


The Cuvelai Basin in Angola and Namibia can be divided into 10 drainage zones. Of these:

- Three carry little or no surface water: Eastern Sand, Karstveld and Calemo-Caundo Rivers;
- Two are filled by local rain: Saline Pans and Central Pans;
- Two are largely permanent: the Mui River and Cuvelai River Zones;
- The Iishana zone consists of broad channels where the water flows very slowly and the soils are saline;
- Flows in the Mui and Cuvelai Rivers radiate into the Cuvelai Delta;
- Water in the Cuvelai Delta and some from the Iishana Zone flows into the Central Drainage.

Most *iishana* flow from north-west to south-east, and are broader in the north than in the south where they are more interconnected.

Darker, higher areas between the *iishana* are densely populated, but few people live and farm in the paler areas in the southern half of the image because the soils are more saline than those to the north.



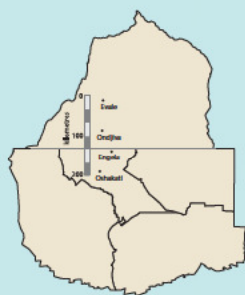
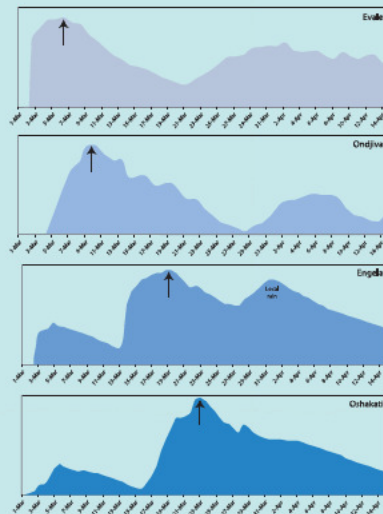
Some of the thousands of small pans filled by local rain in the Central Pans Zone. Many of the south-flowing channels of the Central Drainage Zone become narrower until they break up into individual pans. *Iishana* of the Central Drainage do not reach Ondangwa which thus does not suffer from the kind of flooding that occurs in Oshakati.

All homes are built on higher ground (*omitunda*) between the *iishana*. The oldest and biggest farmsteads are usually on the highest areas where the soils are less salty and clayey.



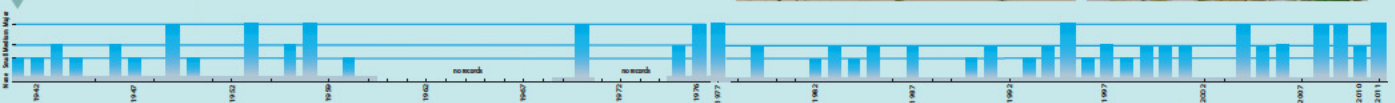
Flows and flooding

Flows in the *iishana* come from local rainfall and rain in the upstream catchment in Angola. The graphs show the movement of a wave of water from Evale in Angola to Oshakati in March 2010. Flows at Evale peaked between the 4th and 6th of March and arrived about two weeks later at Engela, and then reached Oshakati a week later. The effect of local rainfall is shown by the upsurge at Engela in early April.



Flows change substantially from year to year. The graph below shows the approximate levels of flooding over the past 70 years. Excluding 13 years for which no information is available,

exceptionally high flows, locally called *efundjas*, occurred ten times: in 1950, 1954, 1957, 1971, 1977, 1995, 2004, 2008, 2009 and 2011. There were no or only negligible flows in 19 years.



Flooding usually has the greatest impact on road access and poor people, especially those forced to build their homes in low-lying areas. Tens of thousands of people have repeatedly had to abandon their informal shacks in Oshakati. Many poor rural homes, with tiny fields and little cash income, have been built in the lowest areas close to the *iishana* because no space was available on higher ground.

The record floods in 2011 were the result of very heavy rain on the Namibian side of the Cuvelai as well as flows of water south from Angola.

