DataSet Bottle

DATA COLLECTION

In [1]:

```
import numpy as np
import pandas as pd
import matplotlib.pyplot as plt
import seaborn as sns
```

In [2]:

```
a=pd.read_csv(r"C:\Users\user\Downloads\9_bottle.csv")
a
```

```
C:\ProgramData\Anaconda3\lib\site-packages\IPython\core\interactiveshell.p
y:3165: DtypeWarning: Columns (47,73) have mixed types.Specify dtype optio
n on import or set low_memory=False.
  has_raised = await self.run_ast_nodes(code_ast.body, cell_name,
```

Out[2]:

	Cst_Cnt	Btl_Cnt	Sta_ID	Depth_ID	Depthm	T_degC	Salnty	O2ml_L	STheta	C
0	1	1	054.0 056.0	19-4903CR-HY-060-0930-05400560-0000A-3	0	10.500	33.4400	NaN	25.64900	
1	1	2	054.0 056.0	19-4903CR-HY-060-0930-05400560-0008A-3	8	10.460	33.4400	NaN	25.65600	
2	1	3	054.0 056.0	19-4903CR-HY-060-0930-05400560-0010A-7	10	10.460	33.4370	NaN	25.65400	
3	1	4	054.0 056.0	19-4903CR-HY-060-0930-05400560-0019A-3	19	10.450	33.4200	NaN	25.64300	
4	1	5	054.0 056.0	19-4903CR-HY-060-0930-05400560-0020A-7	20	10.450	33.4210	NaN	25.64300	
...	...	...	...	...	...	...	...	...	...	
864858	34404	864859	093.4 026.4	20-1611SR-MX-310-2239-09340264-0000A-7	0	18.744	33.4083	5.805	23.87055	1
864859	34404	864860	093.4 026.4	20-1611SR-MX-310-2239-09340264-0002A-3	2	18.744	33.4083	5.805	23.87072	1
864860	34404	864861	093.4 026.4	20-1611SR-MX-310-2239-09340264-0005A-3	5	18.692	33.4150	5.796	23.88911	1
864861	34404	864862	093.4 026.4	20-1611SR-MX-310-2239-09340264-0010A-3	10	18.161	33.4062	5.816	24.01426	1

In [3]:
```
b=a.head(1000)
b
```

	Cst_Cnt	Btl_Cnt	Sta_ID	Depth_ID	Depthm	T_degC	Salnty	O2ml_L	STheta	C
864862	34404	864863	093.4 026.4	20-1611SR-MX-310-2239-09340264-0015A-3	15	17.533	33.3880	5.774	24.15297	1

864863 rows × 74 columns

Out[3]:

	Cst_Cnt	Btl_Cnt	Sta_ID	Depth_ID	Depthm	T_degC	Salnty	O2ml_L	STheta	O2Sat
0	1	1	054.0 056.0	19-4903CR-HY-060-0930-05400560-0000A-3	0	10.50	33.440	NaN	25.649	NaN
1	1	2	054.0 056.0	19-4903CR-HY-060-0930-05400560-0008A-3	8	10.46	33.440	NaN	25.656	NaN
2	1	3	054.0 056.0	19-4903CR-HY-060-0930-05400560-0010A-7	10	10.46	33.437	NaN	25.654	NaN
3	1	4	054.0 056.0	19-4903CR-HY-060-0930-05400560-0019A-3	19	10.45	33.420	NaN	25.643	NaN
4	1	5	054.0 056.0	19-4903CR-HY-060-0930-05400560-0020A-7	20	10.45	33.421	NaN	25.643	NaN
...	...	...	...	...	...	...	...	...	...	...
995	33	996	092.0 088.0	19-4903NS-HY-061-0906-09200880-0300A-7	300	7.22	34.040	NaN	26.636	NaN
996	33	997	092.0 088.0	19-4903NS-HY-061-0906-09200880-0379A-3	379	6.58	34.040	NaN	26.724	NaN
997	33	998	092.0 088.0	19-4903NS-HY-061-0906-09200880-0400A-7	400	6.44	34.049	NaN	26.750	NaN
998	33	999	092.0 088.0	19-4903NS-HY-061-0906-09200880-0500A-7	500	5.85	34.113	NaN	26.876	NaN

	Cst_Cnt	Btl_Cnt	Sta_ID	Depth_ID	Depthm	T_degC	Salnty	O2ml_L	STheta	O2Sat
999	33	1000	092.0 088.0	19-4903NS-HY-061-0906-09200880-0552N3	552	5.60	34.160	NaN	26.944	NaN

DATA CLEANING AND PRE-PROCESSING

1000 rows × 74 columns

In [4]:

```
b.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 1000 entries, 0 to 999
Data columns (total 74 columns):
 #   Column               Non-Null Count  Dtype  
---  ------               --------------  -----  
 0   Cst_Cnt              1000 non-null   int64  
 1   Btl_Cnt              1000 non-null   int64  
 2   Sta_ID               1000 non-null   object 
 3   Depth_ID             1000 non-null   object 
 4   Depthm               1000 non-null   int64  
 5   T_degC               998 non-null    float64
 6   Salnty               970 non-null    float64
 7   O2ml_L               0 non-null      float64
 8   STheta               968 non-null    float64
 9   O2Sat                0 non-null      float64
 10  Oxy_µmol/Kg          0 non-null      float64
 11  BtlNum               0 non-null      float64
 12  RecInd               1000 non-null   int64  
 13  T_prec               998 non-null    float64
 14  T_qual               10 non-null     float64
 15  S_prec               970 non-null    float64
 16  S_qual               45 non-null     float64
 17  P_qual               1000 non-null   float64
 18  O_qual               1000 non-null   float64
 19  SThtaq               55 non-null     float64
 20  O2Satq               1000 non-null   float64
 21  ChlorA               0 non-null      float64
 22  Chlqua               1000 non-null   float64
 23  Phaeop               0 non-null      float64
 24  Phaqua               1000 non-null   float64
 25  PO4uM                0 non-null      float64
 26  PO4q                 1000 non-null   float64
 27  SiO3uM               0 non-null      float64
 28  SiO3qu               1000 non-null   float64
 29  NO2uM                0 non-null      float64
 30  NO2q                 1000 non-null   float64
 31  NO3uM                0 non-null      float64
 32  NO3q                 1000 non-null   float64
 33  NH3uM                0 non-null      float64
 34  NH3q                 1000 non-null   float64
 35  C14As1               0 non-null      float64
 36  C14A1p               0 non-null      float64
 37  C14A1q               1000 non-null   float64
 38  C14As2               0 non-null      float64
 39  C14A2p               0 non-null      float64
 40  C14A2q               1000 non-null   float64
 41  DarkAs               0 non-null      float64
 42  DarkAp               0 non-null      float64
 43  DarkAq               1000 non-null   float64
 44  MeanAs               0 non-null      float64
 45  MeanAp               0 non-null      float64
 46  MeanAq               1000 non-null   float64
 47  IncTim               0 non-null      object 
 48  LightP               0 non-null      float64
 49  R_Depth              1000 non-null   float64
 50  R_TEMP               998 non-null    float64
 51  R_POTEMP             962 non-null    float64
 52  R_SALINITY           970 non-null    float64
 53  R_SIGMA              945 non-null    float64
 54  R_SVA                945 non-null    float64
 55  R_DYNHT              973 non-null    float64
```

```
 56  R_O2                 0 non-null      float64
 57  R_O2Sat              0 non-null      float64
 58  R_SIO3               0 non-null      float64
 59  R_PO4                0 non-null      float64
 60  R_NO3                0 non-null      float64
 61  R_NO2                0 non-null      float64
 62  R_NH4                0 non-null      float64
 63  R_CHLA               0 non-null      float64
 64  R_PHAEO              0 non-null      float64
 65  R_PRES               1000 non-null   int64
 66  R_SAMP               0 non-null      float64
 67  DIC1                 0 non-null      float64
 68  DIC2                 0 non-null      float64
 69  TA1                  0 non-null      float64
 70  TA2                  0 non-null      float64
 71  pH2                  0 non-null      float64
 72  pH1                  0 non-null      float64
 73  DIC Quality Comment  0 non-null      object
dtypes: float64(65), int64(5), object(4)
memory usage: 578.2+ KB
```

In [5]:

```
c=b.dropna(axis=1)
c
```

Out[5]:

	Cst_Cnt	Btl_Cnt	Sta_ID	Depth_ID	Depthm	RecInd	P_qual	O_qual	O2Satq	Chlqua
0	1	1	054.0 056.0	19-4903CR-HY-060-0930-05400560-0000A-3	0	3	9.0	9.0	9.0	9.0
1	1	2	054.0 056.0	19-4903CR-HY-060-0930-05400560-0008A-3	8	3	9.0	9.0	9.0	9.0
2	1	3	054.0 056.0	19-4903CR-HY-060-0930-05400560-0010A-7	10	7	9.0	9.0	9.0	9.0
3	1	4	054.0 056.0	19-4903CR-HY-060-0930-05400560-0019A-3	19	3	9.0	9.0	9.0	9.0
4	1	5	054.0 056.0	19-4903CR-HY-060-0930-05400560-0020A-7	20	7	9.0	9.0	9.0	9.0
...	...	...	...	...	...	...	...	...	...	...
995	33	996	092.0 088.0	19-4903NS-HY-061-0906-09200880-0300A-7	300	7	9.0	9.0	9.0	9.0
996	33	997	092.0 088.0	19-4903NS-HY-061-0906-09200880-0379A-3	379	3	9.0	9.0	9.0	9.0
997	33	998	092.0 088.0	19-4903NS-HY-061-0906-09200880-0400A-7	400	7	9.0	9.0	9.0	9.0
998	33	999	092.0 088.0	19-4903NS-HY-061-0906-09200880-0500A-7	500	7	9.0	9.0	9.0	9.0

	Cst_Cnt	Btl_Cnt	Sta_ID	Depth_ID	Depthm	RecInd	P_qual	O_qual	O2Satq	Chlqua
999	33	1000	092.0 088.0	19-4903NS-HY-061-0906-09200880-0552A-3	552	3	9.0	9.0	9.0	9.0

In [6]:

```
c.describe()
```

Out[6]:

1000 rows × 22 columns

	Cst_Cnt	Btl_Cnt	Depthm	RecInd	P_qual	O_qual	O2Satq	Chlqua
count	1000.000000	1000.000000	1000.000000	1000.000000	1000.0	1000.0	1000.0	1000.0
mean	16.803000	500.500000	329.604000	5.316000	9.0	9.0	9.0	9.0
std	9.500972	288.819436	346.635231	1.975866	0.0	0.0	0.0	0.0
min	1.000000	1.000000	0.000000	3.000000	9.0	9.0	9.0	9.0
25%	9.000000	250.750000	50.000000	3.000000	9.0	9.0	9.0	9.0
50%	16.000000	500.500000	189.500000	7.000000	9.0	9.0	9.0	9.0
75%	25.000000	750.250000	515.250000	7.000000	9.0	9.0	9.0	9.0
max	33.000000	1000.000000	1352.000000	7.000000	9.0	9.0	9.0	9.0

In [7]:

```
c.columns
```

Out[7]:

```
Index(['Cst_Cnt', 'Btl_Cnt', 'Sta_ID', 'Depth_ID', 'Depthm', 'RecInd',
       'P_qual', 'O_qual', 'O2Satq', 'Chlqua', 'Phaqua', 'PO4q', 'SiO3qu',
       'NO2q', 'NO3q', 'NH3q', 'C14A1q', 'C14A2q', 'DarkAq', 'MeanAq',
       'R_Depth', 'R_PRES'],
      dtype='object')
```

In [8]:

```
c1=c.head(10)
c1
```

Out[8]:

	Cst_Cnt	Btl_Cnt	Sta_ID	Depth_ID	Depthm	RecInd	P_qual	O_qual	O2Satq	Chlqua	..
0	1	1	054.0 056.0	19-4903CR-HY-060-0930-05400560-0000A-3	0	3	9.0	9.0	9.0	9.0	..
1	1	2	054.0 056.0	19-4903CR-HY-060-0930-05400560-0008A-3	8	3	9.0	9.0	9.0	9.0	..
2	1	3	054.0 056.0	19-4903CR-HY-060-0930-05400560-0010A-7	10	7	9.0	9.0	9.0	9.0	..
3	1	4	054.0 056.0	19-4903CR-HY-060-0930-05400560-0019A-3	19	3	9.0	9.0	9.0	9.0	..
4	1	5	054.0 056.0	19-4903CR-HY-060-0930-05400560-0020A-7	20	7	9.0	9.0	9.0	9.0	..
5	1	6	054.0 056.0	19-4903CR-HY-060-0930-05400560-0030A-7	30	7	9.0	9.0	9.0	9.0	..
6	1	7	054.0 056.0	19-4903CR-HY-060-0930-05400560-0039A-3	39	3	9.0	9.0	9.0	9.0	..
7	1	8	054.0 056.0	19-4903CR-HY-060-0930-05400560-0050A-7	50	7	9.0	9.0	9.0	9.0	..
8	1	9	054.0 056.0	19-4903CR-HY-060-0930-05400560-0058A-3	58	3	9.0	9.0	9.0	9.0	..
9	1	10	054.0 056.0	19-4903CR-HY-060-0930-05400560-0075A-7	75	7	9.0	9.0	9.0	9.0	..

10 rows × 22 columns

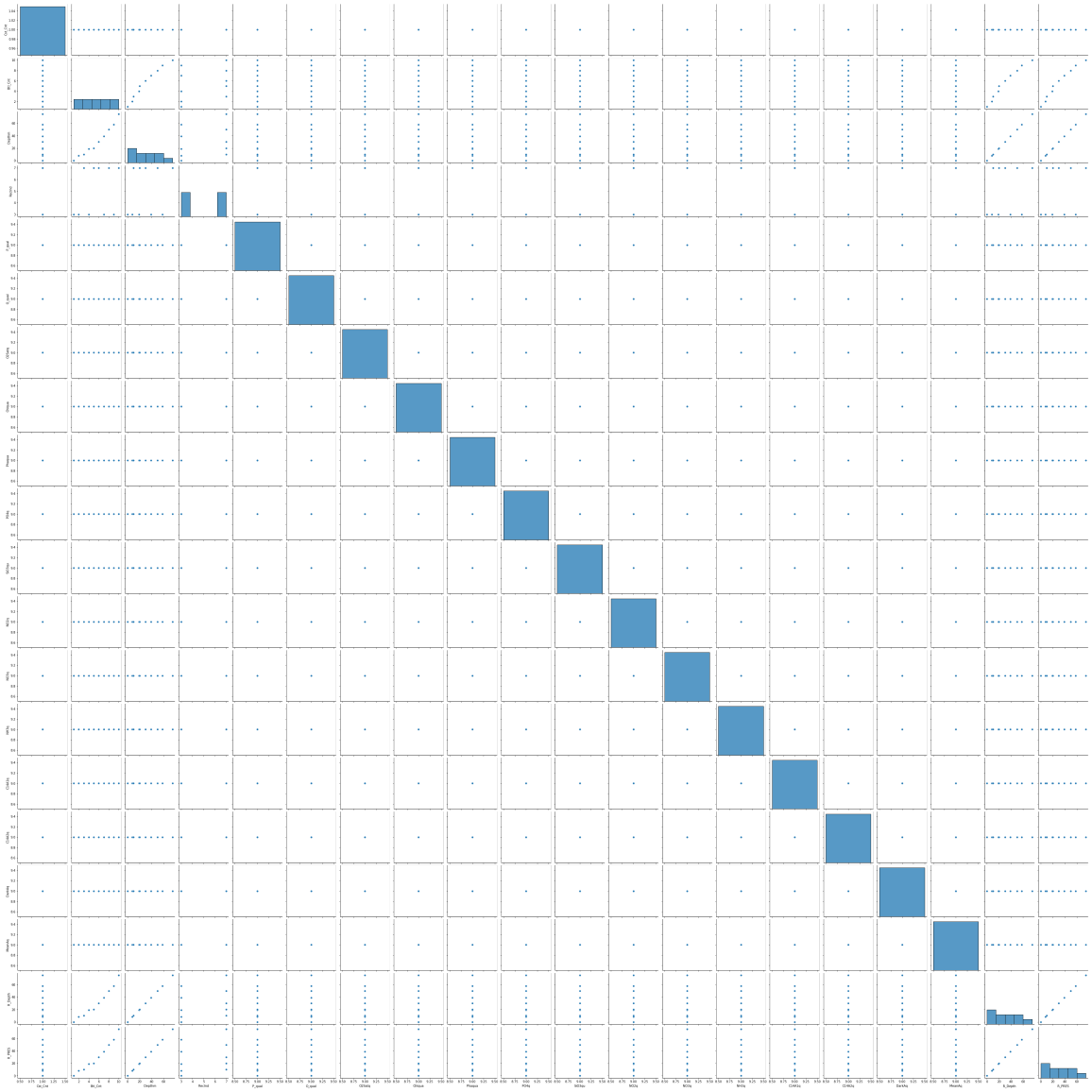
EDA and VISUALIZATION

In [9]:

```
sns.pairplot(c1)
```

Out[9]:

```
<seaborn.axisgrid.PairGrid at 0x25b556851c0>
```



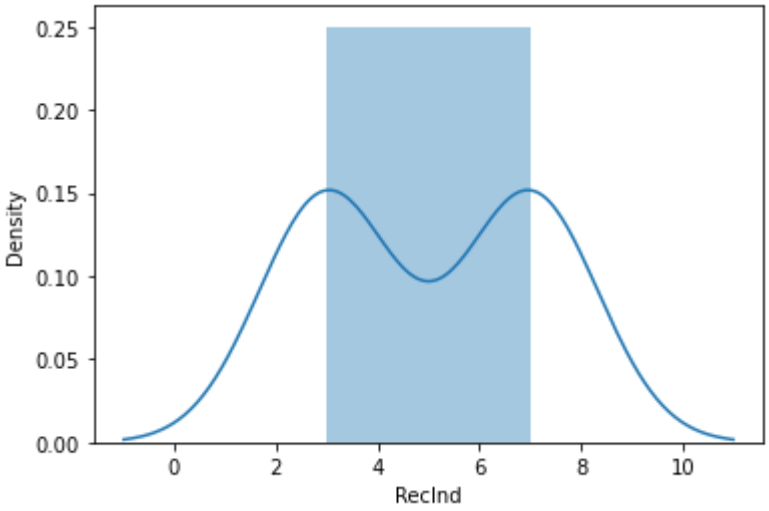
In [12]:

```
sns.distplot(c1['RecInd'])
```

```
C:\ProgramData\Anaconda3\lib\site-packages\seaborn\distributions.py:2557:
FutureWarning: `distplot` is a deprecated function and will be removed in
a future version. Please adapt your code to use either `displot` (a figure
-level function with similar flexibility) or `histplot` (an axes-level fun
ction for histograms).
  warnings.warn(msg, FutureWarning)
```

Out[12]:

```
<AxesSubplot:xlabel='RecInd', ylabel='Density'>
```



In [17]:

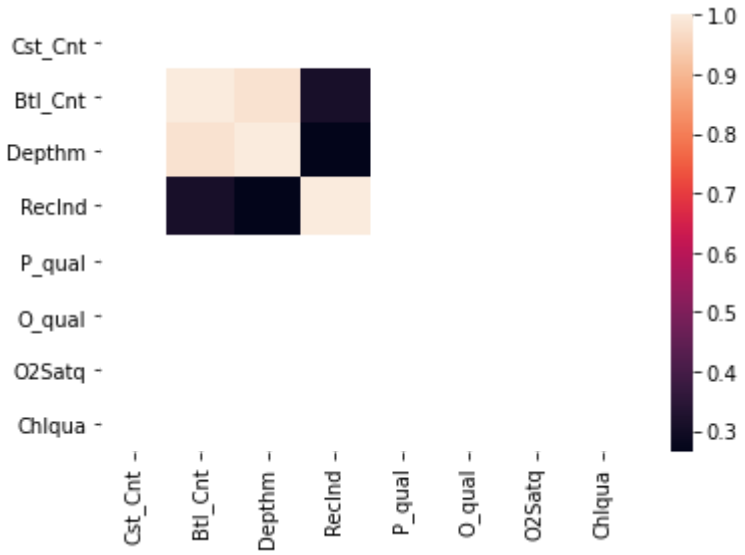
```
d=c1[['Cst_Cnt', 'Btl_Cnt', 'Sta_ID', 'Depth_ID', 'Depthm', 'RecInd',
       'P_qual', 'O_qual', 'O2Satq', 'Chlqua']]
```

In [19]:

```
sns.heatmap(d.corr())
```

Out[19]:

```
<AxesSubplot:>
```



TO TRAIN THE MODEL - MODEL BUILDING

In [40]:

```
x=c1[['Cst_Cnt', 'Btl_Cnt','NO3q','Phaqua', 'PO4q', 'SiO3qu',
       'NO2q', 'NH3q', 'C14A2q', 'DarkAq',   'O_qual', 'O2Satq', 'Chlqua']]
y=c1['MeanAq']
```

In [41]:

```
from sklearn.model_selection import train_test_split

x_train,x_test,y_train,y_test=train_test_split(x,y,test_size=0.3)
```

In [42]:

```
from sklearn.linear_model import LinearRegression

lr=LinearRegression()
lr.fit(x_train,y_train)
```

Out[42]:

```
LinearRegression()
```

In [43]:

```
print(lr.intercept_)
```

```
9.0
```

In [44]:

```
coe=pd.DataFrame(lr.coef_,x.columns,columns=['Coefficients'])
coe
```

Out[44]:

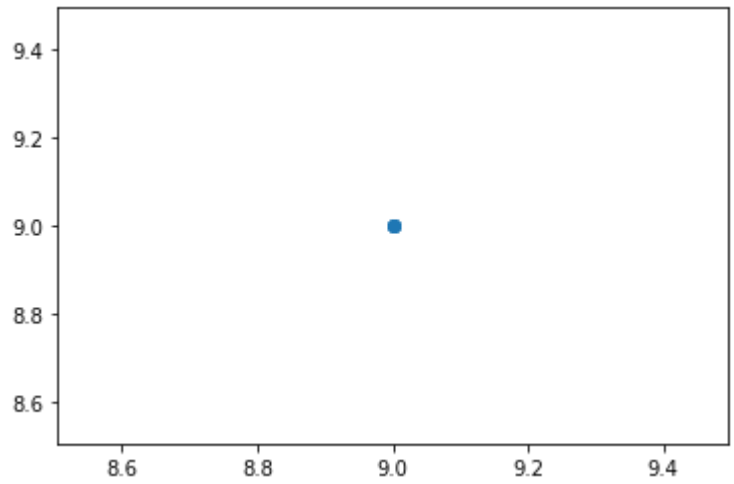
	Coefficients
Cst_Cnt	0.0
Btl_Cnt	0.0
NO3q	0.0
Phaqua	0.0
PO4q	0.0
SiO3qu	0.0
NO2q	0.0
NH3q	0.0
C14A2q	0.0
DarkAq	0.0
O_qual	0.0
O2Satq	0.0
Chlqua	0.0

In [45]:

```
prediction=lr.predict(x_test)
plt.scatter(y_test,prediction)
```

Out[45]:

```
<matplotlib.collections.PathCollection at 0x25b0f024430>
```



In [39]:

```
print(lr.score(x_test,y_test))
```

```
1.0
```

In [ ]:

```
```