Surface water overlay groundwater at the groundwater/surface water interface (GSI). Water and chemicals are continually exchanged via GSI. Surface water recharges the underlying aquifer and undergo significant changes in chemical composition before it discharges back into the stream or at the surface. Thus, a sustainable management of water resource needs an insight into the water chemistry and seasonal variations. The hydrochemical dataset representing a total of 37 groundwater samples and 13 surface water samples has been collected from Kattumannarkoil taluk, India to identify the factors governing water chemistry of the region. Hence, the samples were collected during two different seasons, summer (April 2015) and monsoon (September 2015), to broadly cover seasonal variation. The collected samples were analyzed for physical and chemical parameters. The physical parameters measured in the field are pH, electrical conductivity (EC), total dissolved solids (TDS). The chemical parameters analyzed in the laboratory are calcium (Ca$^{2+}$), magnesium (Mg$^{2+}$), sodium (Na$^+$), potassium (K$^+$), chloride (Cl$^-$), bicarbonate (HCO$_3^-$), nitrate (NO$_3^-$), phosphate (PO$_4^{3-}$), sulfate (SO$_4^{2-}$) and silica (H$_4$SiO$_4$). Furthermore, the results were processed using AquaChem software, Geographical information system (GIS), multivariate statistical techniques and a computer program WATCLAST written in C++. This hydrochemical dataset ascertain the utility purpose of water. The dataset can serve as a guide for hydrogeochemistry.
of other predominantly agricultural area that share similar geological characteristics. The raw data of this research work is hosted in the mendeley repository [1]
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Specifications Table

| Subject | Hydrogeology |
|---------|--------------|
| Specific subject area | Hydrogeochemistry |
| Type of data | Tables, Figures |
| How data were acquired | The latitude and longitude of sampling locations were located by Global Positioning System (GPS, GARMAN 76CSx). Titration methods, flame photometry and Ultra-violet visible spectrometry were used to identify the major ions; Na⁺, Ca²⁺, Mg²⁺, Cl⁻, K⁺, SO₄²⁻, PO₄, Si(OH)₄ and NO₃⁻. Statistical analyses such as correlation coefficient, factor analysis and factor scores were applied for understanding the dataset attained in the study area. The results were further processed through geographic information system (GIS), Statistical Package of Social Studies (SPSS) version 15.0 and AquaChem software’s. To find out hydrochemical facies by the use of, e.g., the Piper plot or Gibbs diagram to unravel the leading process overriding the groundwater chemistry AquaChem 4.0 software were applied. The physico-chemical results were further processed via WATCLAST. |
| Data format | Raw Analyzed |
| Parameters for data collection | All samples were picked up and stored in clean polyethylene bottles as per sampling procedures. Samples were filtered with 0.45μm filter paper and kept at 4°C in plastic bottles (1000 ml) and conserved for later chemical analyses. |
| Description of data collection | The digital apparatuses were utilized to record pH, total dissolved solids and conductivity immediately after sampling onsite. The concentrations of ions such as Ca²⁺, Mg²⁺, Na⁺ and K⁺ were determined by Titrimetry and Flame photometry respectively. Concentrations of major anions (Cl⁻, HCO₃⁻, SO₄²⁻, PO₄ and H₂SiO₄⁻) were determined by Titrimetry and UV/visible spectrophotometer respectively. Sodium absorption ratio (SAR), sodium percentage (Na%), residual sodium carbonate (RSC) were used to evaluate the suitability of water for irrigation purposes. |
| Data source location | Annamalai University Annamalainagar,Chidambaram, Tamilnadu India |
| Latitude and longitude (and GPS coordinates) for collected samples/data: | The study area is located within southeast of India between 11°30’ to 11°10’ North latitude and 79°20’ to 79°40’ East longitude(Table 1) |
| Data accessibility | The data is attached with this submission and can also be downloaded via https://data.mendeley.com/datasets/td9z466xjv/1 |
| Related research article | Remy Rumuri & Manivannan R. (2020): Identifying major factors controlling groundwater chemistry in predominantly agricultural area of Kattumannarkoil taluk, India, using the hydrochemical processes and GIS, Geology, Ecology, and Landscapes.https://doi.org/10.1080/24749508.2020.1726560 |

Value of the data

• The dataset are useful in conducting hydrogeochemical studies of groundwater and surface water. In this case, we have investigated major factors controlling groundwater chemistry in largely agricultural area.
• The dataset could be used for the detection and estimation of trends in water quality.
• The dataset would used by agro-industrial practitioner as guideline to define suitable management practice and to sustain existing soil productivity in irrigated land with high crop yield.

1. Data description

The dataset make up: (a) water chemistry, (b) water classification, (c) geochemical plots and (d) factor analysis data. The datasets (a) and (b) are used to assess water suitability for drinking and irrigation purpose, whereas datasets (c) and (d) are used to determine potential factors controlling groundwater chemistry [2].

Fig. 1 shows the sampling location area, which is located in the eastern part of the Southern Region, India between north latitudes 11°30’ and 11°10’ and east longitudes 79°20’ and 79°40’. The study covers a geographical area of 449.61 km². Fig. 2 illustrates the evolution of groundwater and surface water chemistry.

The stations and their location are listed in Table 1. The full details of the data can be accessed through [1]. The maximum, minimum and average values of physic-chemical compositions of groundwater and surface water for summer and monsoon season are given in Table 2. Table 3 presents the order of dominance of anions and cations during different seasons. The summary of the geochemical classification by WATCLAST computer program for summer and monsoon season are presented in Table 4. Lastly, the factor representations and total variability for groundwater and surface water during summer and monsoon presented Table 5.

2. Experimental design, materials, and methods

Hydrogeochemical investigations require appropriate analysis method and some techniques to establish the chemistry of water. Sampling sites were located taking several factors into considerations like lithology, structure, geomorphology, river influence, industry, urban, agricultural
| S. No | Location Name             | Longitude    | Latitude     | Water Type      | S.No | Name                    | Longitude    | Latitude     | Water Type      |
|-------|---------------------------|--------------|--------------|-----------------|------|-------------------------|--------------|--------------|-----------------|
| 1     | Paripooranatham           | 79°32'15.2"N | 11°24.293"E | Ground water    | 26   | Venaiyur                | 79°37'18.1"N | 11°17.476"E | Ground water    |
| 2     | Kumarakudi                | 79°31'43.9"N | 11°25.145"E | Ground water    | 27   | Keezhaparuthikudi       | 79°38'60.7"N | 11°18.183"E | Ground water    |
| 3     | Kavalakudi                | 79°29'45.8"N | 11°25.029"E | Ground water    | 28   | Kumaratchi              | 79°37'85.8"N | 11°18.656"E | Ground water    |
| 4     | Kanoor                    | 79°28'05.5"N | 11°23.924"E | Ground water    | 29   | Nanthimangalam          | 79°39'08.0"N | 11°20.168"E | Ground water    |
| 5     | Venkatapuram              | 79°26'19.5"N | 11°24.163"E | Ground water    | 30   | Athhipattu              | 79°40'09.2"N | 11°19.22.2"E | Ground water    |
| 6     | Mathakalimanikkan         | 79°28'09.5"N | 11°21'44.6"E | Surface water   | 31   | Vattathur               | 79°31'05.9"N | 11°23.611"E | Ground water    |
| 7     | Gunamankalamar lake       | 79°28'30.5"N | 11°22'7.6"E | Surface water   | 32   | Solatharam              | 79°30'36.4"N | 11°22.084"E | Ground water    |
| 8     | Kattumanarkudi South      | 79°33'24.9"N | 11°16.251"E | Surface water   | 33   | Pudaiyur                | 79°31'12.6"N | 11°21.603"E | Ground water    |
| 9     | Arantanki                 | 79°30'73.7"N | 11°18.588"E | Surface water   | 34   | Mamangalam              | 79°28'90.4"N | 11°19.889"E | Ground water    |
| 10    | Eyyalore                  | 79°31'03.1"N | 11°11.238"E | Surface water   | 35   | Arantanki West          | 79°30'10.8"N | 11°18.828"E | Ground water    |
| 11    | Ramapuram                 | 79°26'29.8"N | 11°20.780"E | Ground water    | 36   | Arantanki East          | 79°30'10.8"N | 11°18.828"E | Ground water    |
| 12    | Karunakaranallure         | 79°30'67.7"N | 11°17.633"E | Ground water    | 37   | Thirunaraiyur           | 79°36'15.0"N | 11°17.672"E | Ground water    |
| 13    | Themmur                   | 79°37'04.5"N | 11°20.301"E | Ground water    | 38   | Mathakalimanikann       | 79°28'09.5"N | 11°21.44.6"E | Surface water   |
| 14    | VadamurEast               | 79°35'66.8"N | 11°20.388"E | Ground water    | 39   | Gunamankalamar lake     | 79°28'30.5"N | 11°22.78"E  | Surface water   |
| 15    | Vadamur                   | 79°35'04.3"N | 11°18.083"E | Ground water    | 40   | Kattumanarkudi South    | 79°33'24.9"N | 11°16.251"E | Surface water   |
| 16    | Elleri                    | 79°33'42.2"N | 11°20.078"E | Ground water    | 41   | Arantanki               | 79°30'73.7"N | 11°18.588"E | Ground water    |
| 17    | Rayanallure               | 79°32'69.9"N | 11°21.056"E | Ground water    | 42   | Eyyalore                | 79°31'03.1"N | 11°11.238"E | Surface water   |
| 18    | Lalpetai                  | 79°33'49.8"N | 11°17.772"E | Ground water    | 43   | Mutam                   | 79°34'69.3"N | 11°13.102"E | Surface water   |
| 19    | Nattarmangalam           | 79°31'98.9"N | 11°16.534"E | Ground water    | 44   | Omampuliyur             | 79°33'39.6"N | 11°12.25.2"E | Surface water   |
| 20    | Kandamangalam            | 79°31'64.2"N | 11°15.167"E | Ground water    | 45   | Sethaiyehope            | 79°32'2.4"N  | 11°25.48"E  | Surface water   |
| 21    | Kattumanarkudi           | 79°33'24.9"N | 11°16.251"E | Ground water    | 46   | Kudalaiyattur           | 79°29'34.0"N | 11°21.36.7"E | Surface water   |
| 22    | Eyyalur                  | 79°31'18.9"N | 11°11.747"E | Ground water    | 47   | Muttukrishnapuram       | 79°20'16.8"N | 11°27.36"E  | Surface water   |
| 23    | Omanpuliyur              | 79°33'23.7"N | 11°12.708"E | Ground water    | 48   | Kundakumar             | 79°32'69.9"N | 11°21.056"E | Surface water   |
| 24    | Moovur                   | 79°33'44.1"N | 11°13.676"E | Ground water    | 49   | PalayamKottai          | 79°28'28.4"N | 11°21.33.9"E | Surface water   |
| 25    | Puliyankudi              | 79°36.485°N  | 11°16.120°E | Ground water    | 50   | Mathakalimanikann       | 79°28'35.5°N | 11°40.53.2°E | Surface water   |
**Table 2**
Maximum, Minimum and average values in mg/l\(^{-1}\) for summer and monsoon season except pH, EC (\(^*\)=Groundwater,\(^b\)=Surface water).

| Physico-chemical parameters | Summer |  | Average | BIS 2012 | WHO 2011 | Monsoon |  | Average | BIS 2012 | WHO 2011 |
|-----------------------------|--------|---|---------|----------|-----------|---------|---|---------|----------|-----------|
| pH                          | 7.0\(^b\) | 8.4 | 7.72    | 6.5–8.5  | 6.5–8.5   | 7.8     | 8.75 | 8.22    | 6.5–8.5  | 6.5–8.5   |
| EC                          | 366.0\(^a\) | 4240 | 1271.89 | –        | 1500      | 352     | 4300 | 1200.85 | –        | 1500      |
| TDS                         | 175\(^b\) | 1204 | 580.46  | –        | 274       | 474.33  |   |         |          |           |
| Ca                          | 32\(^a\)  | 248  | 79.22   | 75       | 14        | 32      | 160  | 66.03   | 75       | 14        |
| Mg                          | 2.4\(^b\) | 93   | 35.81   | 30       | 9.6       | 0       | 91   | 28.96   | 30       | 9.6       |
| Na                          | 10.3\(^b\) | 189  | 72.81   | 200      | 11        | 32      | 556  | 167.33  | 200      | 11        |
| K                           | 0.6\(^b\) | 74   | 17.94   | –        | 0.2       | 3       | 78   | 25.46   | –        | 0.2       |
| Cl                          | 53.2\(^a\) | 1058.5 | 293.36 | 200      | 250       | 88.63  | 1276.2 | 292.21  | 200      | 250       |
| HCO3                        | 73.2\(^b\) | 301.3 | 171.8   |          |           | 70.9   | 248.15 | 147.71  |          |           |
| NO3                         | 34.0\(^b\) | 125.2 | 85.9    | 45       | 45        | 40.91  | 113.95 | 61.46   | 45       | 45        |
| PO4                         | 0.03\(^b\) | 0.7  | 0.13    | –        | –         | –0.17  | 1.84  | 0.02    | –        | –         |
| SO4                         | 0.12\(^b\) | 3.9  | 0.81    | 200      | 250       | 0.19   | 9.03  | 1.3     | 200      | 250       |
| H4SiO4                      | 6.0\(^b\)  | 158  | 100.38  | –        | –         | 40     | 250   | 140.95  | –        | –         |
|                             | 18.0\(^b\) | 80   | 40.46   |          |           | 20     | 40    | 26.67   |          |           |

BIS, Bureau of Indian Standard; WHO, World Health Organization.

**Table 3**
The order of dominance of anions and cations in different seasons.

| Seasons | Water types | Groundwater | Surface water |
|---------|-------------|-------------|--------------|
|         | Summer      | Monsoon     | Summer       | Monsoon     |
| Anions  | Cl\(^-\) > HCO3\(^-\) > H2SiO4\(^-\) > NO3\(^-\) | HCO3\(^-\) > Cl\(^-\) > HCO3\(^-\) > H2SiO4\(^-\) | NO3\(^-\) > Cl\(^-\) > HCO3\(^-\) > Cl\(^-\) > H2SiO4\(^-\) | HCO3\(^-\) > NO3\(^-\) > Cl\(^-\) > H2SiO4\(^-\) |
| Cations | Ca\(^2+\) > Na\(^+\) > Mg\(^2+\) > K\(^+\) | Na\(^+\) > Ca\(^2+\) > Mg\(^2+\) > K\(^+\) | Na\(^+\) > Ca\(^2+\) > Mg\(^2+\) > K\(^+\) | Na\(^+\) > Ca\(^2+\) > Mg\(^2+\) > K\(^+\) |

Fig. 2. Piper plot exhibiting the chemical facies of groundwater and surface water samples for summer and monsoon.
Table 4
Summary of geochemical classification by WATCLAST program for summer and monsoon season.

| Category         | Grade | SUMMER GW | SUMMER SW | MONSOON GW | MONSOON SW | Category         | Grade | SUMMER GW | SUMMER SW | MONSOON GW | MONSOON SW | Category         | Grade | SUMMER GW | SUMMER SW | MONSOON GW | MONSOON SW |
|------------------|-------|-----------|-----------|------------|------------|------------------|-------|-----------|-----------|------------|------------|------------------|-------|-----------|-----------|------------|------------|
| Na% Wilcox (1955) | Excellent 0-20 7 2 1 0 USGS Hardness Soft <75 0 0 0 3 | TDS Classification (USSL, 1954) <200 2 0 0 3 |
|                  | Good 20-40 17 4 0 3 Slightly Hard 75-150 3 2 1 9 | 200–500 26 6 9 9 |
|                  | Permissible 40-60 13 5 24 1 Moderately Hard 150–300 15 9 24 1 | 500–1500 9 7 25 1 |
|                  | Doubtful 60-80 0 2 11 9 Very Hard >300 19 2 12 0 | 1500–3000 0 0 3 0 |
|                  | Unsuitable >80 0 0 1 0 IBE Schoeller (1965) | |
|                  | Na% Eaton (1950) Safe <60 37 11 25 4 (Na+K)rock>Ca/Mg g.w. | |
|                  | Unsuitable >60 0 2 12 9 Schoeller Classification (1967) | |
|                  | S.A.R. Richards (1954) Excellent 0-10 37 13 35 13 Type I 37 13 37 13 | Na Facies 0 0 0 0 |
|                  | Good 10-18 0 0 2 0 Type II 0 0 0 0 | Anion Facies |
|                  | Fair 18-26 0 0 0 0 Type III 0 0 0 0 | HCO3 Facies 0 0 0 0 |
|                  | Poor >26 0 0 0 0 Type IV 0 0 0 0 | HCO3-CI-SO4 0 0 0 0 |
|                  | R.S.C. Richards(1954) Good <1.25 37 13 13 13 Safe <1 35 13 15 8 | Cl- Facies 8 4 1 33 |
|                  | Medium 1.25–2.5 0 0 2 0 Chloride Classification (Stuyfzand, 1989) | Permanent Hardness (NCH) |
|                  | Bad >2.5 0 0 3 0 Extremely fresh | |
|                  | EC Wilcox (1955) Excellent >250 0 1 0 3 Very fresh 0 0 0 0 | A2 30 10 3 1 |
|                  | Good 250–750 8 11 11 10 Fresh 7 3 11 7 | A3 5 3 11 3 |
|                  | Permissible 750–2250 25 1 23 0 Fresh Brackish 19 9 17 3 | Temporary Hardness (CH) |
|                  | Doubtful 2250–5000 4 0 3 0 Brackish-salt 1 0 1 0 | |
|                  | Unsuitable >5000 0 0 0 0 Salt 0 0 0 0 | B3 0 0 7 5 |
activity and availability of wells. The hydrogeochemical characteristics of groundwater and surface water have been studied in predominantly agricultural area of Kattumannarkoil taluk, India. Sampling of groundwater and surface water has been collected during two different seasons summer (April 2015) and monsoon (September 2015) to broadly cover seasonal variation.

The data collection process involved the use of Global Positioning System (GPS, GARMAN 76CSx) to get the latitude and longitude of sampling locations. This location data along with geological survey of India topographical maps Nos.58 M/7, M/8, 11 and M/12 were further subjected to ArcGIS® 10.1 software for generating the sampling location map. The water samples were collected from 50 different locations from bore wells (37) and surface water (13) during summer and monsoon season. Each sample was collected in 500 ml acid-washed high density linear polyethylene bottle and clearly labeled. Before collecting groundwater samples, pumping water for adequate time was assured to get rid of water in bore wells storage. To remove particulate matter from samples, filtering was performed using a vacuum filtration kit and a 0.45 μm cellulose acetate filter membrane. Lastly, the water samples were sealed and sent to the university laboratory for analysis.

The major cations and anions were analyzed using standard procedures [3]. The titration methods, flame photometry and Ultra-violet visible spectrometry were used to define the major ions; Na⁺, Ca²⁺, Mg²⁺, Cl⁻, K⁺, SO₄²⁻, PO₄, Si(OH)₄ and NO₃⁻. The range of flame photometry is 1–100 ppm with an accuracy of 1 digit. And the range is 340–1000 nm with an accuracy of 2.5 nm. The physico-chemical parameters of the analytical results of groundwater and surface water were compared with standard guideline values recommended by the WHO(World Health Organization) [4] and BIS(Bureau of Indian Standard) [5]. The reliability of the results was determined by the ionic balance of groundwater and surface water samples and acceptable range of 5–10% of percentage error was observed [6].

The hydrogeochemical data were analyzed using multivariate statistical technique including principal component analysis (PCA) and factor analysis (FA). These are effective multivariate techniques of manipulating, interpreting data and identifying geochemical processes that control groundwater chemistry. Principal component analysis was used as a numerical method of discovering variables that are more important than others for representing parameter variation and identifying hydrogeochemical processes. The entire dataset was first standardized and arranged in correlation matrix with normal distribution in all variables. The eigen values calculated quan-

| Groundwater                  | SUMMER | MONSOON |
|------------------------------|--------|---------|
| Factors                      | Loadings | TDV(%) | Loadings | TDV(%) |
| Factor I                     | Ca, Mg, Na, K, Cl, PO₄, SO₄, EC and TDS | 41.96   | Na, Cl, SO₄, EC and TDS | 37.99 |
| Factor II                    | Na, HCO₃, NO₃, SO₄ | 17.54   | Ca and Mg, pH | 14.08 |
| Factor III                   | pH     | 10.44   | HCO₃, and pH | 12.62 |
| Factor IV                    | H₂SiO₄ | 10.41   | K and PO₄ | 10.32 |
| Factor V                     | NO₃    | 8.3     |            |       |

| Surface water                | SUMMER | MONSOON |
|------------------------------|--------|---------|
| Factors                      | Loadings | TDV(%) | Loadings | TDV(%) |
| Factor I                     | Na⁺, K⁺, Cl⁻, HCO₃⁻, pH, EC and TDS | 36.2    | Ca²⁺, Mg²⁺, Na⁺, Cl⁻, HCO₃⁻, SO₄²⁻, H₂SiO₄, pH and TDS | 40.71 |
| Factor II                    | Ca²⁺⁺ Mg²⁺⁺, SO₄²⁻ and pH | 23.41   | Mg²⁺, Na⁺, NO₃⁻, K⁺ and H₂SiO₄ | 34.62 |
| Factor III                   | K⁺, NO₃⁻, PO₄³⁻ and H₂SiO₄ | 22.56   | PO₄³⁻ | 13.51 |

Table 5: Factor Representations and total data variability for Groundwater and Surface water during summer and monsoon.
tify the factor contribution to the total variance. When eigen value >1 the factor contribution is significant. The factor loadings were calculated by a varimax rotation technique in such a way that they are closer to +1, 0,−1, representing positive contribution, no contribution and negative contribution [7]. The voluminous raw hydrogeochemical data analyzed is often processed manually for interpretation. To simplify the interpretation of the data, a computer program ‘WATCLAST’ written in C++ [8] was used for calculation and graphical representations. Additionally, AQUACHEM software was used to plot Trilinear diagram (Piper) [9] for identification of major factor controlling the groundwater chemistry.

Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships which have, or could be perceived to have, influenced the work reported in this article.

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Supplementary materials

Supplementary material associated with this article can be found, in the online version, at doi:10.1016/j.dib.2020.106058.

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