SUMMARY AND CONCLUSIONS
Introduction

The Shoolpaneshwar Wildlife Sanctuary is an expansion of old Dumkhal Sloth Bear Sanctuary. It covers an area of 675 sq. kms. and lies along the North-Eastern border of Bharuch district with Maharashtra. The area has received great attention as it is a part of the catchment areas of Karjan reservoir as well as the proposed Sardar Sarovar; it also contains one of the best forests in South Gujarat.

In the past, parts of the area were explored for floristic and vegetational studies by Patel (1965), Shah (1967), Singh (1970), Shah and Singh (1970, 1971), Bhatt, Bedi and Sabnis (1971), Patel (1971), Shah (1978) and Joshi (1983). However, detailed information regarding the vegetation and floristic composition and the ecology of the entire Shoolpaneshwar Sanctuary is not available. The present investigation was taken up with a view to develop detailed information to fill these lacunae.

Location of the area

The study area is almost 200 km away from Baroda and located between 73°.32" and 73°.54" East longitude and 21°.34.5" and 21°.52" North latitude. It is characterised by steep hilly terrain, with hills ranging in height from 400 to 882 metres. Several streams and rivulets originate from these
hillocks and form the tributaries of Tarav, Karjan and Narmada river systems. The river Tarav forms the life line of the Sanctuary. The area is bounded in the North by Sardar Sarovar and Narmada river and in the West by Karjan and Tarav rivers. Most of its Eastern boundary runs along Devganga river and the South, South-East and South-Western boundaries slowly merge into more populated areas of forests of Sagbara division.

The climate of the area is characterised by clear cut winter (November-February), summer (March-May) and monsoon (June-September) seasons; the month of October being a transition period between monsoon and winter seasons. The temperature varies between 43°C and 10°C and the area receives an average rainfall of 1000 mm. The principal geological formations of this area, in sequence of deposition, are Bag limestones, sand stones, the deccan trap lava flows and alluvial deposits.

Previous studies have revealed the presence of (a) moist deciduous forests, (b) dry deciduous forests and (c) riverain forests in this area. The forests types mentioned here are listed in the Champion and Seth's (1968) system of forest classification. In addition there are man made forests which include plantations in forest areas as well as along road sides.
Study

A map of the entire Sanctuary area was prepared and was divided into grids representing 1 sq.km. each. Vegetation in these grids was studied by frequent visits to the area for a period of four years. During these visits in addition to the collection of plant specimens, observations on the occurrence of different floristic components, the seasonal variation in vegetation, the ecosystems and the factors which affected these ecosystems were also made. The collected plant specimens were properly preserved, identified and stored in the departmental Herbarium, at Baroda. The entire area was divided into four zones based on the forest types met with. They are: zone I comprising bamboo dominated forests; zone II comprising moist deciduous and drydeciduous forests; zone III comprising drydeciduous degraded forests and zone IV comprising totally degraded forest areas. The characteristic features of vegetation of each zone are discussed in detail in the thesis.

The study yielded a rich haul of 623 angiospermic plant species belonging to 109 families. The flora shows diversity both in quality and in quantity. It was observed that good forest cover exists only in the interior areas (Namgir, Chopdi, Vav, Waghumar, Dabchar, Kalvat, Shisha, Mohbi, Sagai, etc.). Some of these areas viz. Chopdi, Vav, Kalvat and Dabchar show dominance of Bamboo (*Dendrocalamus strictus*).
Plants such as Grewia tiliaefolia, Garuga pinnata, Anogeissus latifolia and Morinda pubescens are the major associates of Dendrocalamus.

In contrast to this the peripheral areas of the Sanctuary show degraded forests (Surpan, Mokhadi, Bhilvasi, Malsamot etc.). The degradation resulted in the depletion of forest cover and a few plant species which are the components of thick forest are noticed only in limited areas in the Sanctuary. They include Radermachera xylocarpa (Bignoniaceae), Firmiana colorata (Sterculiaceae), Dillenia pentagyna (Dilleniaceae), Begonia crenata (Begoniaceae), Aeginetia indica (Orbanchaceae), Paracaryum coelustinum (Boraginaceae), Phanera integrifolia (Caesalpiniaceae), Colebrookea oppositifolia (Lamiaceae), and Bambusa arundinacea (Poaceae).

An understanding of the ecology of the Shoolpaneshwar Wildlife Sanctuary calls for detailed information regarding various forces that operate and interact in the area. Field trips undertaken to the area revealed the prevalence of a wide variety of ecological conditions and hence it was thought fit to treat the entire area as a collection of closely related ecosystems rather than a single large ecosystem. Identification of various ecosystems, used here as eco-grades, was made following the multisystem approach developed by Amin (1990). His system of classification is based on the prevalent land use pattern and also takes into account the degree of biotic interference, the soil erosion as well as
forest cover. Thus employing the above method of ecosystem classification the entire study area was classified into eight eco-grades.

The first and second eco-grades are characterised by thick forest cover with least biotic interference and negligible soil erosion. As the eco-grade number rises from 1 to 8 the forest cover decreases and other parameters such as biotic pressure and soil erosion increase. In areas where agriculture was practised for a long time and the terrain was plain or undulating the areas were given eco-grade number 8. An attempt was also made to understand the floristic composition of each of the eight eco-grades and to study the food pyramid of undisturbed and distributed ecosystem grades.

The present investigation did help to get a clear picture of vegetation, floristic composition and the status of ecosystems of the Shoolpaneshwar Wildlife Sanctuary. It has been observed that few ecosystems located especially in the peripheral areas are in a highly degraded state. The operation of heavy biotic pressures (human and cattle) and the consequent loss of vegetation as well as soil erosion have been found mainly responsible for degradation of ecosystems. Taking into consideration the requirement of resident population, destruction of good forests, wildlife, availability of perennial waterholes etc., a few suggestions are made for the
management of the Sanctuary. Creation of central core area with good forests housing most of the remnants of Wildlife, reduction of the biotic pressures, adoption of efficient soil and moisture conservation measures are some of the suggestions made for the better management of the Shoolpaneshwar Wildlife Sanctuary. If the Sanctuary is protected properly it can form a very good natural habitat for a large number of plants and animals.