

#### 2.2.4 Water Balance

In an arid zone, it is very difficult to establish a relationship between rainfall and runoff. In the particular case of the Stampriet Artesian Basin, these are important in the determination of amount of recharge for sustainable management of the groundwater of this promising aquifer.

The amount of recharge can only be estimated when, among others, the rainfall-runoff-relationship is known. In order to achieve this, accurate runoff with corresponding rainfall, evaporation, amount of groundwater withdrawal and groundwater level data are pre-requisites.

Consultation with the published paper revealed that about 83% of the precipitation goes back to the atmosphere before it can be used and about 14% is lost as evapo-transpiration. Therefore, although it is a generalized figure, the net amount of recharge to groundwater is only about 1 ~ 2% of the precipitation.

As the first step of water balance for the study area, an attempted has been made to know the runoff coefficient for the study related catchments from the limited observed data. It was found that the coefficient is very small (0.00022 ~ 0.00073). This finding suggests that most of the generated runoff is lost due to high rate of evaporation and infiltration to the thick sandy surface and then evaporates as evapo-transpiration.

#### 2.2.5 Issues

The existing hydrological network, where one device covers 5,000 to 20,000 km<sup>2</sup>, it is very difficult to have accurate runoff data. Therefore, the catchments should be subdivided into small ones and more gauging stations to measure rainfall and runoff need to be established while the effect of geology and vegetation should be properly determined. If it is not possible to under-take the work for whole area, some representative test catchments with smaller areas should be delineated instead. It may take few years to get good results; nevertheless, it is the first step for establishing a relationship between rainfall and runoff for an arid zone.

It was reported that DWA used to collect rainfall data from the meteorological service of the Weather Bureau for their own database. The meteorological service collects data from two sources, one is from their own network and the other one is the private farmers. Due to this system, the meteorological service encounters many problems in the field, as the farmers are not available when the people from the Weather Bureau visit them to collect the data. This problem has affected the compilation of the data of

last hydrological year (1999-2000) considerably.

In order to avoid dependency on the meteorological service, DWA should maintain some rainfall gauging stations, especially in the catchments where runoff is measured.

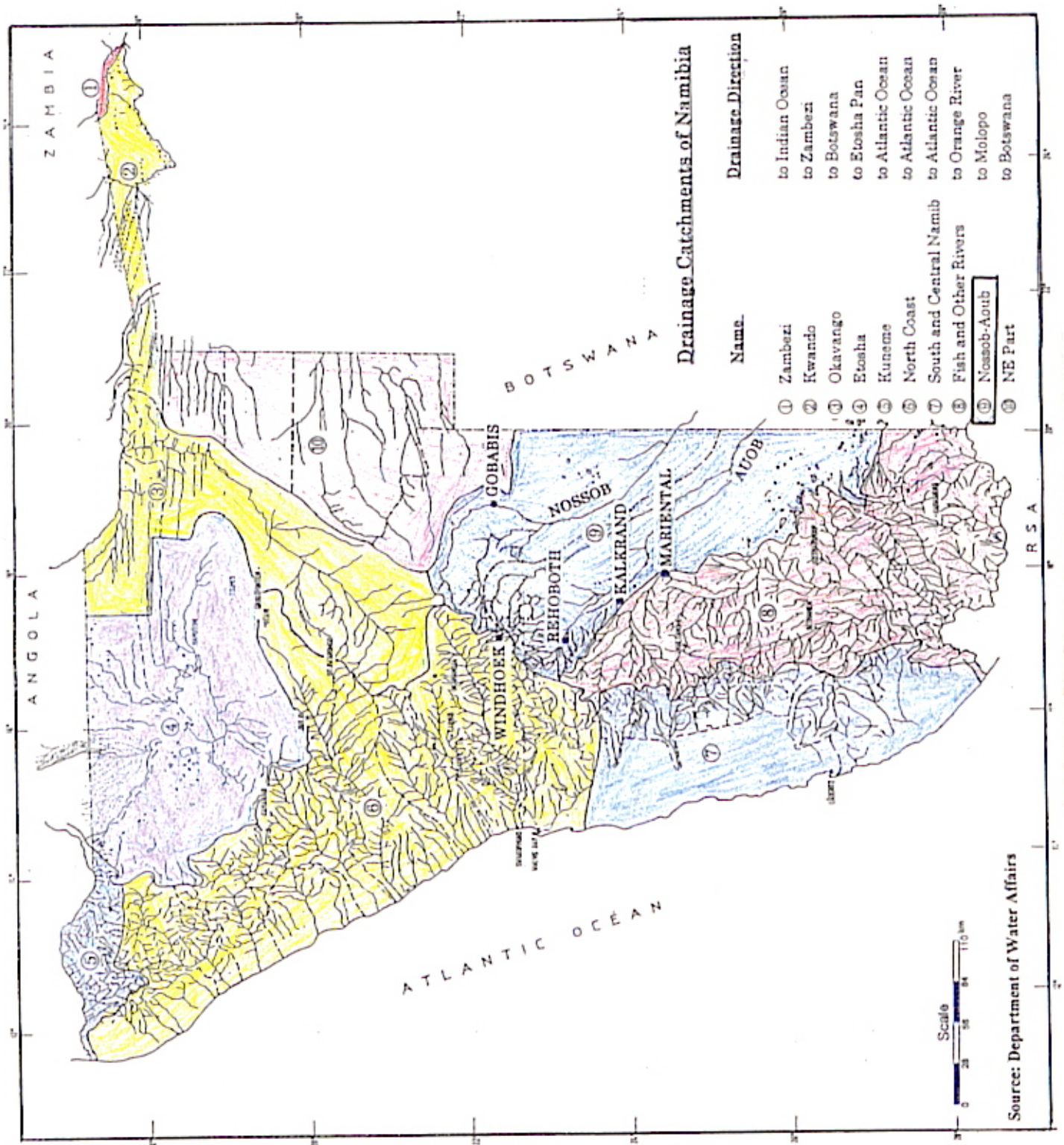


Fig. 2.2-1 Main Drainage Catchment of Namibia

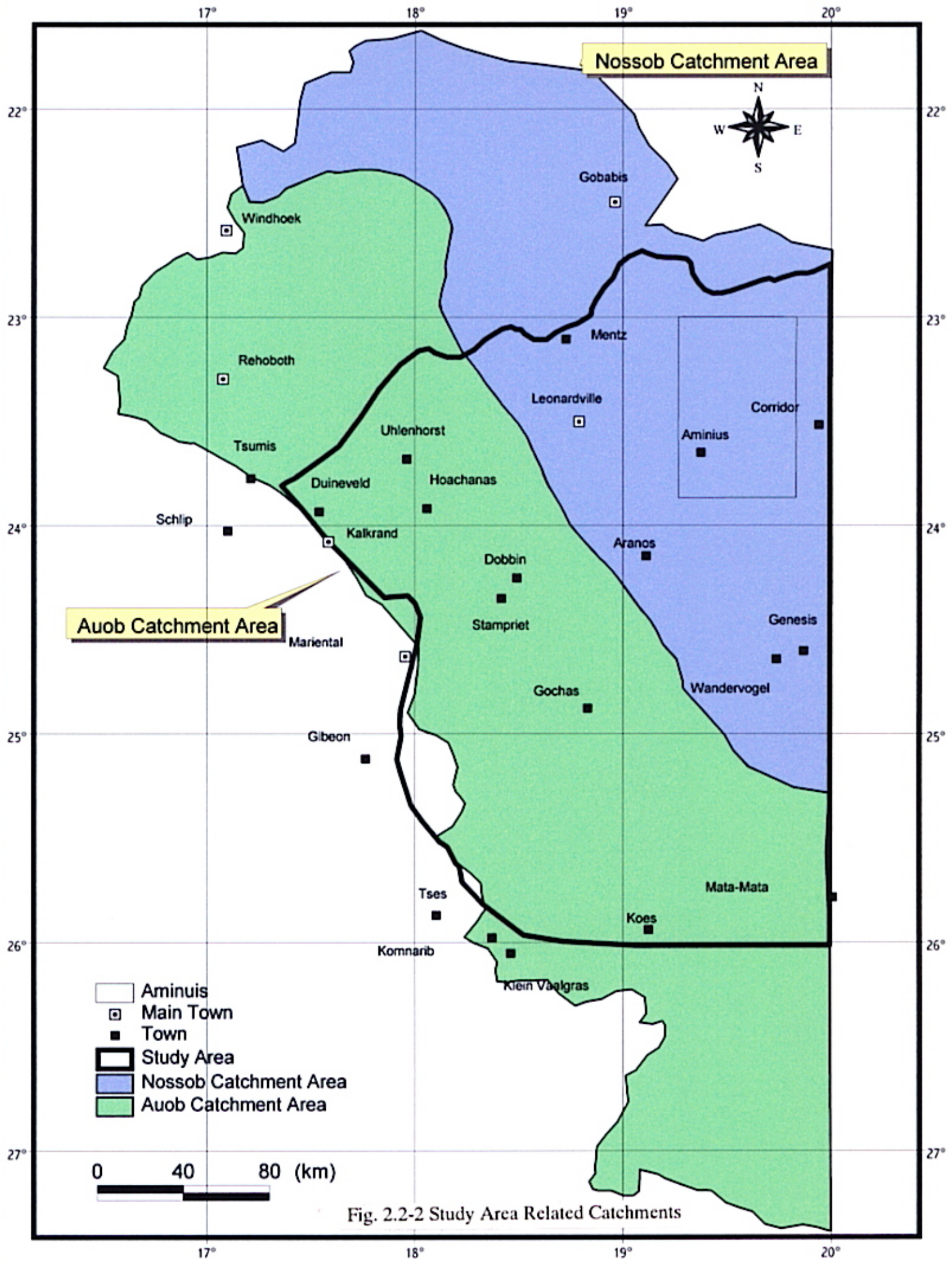


Fig. 2.2-2 Study Area Related Catchments