

Introduction

Climate variations, continuous droughts along with mismanagement of water resources have resulted in water shortage crisis in many parts of the country. This is more noticeable especially in villages where agriculture is the main basis of economy and water.

One of the instances of this problem can be observed in villages of Esfarayen city in North Khorasan province. Alluvial aquifer in this region has been able to supply the water demands through 588 wells, 258 springs and 85 aqueducts with total discharge of 225.2 MCM annual. But this issue has encountered with serious crisis during recent years due to extension of high water demanding agriculture along with repeated droughts. One meter drop of groundwater level in one year and lower quality of water is a consequence of extraction of water in an irregular pattern without caring about its return. This situation has made it necessary to perform decision makings for management of demands in accordance with the shortages or presentation of new potentials in the region.

Esfarayen sewage treatment plant can be thought of as one of the new potentials.

Materials and Methods

study area

The town of Esfarayen is located in south of North Khorasan province with area of 5023 square kilometer. The altitude of Esfarayen is 1260 meters from sea level.

The specifications of Esfarayen WWTP are as below:

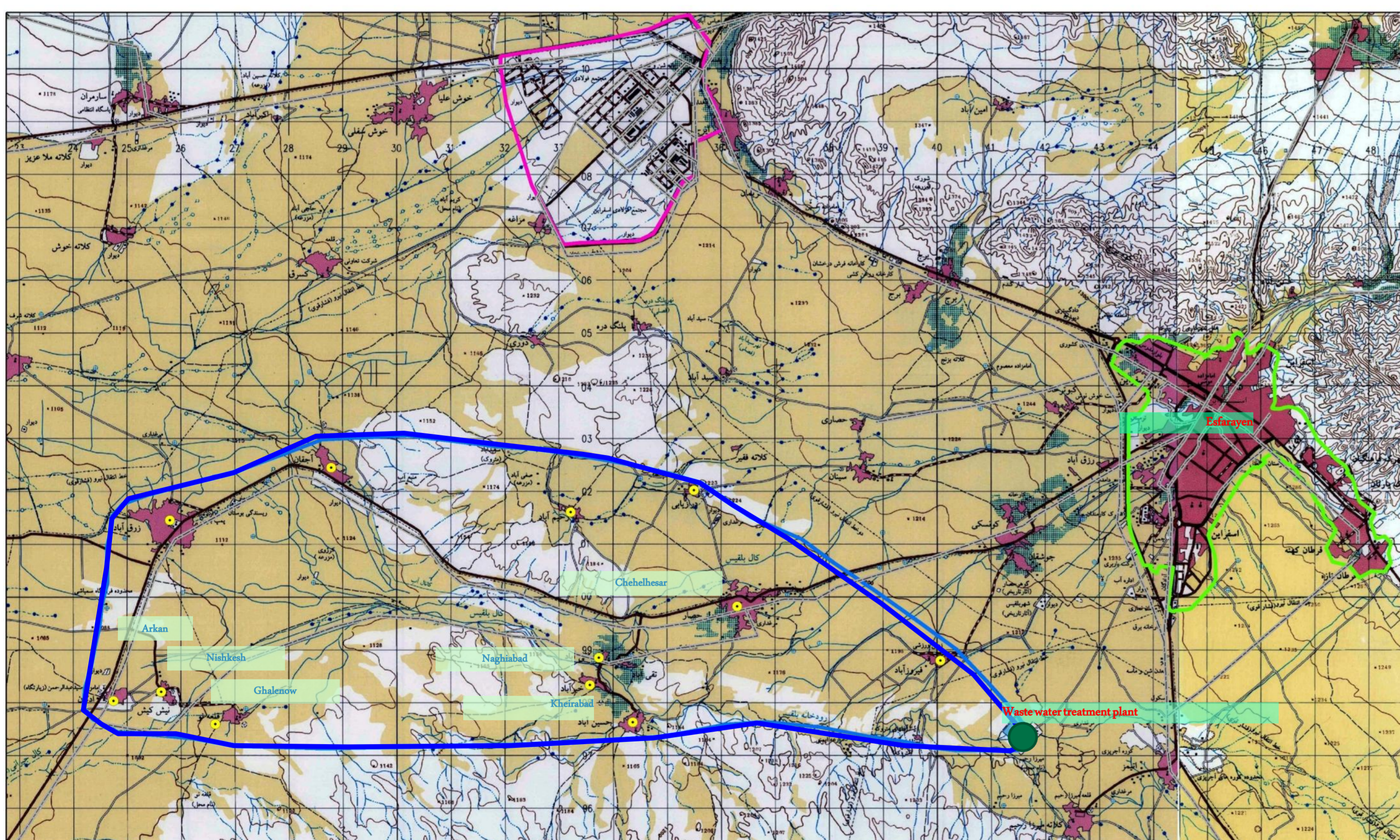
Treatment process: stabilization ponds- upgraded to partial mixed aerated lagoons.

Capacity: 16000 m³/d

BOD₅: 20 mg/lit

TSS :10-20 mg/lit

study area



study area

The main economic activity in rural points down stream of WWTP is often agriculture. In recent few years, due to aridness & reduction of rain fall, the available water of these rural points has severely reduced so the agricultural activities is going to be terminated in result. This has resulted in migration of rural population & settlement of them along cities boundaries. The social reflexes of this matter are very significant. Table (1) provides the specifications of these rural points.

(1) View villages

Name of the village	Cordinates		Population (Person)				Area of irrigated agricultural (ha)
	X	Y	1986	1996	2006	Average rate of growth in 20 years	
Arkan	37° 02'	57° 17'	265	187	123	-3.8	786
Chehel Hesar	37° 30'	57° 25'	1341	1587	1396	0.2	557
kheirabad	37° 02'	57° 22'	412	312	206	-3.4	265
ghalenow	37° 01'	57° 01'	251	265	142	-6.0	408
Nish kesh	37° 04'	57° 17'	295	245	135	-6.1	14
Naghi abad	37° 01'	27° 01'	337	342	285	-1.8	314

In order to prevent migration of rural population, it is planned to reuse Isfarayen WWTP's effluent for agricultural needs of downstream villages during a 25 year period. In this plan effluent is allocated according to table (2) & suitable plants are selected & irrigated regarding the quality of effluent according to table (3).

(2) Waste wter Allocation

ID	Waste wter Allocation (it/s)						Waste water Capacity (lit/s)	Year
	Chehel Hesar	Naghi abad	kheirabad	ghalenow	Nish kesh	Arkan		
1	-	10	10	45	15	15	95	2011
2	-	15	15	45	20	20	115	2016
3	-	20	20	45	25	25	135	2021
4	-	25	25	45	30	30	155	2026
5	5	25	25	45	35	35	170	2031
6	20	25	25	45	35	35	185	2036

(3) Cropping pattern

plant	(%)Cropping pattern
Wheat	10
Barley	70
Cotton	20
Net income of a hectare of pattern (million Rial)	4.5
gross water demand per hectare (m ³)	6298

Result

At present the plan of irrigation of agricultural lands with Esfarayen WWTP's effluent is being operated & during 5 years start up of this project, the migration of rural population has reduced & welfare level in these points has been upgraded.