INTRODUCTION:

Water is the resource that covers almost three-quarters of the planet, and upon which all life depends. Throughout the history of the natural world, water sources have been the centres of life, providing habitat and sustenance for animals and plants alike. The rivers are the important sources of surface water and boon of nature to the human beings. They are the inseparable component of ecology on the earth. A river, with its tributaries, is a system that sustains fish and the other aquatic life. It does one way transport of a significant load of dissolved matter and particulate material from different sources (Shrestha and Kazama, 2007) in the direction of its flow. Rivers play a major role in assimilation or transportation of the municipal and industrial wastewater discharge of a constant as well as occasional or seasonal polluting source. The surface runoff is a seasonal phenomenon which is largely affected by climate within the river basin (Singh et al., 2004). Water pollutants come from point and non-point sources. Their effects on aquatic systems largely depend on whether polluted waters are standing (lakes and ponds) or flowing (rivers). Standing systems are generally more susceptible because of slow turnover (Bardhan, 1993). The major water pollutants are organic nutrients, inorganic nutrients, infectious agents, toxic organics, toxic inorganics, sediment and heat. Organic nutrients come from feedlots, municipal sewage treatment plants, and industry. They promote growth of natural populations of aquatic bacteria. Bacterial decomposition of organic materials results in declines in dissolved oxygen, with dire effects on other oxygen-requiring organisms. Bacterial decay of plants in the fall result in a drop in dissolved oxygen, which may suffocate fish and other organisms. Water may contain pathogenic bacteria, viruses, protozoans, parasites (infectious agents). Untreated or improperly treated sewage, animal wastes, meat-packing wastes, and some wild species are the major sources. Waterborne infectious diseases present a special problem in developing nations with poorly developed sewage treatment facilities. (Cropper and Oates 1992)

Toxic organic pollutants include a large number of chemicals, such as pesticides and PCBs, many of which are non biodegradable or slowly degraded, biologically magnified and carcinogenic. Toxic inorganic pollutants include a wide range of chemicals, such as metals and salts, from a wide array of sources. Mercury is a particularly troublesome pollutant because it is converted into methyl and dimethyl mercury in an aquatic ecosystem by aerobic bacteria. These forms are more toxic than inorganic mercury. Methyl mercury is biologically magnified in the food chain. Eventually, humans are affected by this process as well. People can get diseases such as hepatitis by eating seafood that has been poisoned. Ecosystems can be severely changed or destroyed by water pollution. Many areas all over the world are now being affected by careless human pollution, and this pollution is coming back to hurt humans. Rapid urbanization,
industrialization and population growth have been the major causes of stress on the environment leading to problems like human health problems, eutrophication and fish death, coral reef destruction, biodiversity loss, ozone layer depletion and climatic changes (Sadiq, 2002 and Bay et al., 2003). The suspended and precipitated (non-floating) substances and organic substances in waters are capable of adhering pollutant particles (adsorption). The sediments, both suspended and precipitated substances stored on the water bottom, form a reservoir for many pollutants and trace substances of low solubility and low degree of degradability (Barbour et al., 1998).

The metals category contains a broad collection of elements, typically those in groups 4, 5 and 6 of the Periodic Table. The common characteristic of these elements is their tendency to accumulate in plant – soil system and not to readily migrate from the upper soil zone (Overcash and Pal, 1979). Heavy metals can be absorbed from the soil by plants affecting living organisms (Duffy et al., 2009) and entering the food chain. The Lead (Pb) and Cadmium (Cd) are not essential microelements and their presence in the environment in concentrations that exceed the normal values may seriously affect living organisms and human health. Pb and Cd in soil represent a major environmental and human health concern due to their high toxicity, low biodegradability and cumulative tendency. The Lead (Pb) and Cadmium (Cd) content in plants are influenced by their content in soil, the pH of the soil and the presence of other microelements (Akan et al., 2009).

Nandesari Industrial Estate (NIE) of Gujarat is located on the banks of the Mini river and its tributary the Mahi river 20 km north of the city of Vadodara situated at 22°E and 73°N on the globe. The first major chemical industry came to this area in 1960. The Mini and Mahi Rivers and their easy accessibility served as excellent disposal agents, and attracted other industries to the area. Currently, the NIE has 250 small-scale industries that produce organic and inorganic chemical com-pounds, pharmaceuticals, and drugs. It comprised of around 1200 small & large scale dye industries, engineering, and textile, pharmaceutical and petrochemical industries. The Mini River, located to the west of Vadodara city passes through the Nandesari Industrial area, with factories on both sides. It was used as a dumping site prior to implementation of hazardous waste laws in 1989. It is no longer legally used for accepting wastewater from industries although illegal dumping by several facilities can still be observed. Sludge and sediments in the Mini River, which floods during the monsoon season, is highly contaminated with legacy heavy metals and other waste (Misra and Murty 1995). The Mini River flows into the Mahi River, the second largest river in the state, directly upstream of the intake of water supply for the city of Baroda. (Misra, 1996).

A study shows high metal concentrations of Nickel, Lead, and Zinc at upstream river points. Also, analysis of groundwater from wells located 50–200 meters from the effluent channel
shows high levels of total solids, total dissolved solids, and chemical oxygen demand, as well as chlorides, sulphates, nitrates, and certain metals. In addition, fruits, vegetables, and cereal grains grown in the channel areas have a much higher metal content than do those grown in other areas (Sharma, 1995). There has also been rapid erosion in the quality of estuarine flora and fauna at the Gulf of Cambay. With increasing loads of pollutants in the effluent channel, uncontrolled pilferage of channel water for irrigation, and continuous disposal of untreated effluents into the Mini and Mahisagar Rivers, the underground water is undesirable for human consumption and soil unfit for human subsistence.

**SCOPE**

- The seasonal analysis of soil and water characteristics to be conducted would reflect the overall scenario of Mini river water quality which would provide the base data for some government organization like GPCB, CPCB etc. so that they can take strict measures against the industries polluting the area. The study of biodiversity will give the data regarding the pollution tolerant genera which may the possible bio indicators of pollution. The comparison of medicinal plants from control and the study area would depict the major pollutants degrading the important phytochemical components used for various Ayurvedic drug preparation.

**LIMITATIONS**

- Sometimes there is a heavy dump of pollutants during rainy season mainly discharged during night hours. Therefore the samples collected during day hours would sometimes give different results than actual.

**UTILITY**

- Prevention of pollution from nonpoint sources using the present study data
- Data on plants with authentic identification by survey of biodiversity and list of pollution tolerant genera
- Data on damage due to pollutants as reflected by the abnormal features of the plants
- Suggestions regarding the utility of selected medicinal plants for their use in drug formulation.