



# Introduction

Estuaries are one of the main reproductive ecosystems; however, they are experiencing significant ecological stress due to anthropogenic disturbances, climate change, and the introduction of invasive or non-native species, etc. The Tejan estuary has been studied as a pilot.

## The objectives of our study

- Assessing the diverse human pressures influencing estuaries at different scales (i.e. local and catchment) .
- Calculating two ecological and water quality indices.

# Methods

## Study area

This study focuses on the estuaries of the southern Caspian Sea basin, in this regard, Tejan estuary has been selected as a pilot. As can be seen, the catchment area of Tejan river(Fig.1) covers approximately 4,015.88 square kilometers, with geographical coordinates of 56°52° and 59°54°E longitude and 56°35° and 36°49°N latitude.

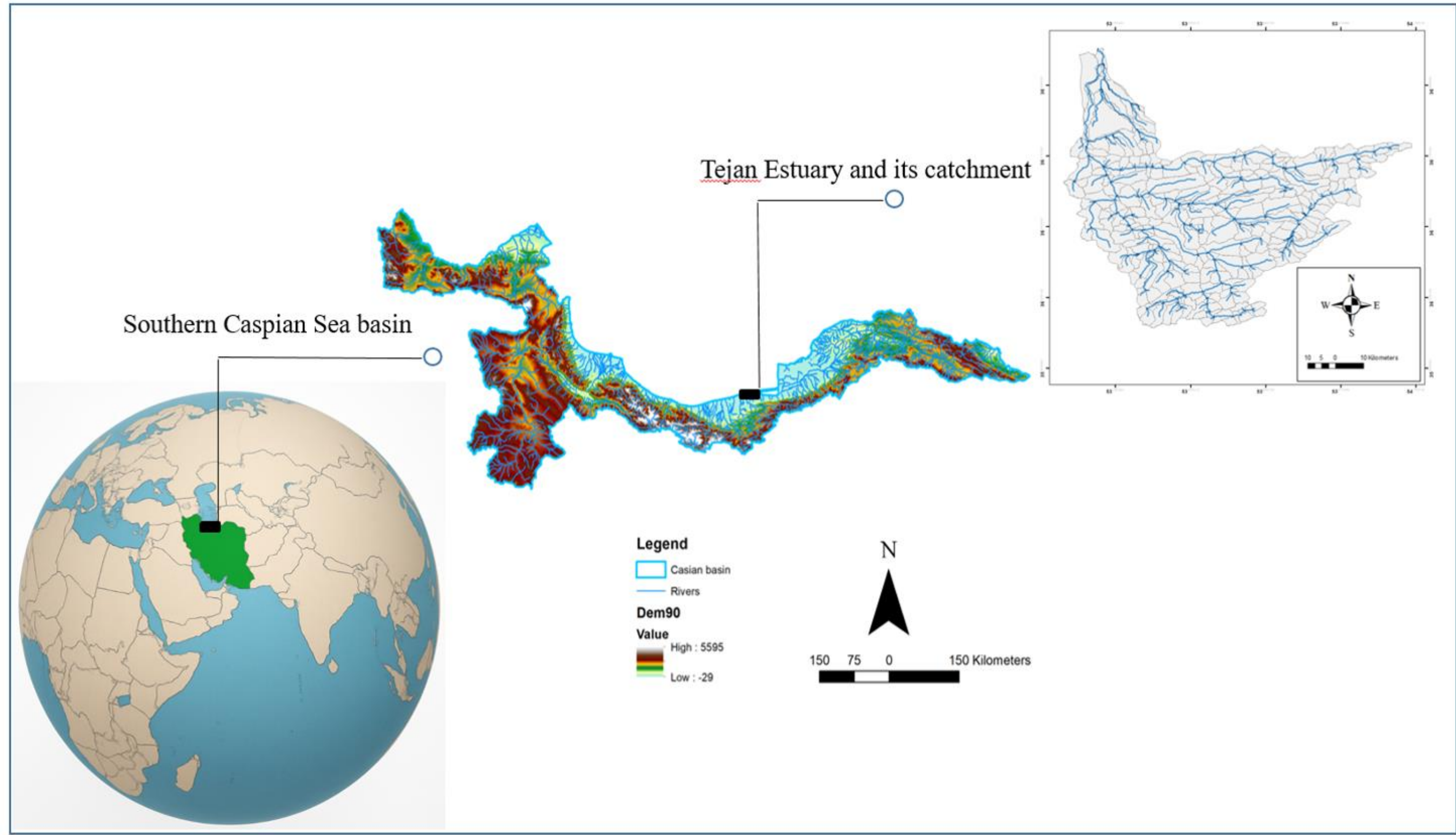


Fig.1: The study area is the southern Caspian Sea basin (Case study: Tejan river estuary) in Iran. ▲

## Applied environmental indices

- Defining, Analyzing, and Classification of Human Pressures.
- Water Quality Index(NSFWQI index (Catchment scale- 20 stations).
- Calculation of Ecological Index: Shannon and Weiner index(Estuary scale - 6 stations).

# Results

- ✓ The Tejan estuary has been influenced by multiple human pressures as illustrated in(Figs.2, 3, 4 & 5).
- ✓ NSFWQI index showed the poor water quality of the Tejan estuary at sites S<sub>1</sub>, S<sub>2</sub>, S<sub>3</sub>, S<sub>4</sub>, S<sub>5</sub>, S<sub>6</sub>, S<sub>7</sub>, S<sub>8</sub>, S<sub>9</sub>, S<sub>10</sub>, S<sub>11</sub>, S<sub>12</sub>, S<sub>13</sub>, S<sub>15</sub>, S<sub>20</sub>(Fig. 6).
- ✓ Shannon and Weiner index showed that the Tejan estuary at sites S<sub>3</sub>, S<sub>5</sub> are in bad status(Fig.7).

## Catchment scale

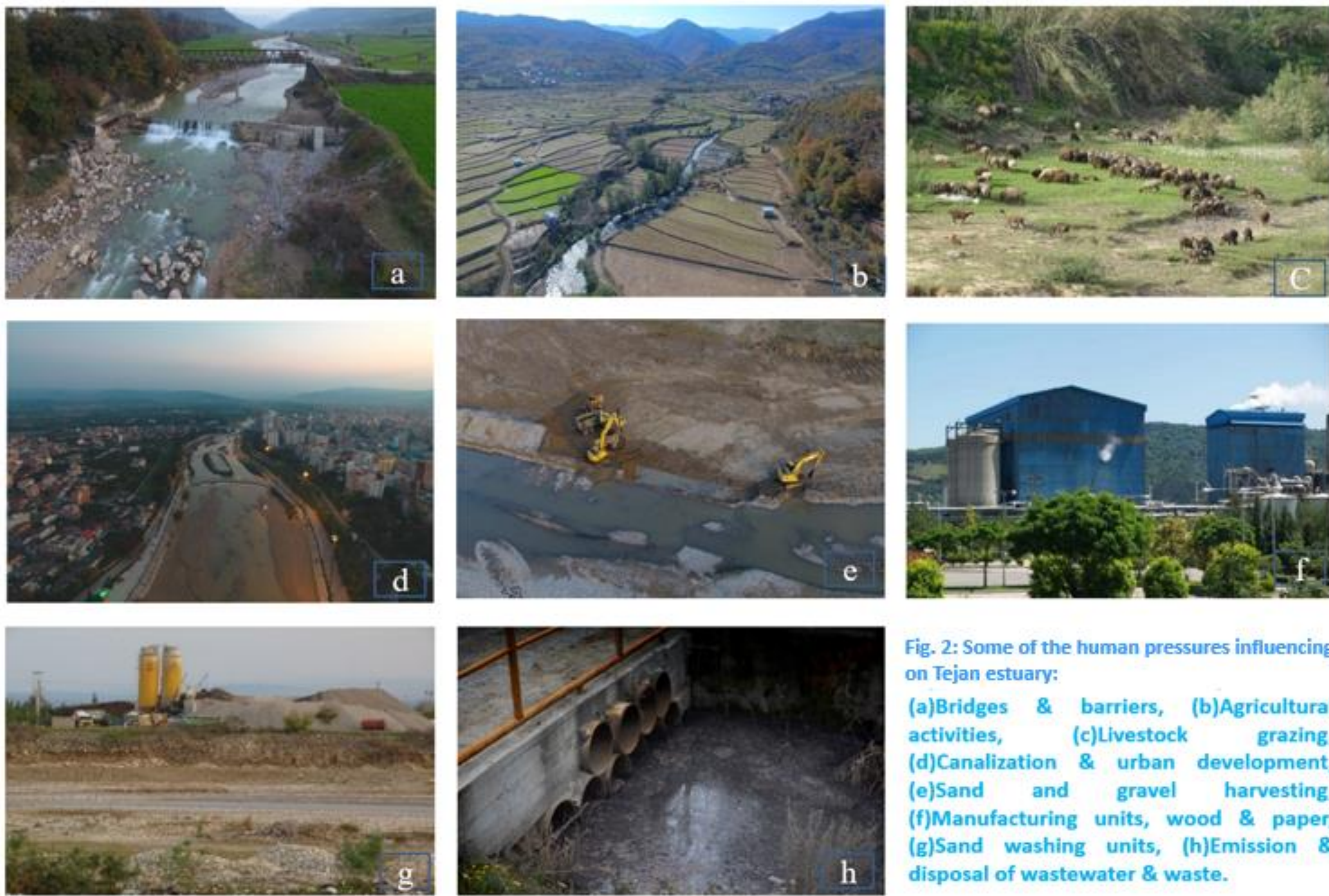


Fig. 2: Some of the human pressures influencing on Tejan estuary: (a)Bridges & barriers, (b)Agricultural activities, (c)Livestock grazing, (d)Canalization & urban development, (e)Sand and gravel harvesting, (f)Manufacturing units, wood & paper, (g)Sand washing units, (h)Emission & disposal of wastewater & waste.

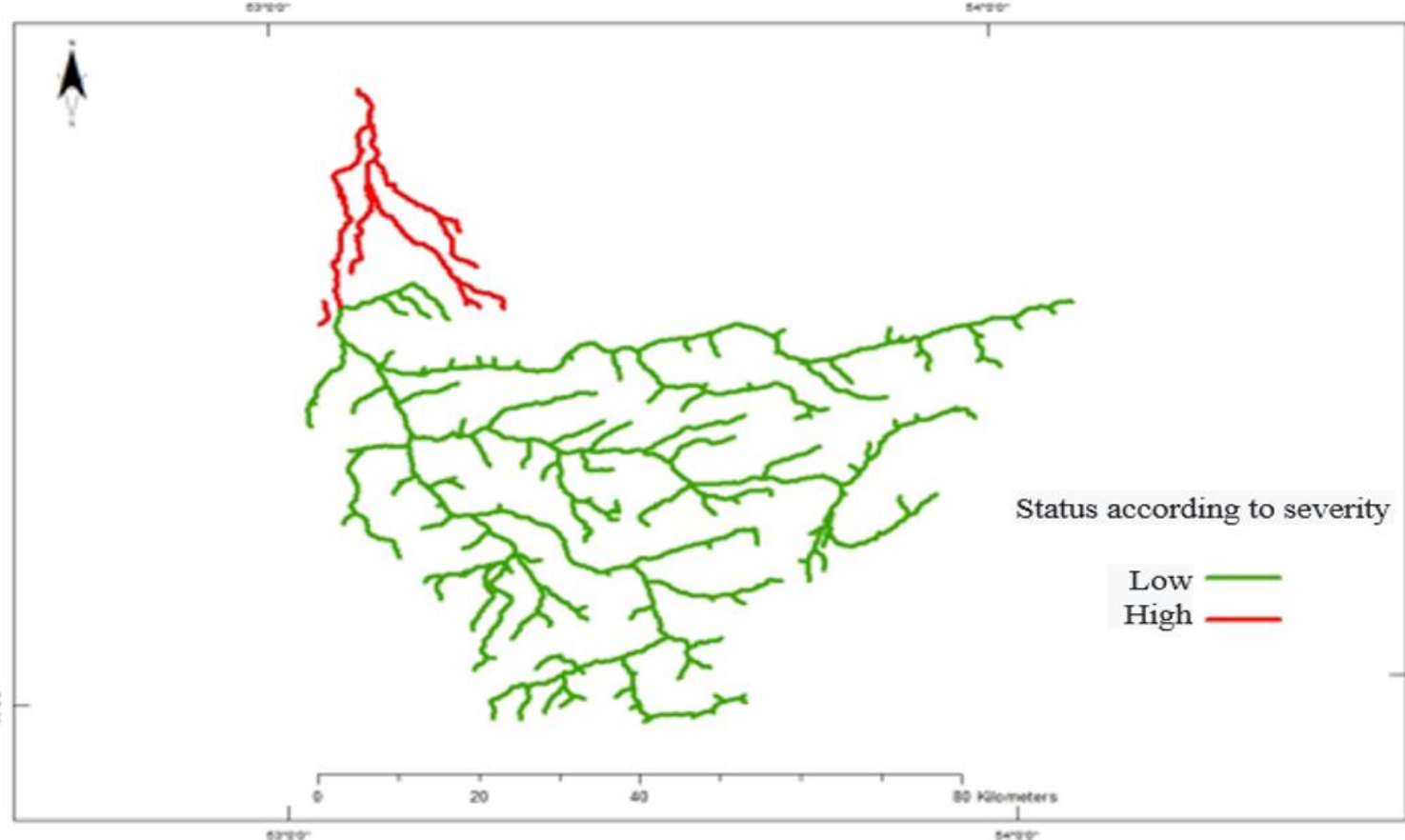


Fig.3: Pressure from agricultural activities due to the intensity. ▲

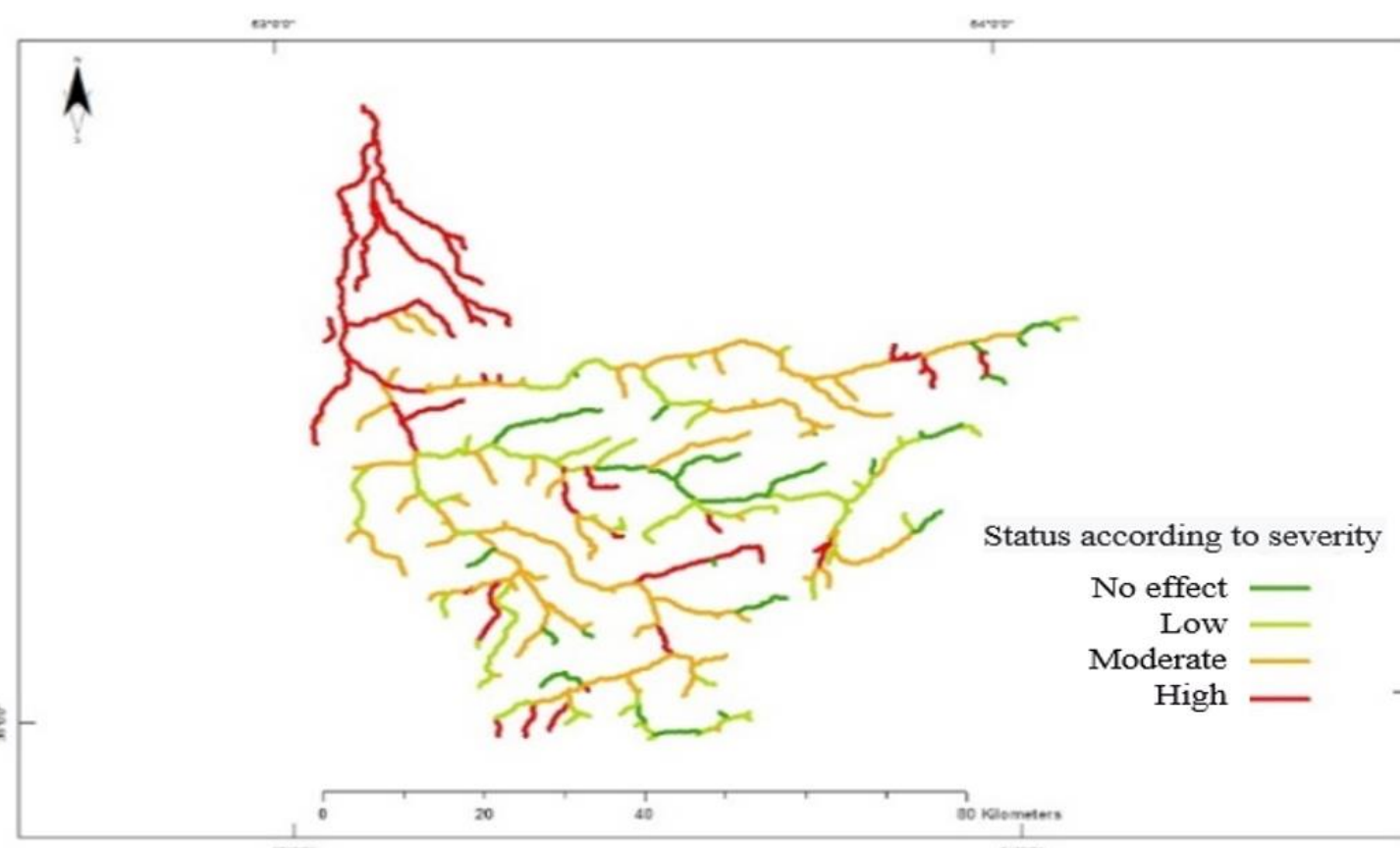


Fig.4: Pressure from urbanization by intensity. ▲

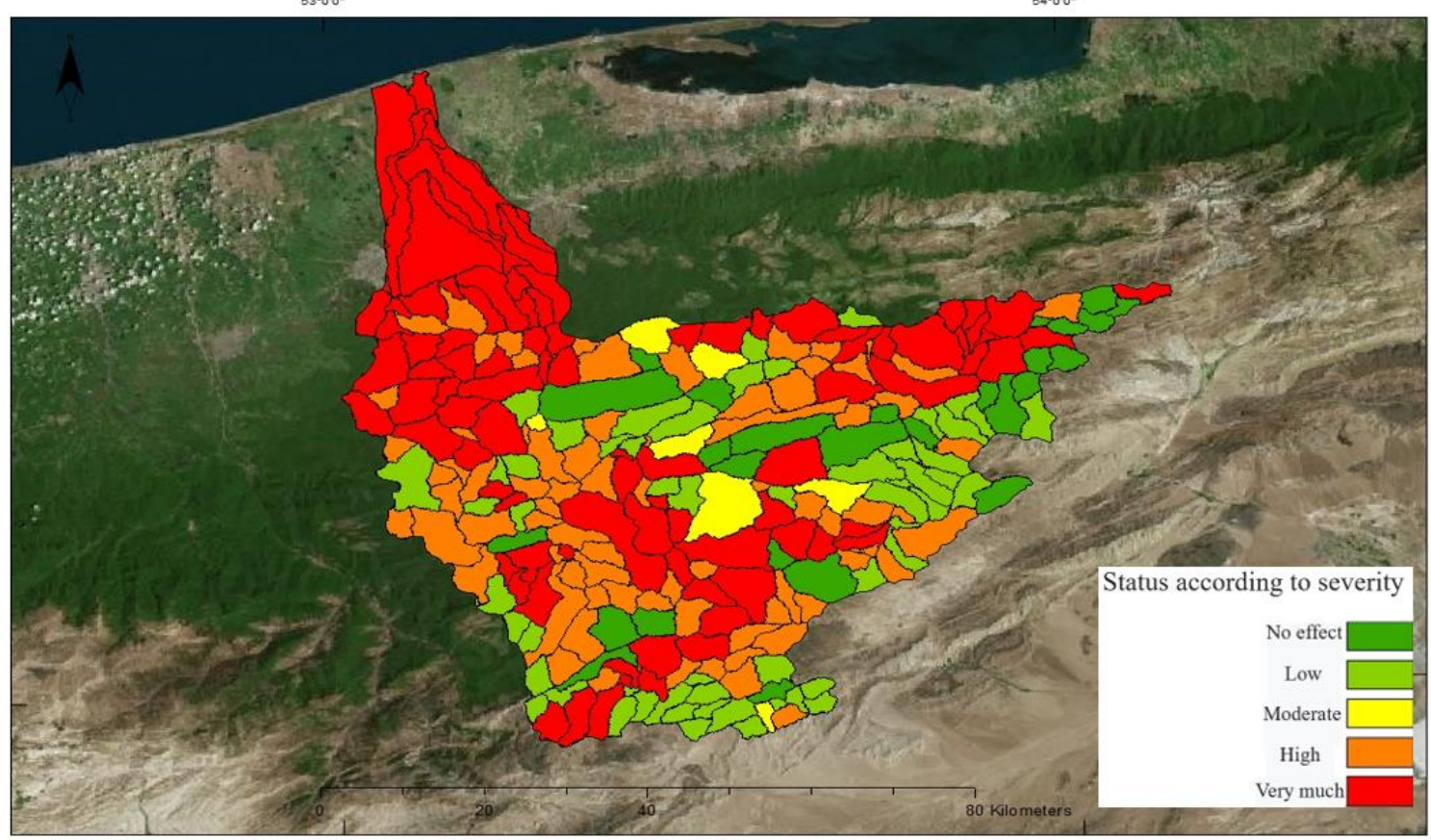


Fig.5: Cumulative pressure by intensity in the Tejan estuary catchment area. ▲

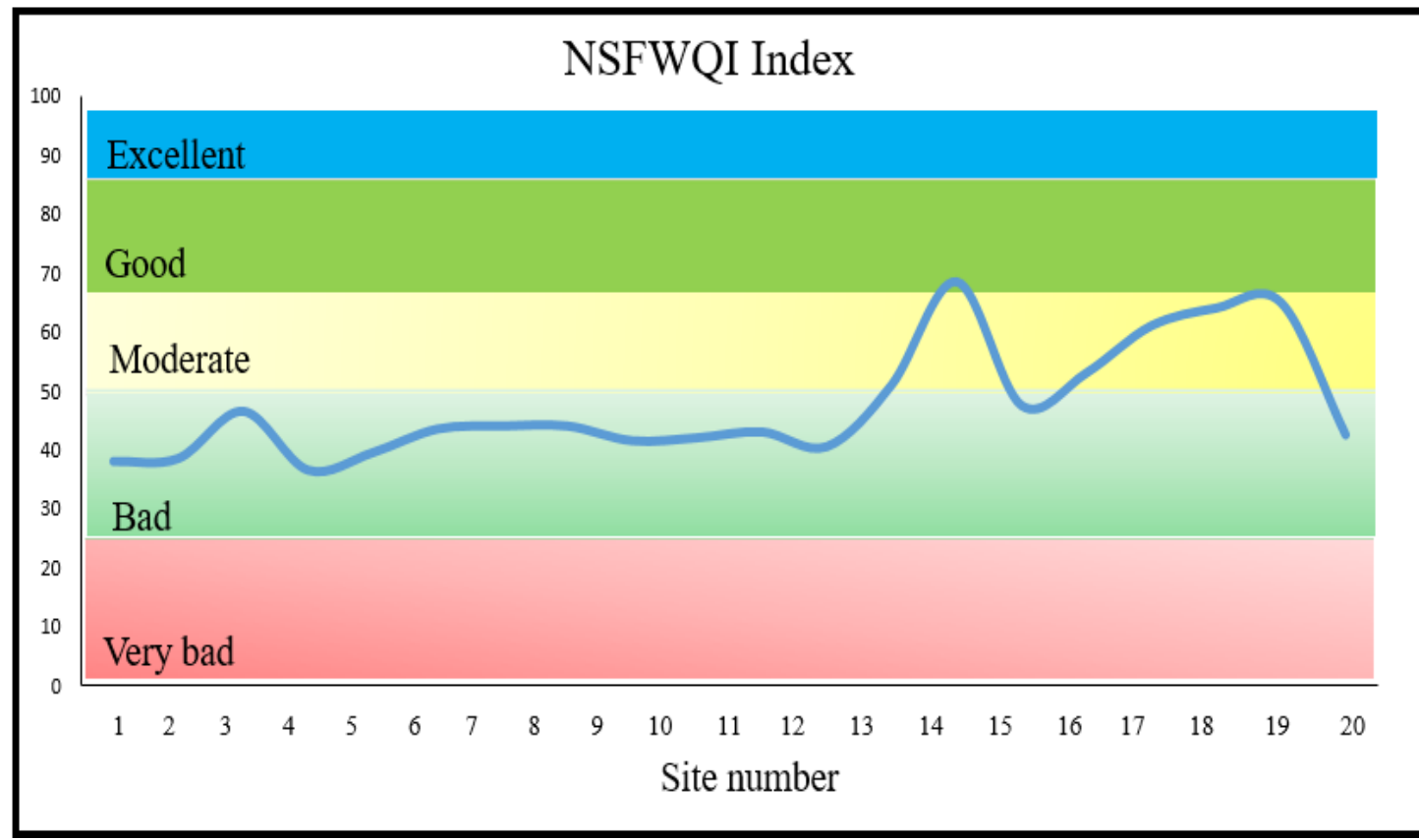


Fig.6: The results of using the NSFWQI index in 20 station of the Tejan estuary catchment. ▲

## Estuary scale

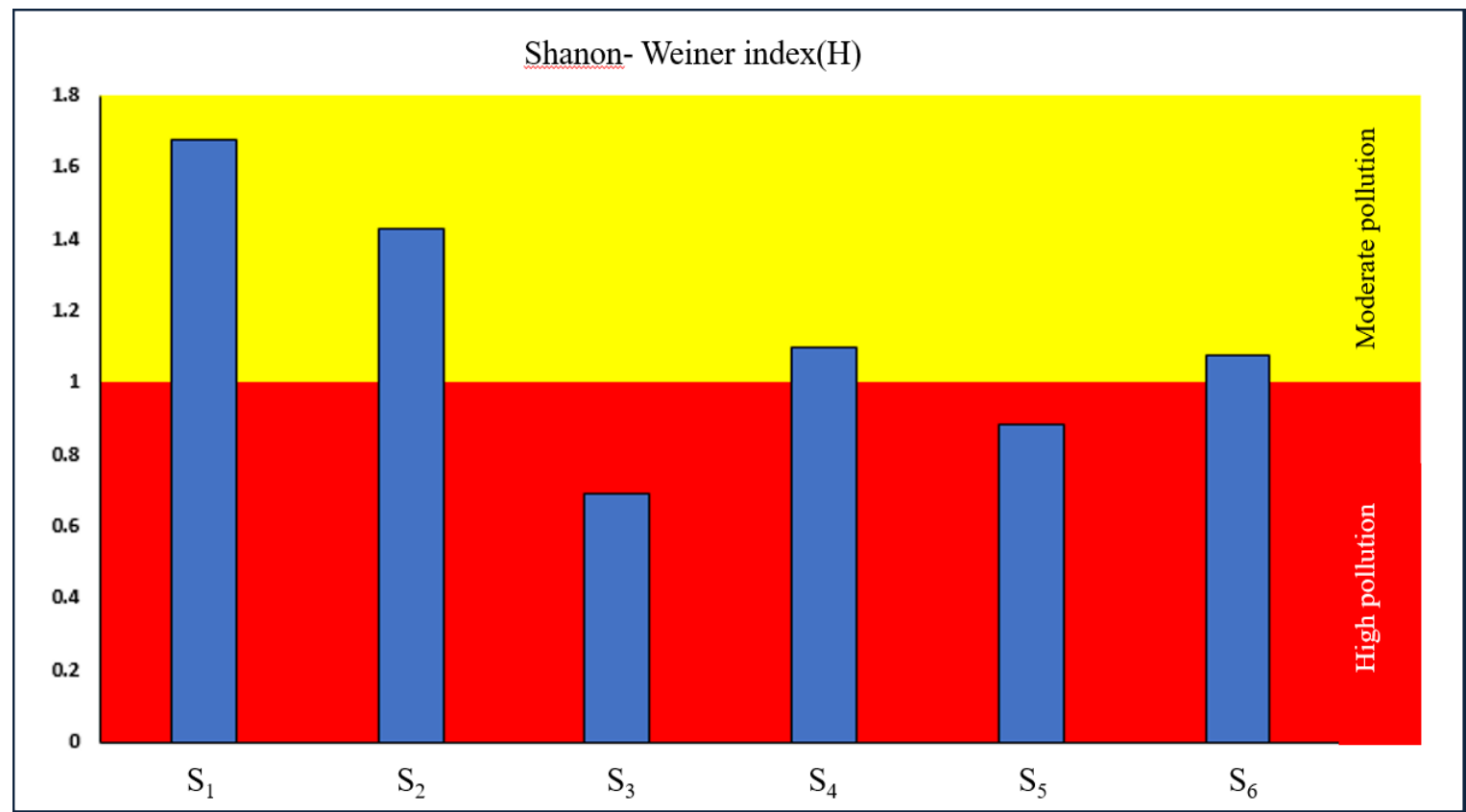


Fig.7: The results of using the Shannon and Weiner index in 6 stations of the Tejan estuary.

# Conclusion

The most sites of the main Tejan river leading to the estuary are affected by various human interventions. Our findings indicate that the quality and health of water in the middle to downstream parts of the river and Tejan estuary is unfavorable. Consequently, there is an urgent need to implement some strategic management plans aimed at mitigating aforementioned pressures and restoring the ecological integrity of the Tejan estuarine ecosystem. Such studies can be applied for other estuaries everywhere in the world as well.