INTRODUCTION

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THE NARMADA is the largest west flowing river of India. It arises in the Amarkantak hills of Vindhyachal Mountains in Madhya Pradesh. It is the fifth largest river of India. It finally submerges with Gulf of Cambay near town Dahej in the Bharuch District of Gujarat State. During this course of travel from origin to submersion it covers about 1320 km and passes through three states viz., Madhya Pradesh, Maharashtra and Gujarat. The river basin in Gujarat is from Shulpaneshwar of District Narmada to Dahej (Fig.1A & 1B). Nearly 160 km river span with two distinct zones of fresh water and estuary is distributed in districts Narmada and Bharuch of the Gujarat state. From its confluence point eastward, due to tidal influence a vast saline intrusion zone is created, nearly of 30 km range upstream (Wallingford 1993). Several small rivers like Amravati, Bhadar, Dhamni, Bhukhi, Kaveri, Nand and Manikaran nadi pours its water in the main channel of river Narmada. Narmada mythologically holds an important position; the river was known as 'Rewa' in purans and considered as pure and holy as River Ganga. On its bank, on either side several temples mainly Shivalaya has been built. From time immemorial the Narmada and its valley has been the cradle of human civilizations.

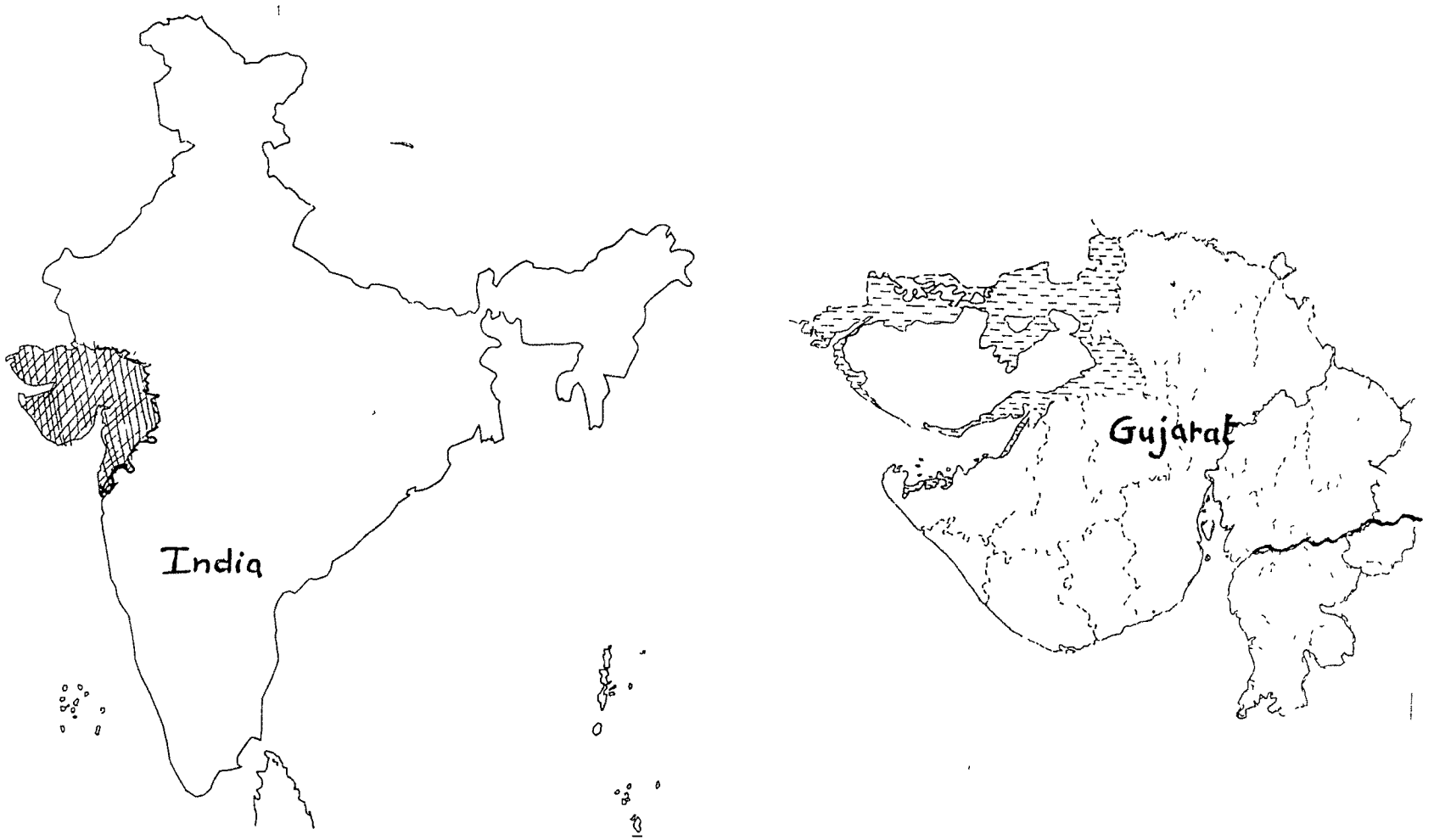

Fig. 1a

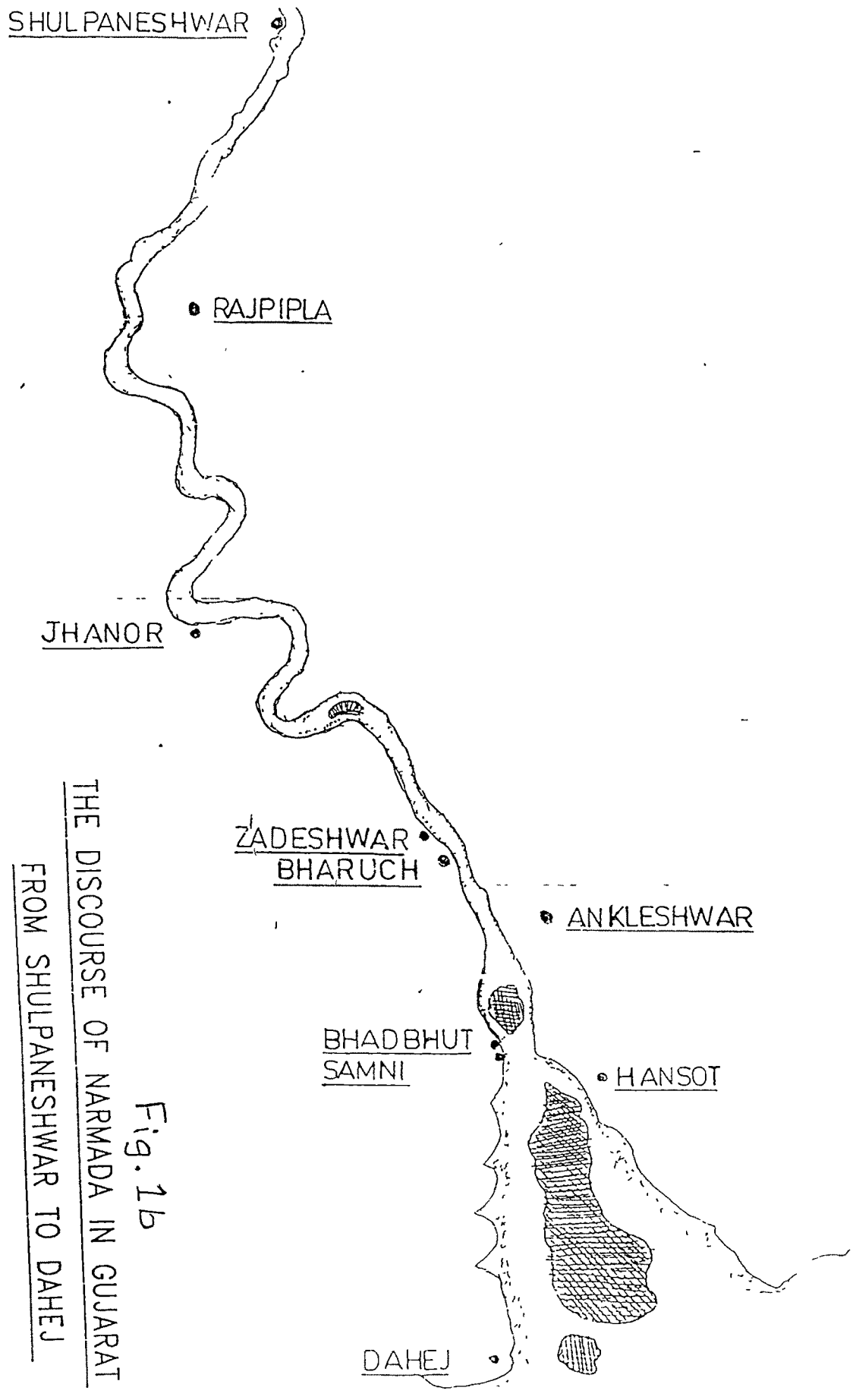

Fig. 1b

THE DISCOURSE OF NARMADA IN GUJARAT

FROM SHULPANESHWAR TO DAHEJ

Spiritually river Narmada is given highest status above all other holy rivers and it is said that,

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गंगा स्नाने यमुना पाने नर्मदा दर्सनात्

महापातक नासनम् ।।

सबिन्दु सिन्धु सुस्लत्तरंगभंग रंजिते द्विषत्सु

पापजातकारिवारिसंयुतम् ।

कृतान्तदूतकालभूतभीतिहारिवर्मदे

त्वदीयपादपंकजं नमामि देवी नर्मदे ।।

Bharuch is the largest town located on the north bank of the river nearly 30 km from Dahej. The city is at the apex point of freshwater and saline water confluence zone. Due to the continuous availability of good quality and quantity of water from river Narmada and its tributaries several anthropogenic activities have developed in last few decades. On either side of the river very good development of agriculture activity is observed with main crops like cotton, sugarcane, banana etc.

In Industrial patch a part of 'Golden Corridor' has developed along the southern bank of river Narmada. This Ankleshwar and Jhagadia Industrial zones uses the water of the river and pours

waster water in the tributaries of main river, allowing it to drain to main river, near its confluence zone with gulf of Cambay opposite Samni village near Bhadbhut. On the north bank of the river NTPC – Jhanor, GNFC – Bharuch and GIDC-Vagra are the main industrial establishment also utilizes the river water for its needs. The water of river Narmada is used mainly for humans needs, agriculture and industrial needs may be leading to pollution.

The environmental pollution includes pollution of air, water and land mainly caused by improper discharge of untreated waste. Municipal waste constitutes sewage, solid waste, and kitchen waste and agriculture run-off. Sewage which is 99.9% liquid and 0.1% solid, affects the river by any of the three ways mentioned here. First it adds bacteria, which are causative agents of diseases like cholera, dysentery etc. Secondly it may add toxic residue and thirdly sewage contributes organic matter which stimulates growth of organisms. Such pollution may exhaust the oxygen content and eventually degenerate the river. Sewage do contribute to enhance nutrients like nitrogen and phosphorous leading to eutrophication and death of planktonic forms. Inorganic waste instead creating pollution hazards increases turbidity and colour. This condition exercises restrictive effect on

the plankton and is detrimental to the photo synthetic activity and spawning of fish. Metals in traces are reported to have Antagonistic as well as synergistic effects, depending on the hardness and pH of water and on the metabolic activities of the aquatic life.

The riverine ecology accommodates several variety of biota. Principally submerged plants and benthic organisms on one side, while free floating planktonic forms i.e. phytoplankton and zooplankton on the other side. The column of water is invaded by nekton like prawns and fishes.

The fishery contribution in Inland fisheries of Gujarat is mainly from village ponds or reservoirs. However, some good quantity and quality of fishable material is contributed by few rivers like Banas, Sabarmati, Mahi, Narmada and Tapi. Narmada amongst all other rivers contributes largest. This river environmentally has remained an attractive component in fishery sector as several anatropous fishes come to this river bed for either food or reproduction. Tolunisa illisa commonly known as Palva, is the species known for its anadromus migration and has established itself in river Narmada.

Aim:

Due to features like stratification of salinity intrusion, industrial and urban waste flow to the river, possible agriculture run off and finally the possible impact of Sardar Sarovar Project in altering water flow dynamics of fresh water inflow reduction and changes in water due to which the silting up of the estuary and narrowing of major channel takes place (Willingford, 1988). So it was felt to analyze water quality of the river and its possible relation to aquatic organisms living in and on it. Such an aim to understand water quality oat iarge, its seasonal variability, site variation and impact on aquatic organisms, this project has been planned.

The main aim of the work is to select some sites on the bank of the river near Bharuch and study the water quality of these selected sites to know the actual status of the river water and its possible effects on human beings, animals as well as flora of river. The river Narmada has influence of different factors which may have adverse effect on the water quality of river. One of these may be the sewage discharge from the Bharuch city carrying a load of certain chemicals, released due to washing and bathing activities of the inhabitant residing on the bank of the river. The other may the Industrial development on or around

the river bank. The Ankleshwar and Panoli industrial state one of the largest industrial estate in Asia and other Industrial near its bank has great influence of river water of Narmada. The effluents discharged by various chemical, pharmaceutical, dyeing, steel, pesticide, textile units; power plants etc. are carried to the river through various ravines of khadis e. g. Amlakhadi, Bhukhikhadi etc. (Ankleshwar-Panoli-Bharuch Industrial Directory 2003-04)

Even during rainy season the agriculture run off from the agriculture field on bank of the river drain to the main stream influences the quality parameters of water of the river. These factors may play an important role in the degradation of water quality of the river making it unusable as portable water as well as harmful for domestic and other animals in or around the river. It may also cause certain physiological or extraneous problem. Ephemeral ponds can be the breeding ground for different type of pathogen like protozoan, helminthes, Bacteria and may even provide an ideal environment to the larvae of mosquitoes. The tidal influence may provide a good scope to them to enter the river water flow.

Due to the development of the Sardar Sarovar Project (Navagam Dam), the freshwater flow dynamics will change in

the major river. Due to the inflow reduction of freshwater, sitting up of the estuary and narrowing of Major channel may not only influence water quality parameters but also influence the trophic level biodiversity of the major channel river. Due to features like present day salinity stratification, Industrial and Urban development on either side of the river Narmada as well as the possible effect of the Sardar Sarovar Project and water need cum utilization it is felt to analyze riverine ecology with general environmental approach.

Objectives:

To achieve the aim of the project planned, following objectives were fore set,

1) Selection of suitable sites.

2) Multidirectional understanding of site

3) Water quality analysis

4) Survey of Organism diversity

5) Impact analysis for water quality and organisms

6) Fishery component analysis.