Assignment 5

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Question 1

In [2]:
```
import pandas as pd
import matplotlib.pyplot as plt
import seaborn as sns
```

In [4]:
```
nut_df = pd.read_excel('NutAverage.xlsx')
nut_df.head()
```

Out[4]:

	Day Count	NH4-N	NO2-N	NO3-N	TN
0	1	6.915879	2.885372	7.457832	35.834969
1	47	6.344965	2.852123	5.696753	36.359106
2	78	4.964745	2.090747	2.167375	40.719987
3	116	4.361492	2.301630	1.653266	24.931194
4	143	3.980372	1.419541	0.233538	36.234797

In [5]:
```
# Finding null values
nut_df.isnull().sum()
```

Out[5]:
```
Day Count    0
NH4-N        0
NO2-N        0
NO3-N        0
TN           0
dtype: int64
```

In [6]:
```
# Adding a column DIN and DON
nut_df['DIN'] = nut_df['NH4-N'] + nut_df['NO2-N'] + nut_df['NO3-N']
nut_df['DON'] = nut_df['TN'] - nut_df['DIN']
```

In [7]:
```
# Adding a row named averages
avg_row = nut_df.mean()
nut_df.loc['Average'] = avg_row
```

In [8]:
```
# describing characterisitcs
nut_df.describe()
```

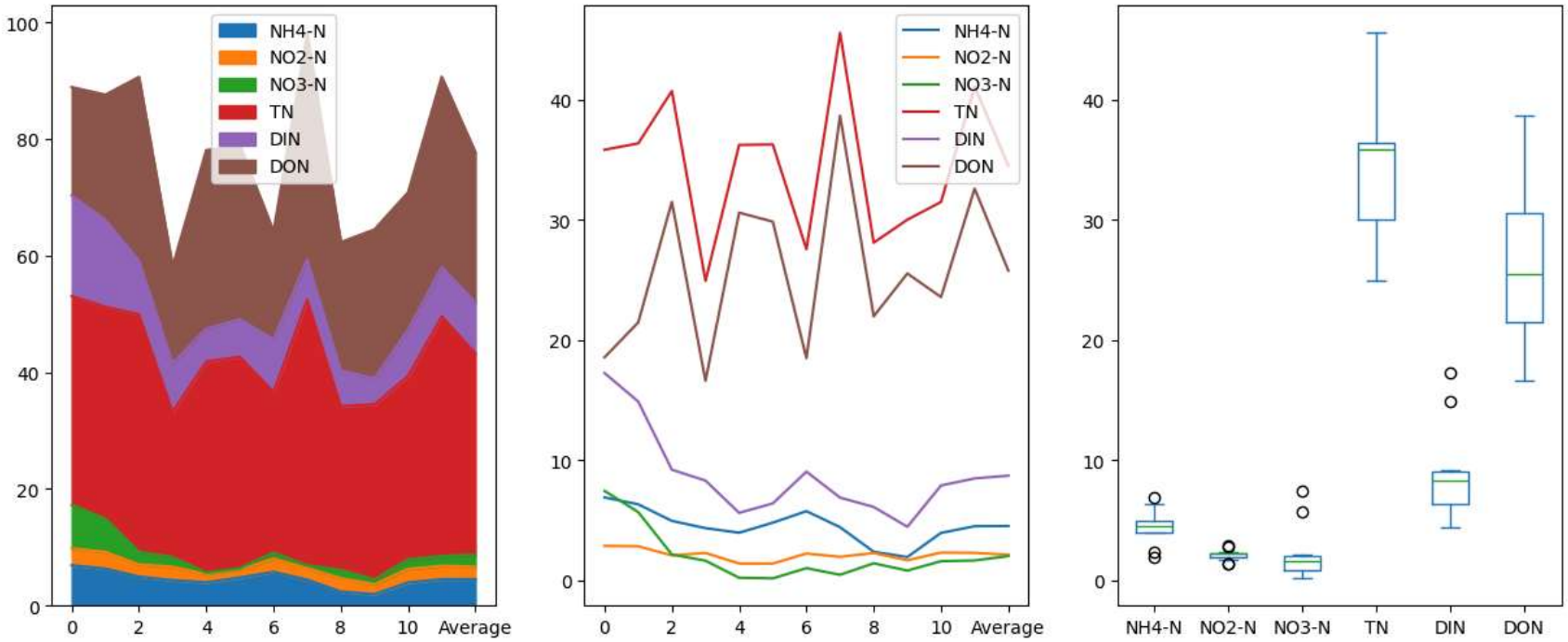
Out[8]:

	Day Count	NH4-N	NO2-N	NO3-N	TN	DIN	DON
count	13.000000	13.000000	13.000000	13.000000	13.000000	13.000000	13.000000
mean	189.666667	4.536201	2.150382	2.038842	34.513920	8.725425	25.788496
std	110.867288	1.373646	0.453143	2.144153	5.956099	3.596171	6.530319
min	1.000000	1.956891	1.416273	0.185584	24.931194	4.474016	16.614806
25%	116.000000	3.980372	1.977844	0.831846	30.017141	6.415864	21.465266
50%	189.666667	4.521629	2.250251	1.613106	35.834969	8.316388	25.543126
75%	270.000000	4.964745	2.305632	2.038842	36.359106	9.059374	30.601346
max	364.000000	6.915879	2.885372	7.457832	45.557639	17.259083	38.657873

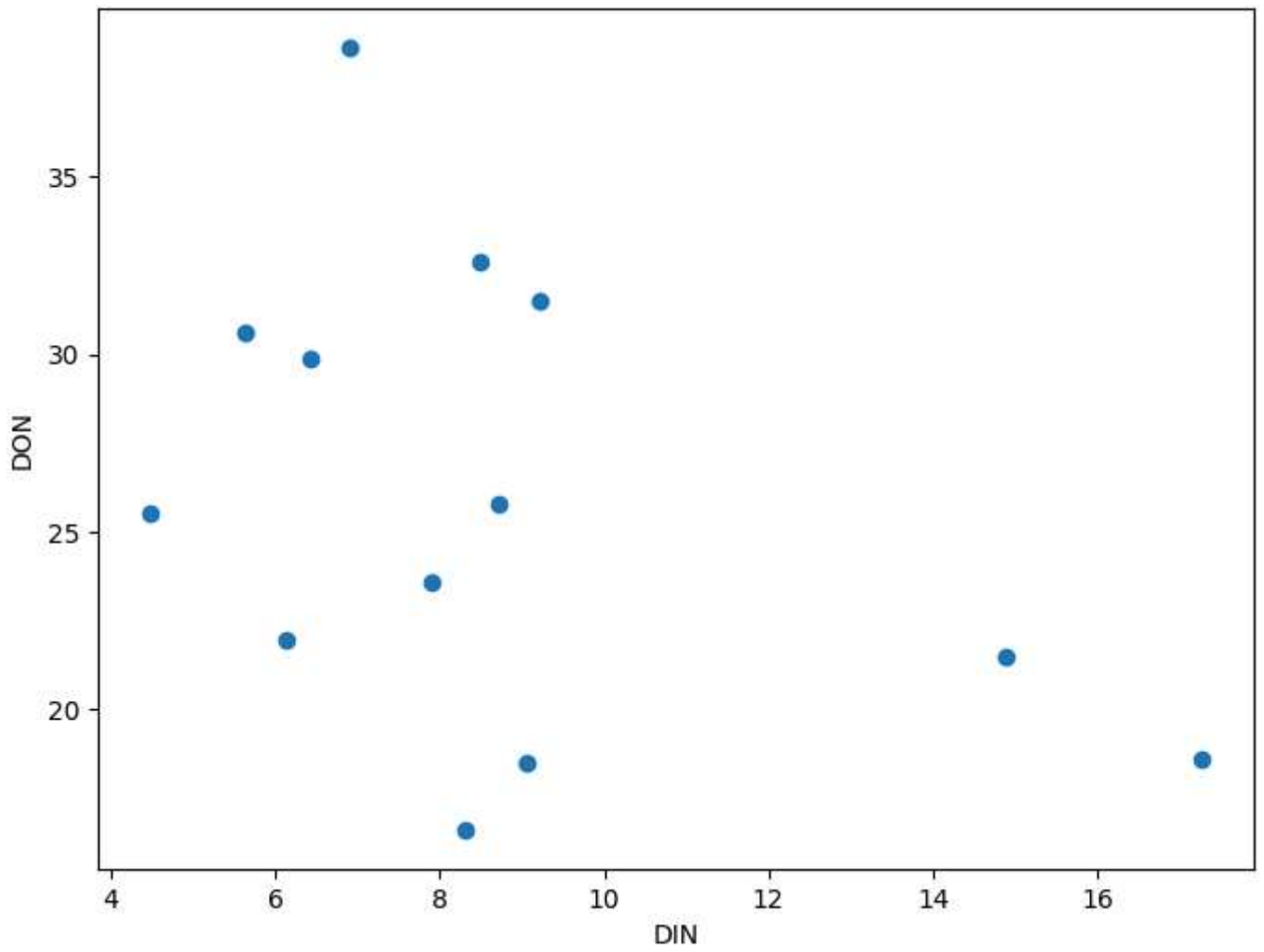
In [10]:
```
# plotting all using areaplot, lineplot, boxplot
fig, ax = plt.subplots(1,3, figsize=(15,6))
temp_df = nut_df.drop(columns=['Day Count'])
temp_df.plot(kind = 'area', ax = ax[0])
```

```
temp_df.plot(kind = 'line', ax = ax[1])
temp_df.plot(kind = 'box', ax = ax[2])
```

Out[10]: <Axes: >



In [11]:
```
# Creating scatterplot of DIN vs DON
plt.figure(figsize=(8,6))
plt.scatter(temp_df['DIN'], temp_df['DON'])
plt.xlabel('DIN')
plt.ylabel('DON')
plt.show()
```



Question 2

In [12]:
```
ph_df = pd.read_excel('PythoBiomass.xlsx')
ph_df.head()
```

Out[12]:

	Days	Cyanophyceans	Chlorophyceae	Total Biomass
0	1	0.554035	0.340955	4.775824
1	47	0.409126	0.446749	4.536462
2	78	0.606581	0.210896	4.131376
3	116	0.308334	1.301525	3.597625
4	143	0.828900	0.352965	2.867716

In [13]:
```
# finding null values
ph_df.isna().sum()
```

Out[13]:
```
Days              0
Cyanophyceans     0
Chlorophyceae     0
Total Biomass     0
dtype: int64
```

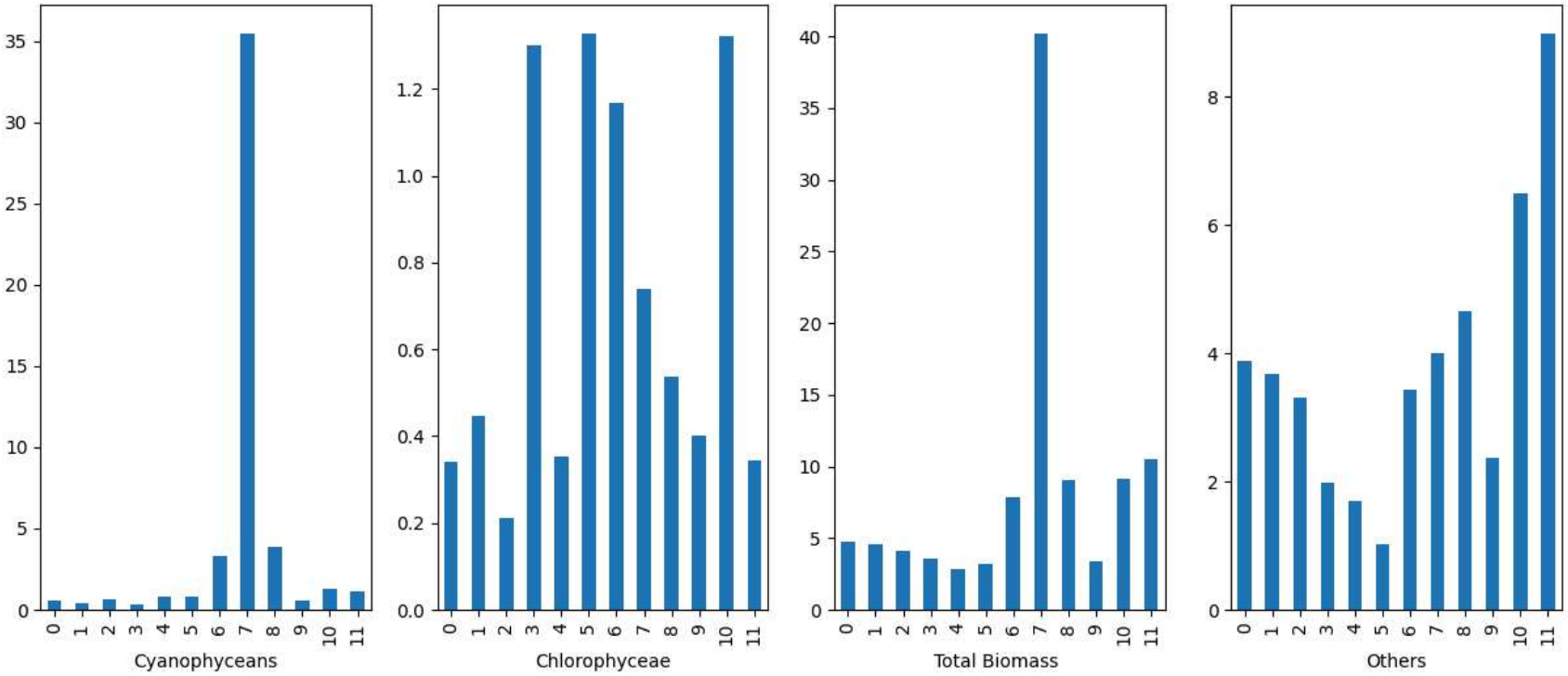
In [15]:
```
# Adding others column
ph_df['Others'] = ph_df['Total Biomass '] - (ph_df['Cyanophyceans'] + ph_df['Chlorophyceae'])
```

In [16]:
```
# describing characteristics of dataframe
ph_df.describe()
```

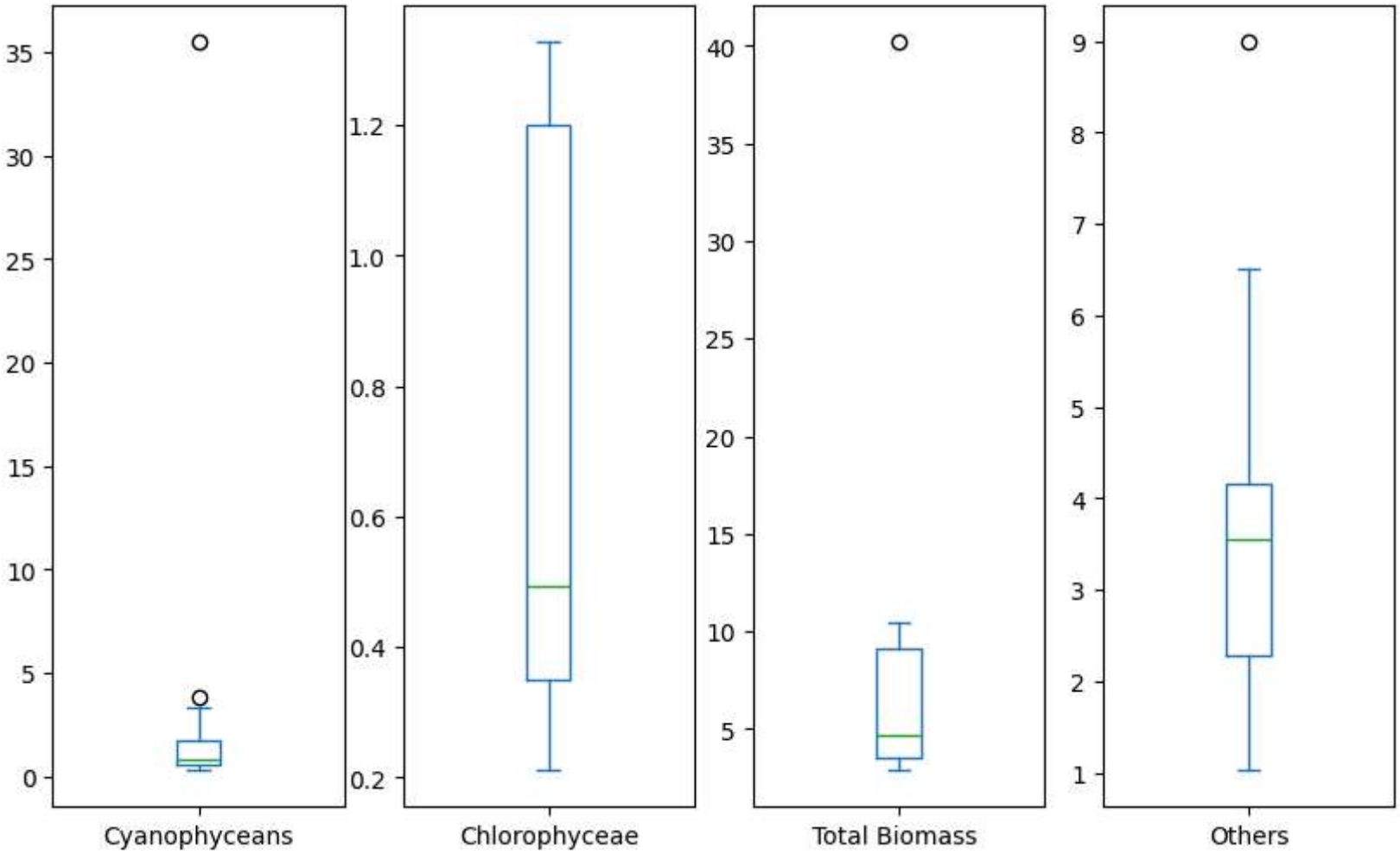
Out[16]:

	Days	Cyanophyceans	Chlorophyceae	Total Biomass	Others
count	12.000000	12.000000	12.000000	12.000000	12.000000
mean	189.666667	4.096431	0.707822	8.597235	3.792982
std	115.797106	9.944160	0.443034	10.307117	2.191045
min	1.000000	0.308334	0.210896	2.867716	1.029841
25%	106.500000	0.570355	0.350853	3.536107	2.278817
50%	195.500000	0.825581	0.492309	4.656143	3.552089
75%	277.000000	1.782892	1.201670	9.084406	4.159469
max	364.000000	35.462698	1.327444	40.195265	8.985380

In [22]:
```
# plot biomass composition of each group using a bar and box plot
fig,ax = plt.subplots(1,4, figsize=(15, 6))
temp_ph_df = ph_df.drop(columns=['Days'])
cols = temp_ph_df.columns
for i, col in enumerate(cols):
    temp_ph_df[col].plot(kind = 'bar', ax = ax[i], label=col)
    ax[i].set_xlabel(f'{col}')
```



In [20]:
```
fig,ax = plt.subplots(1,4, figsize=(10, 6))
cols = temp_ph_df.columns
for i, col in enumerate(cols):
    temp_ph_df[col].plot(kind = 'box', ax = ax[i], label=col)
```

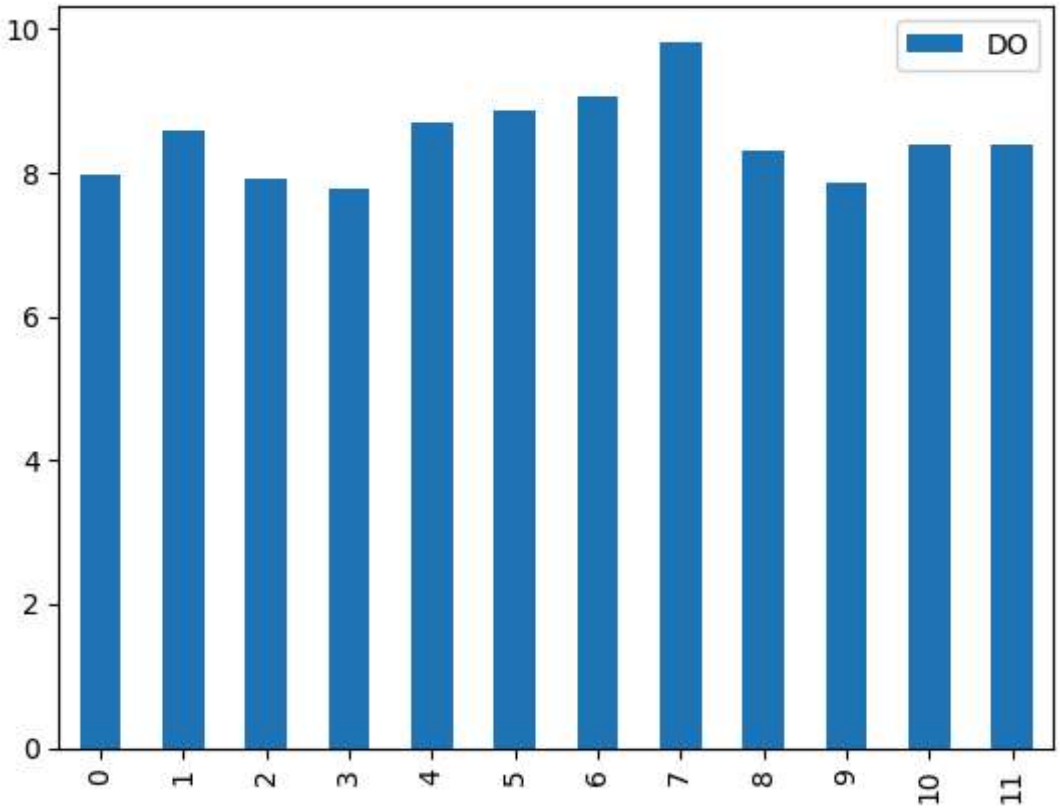


Question 3

In [23]:
```
do_df = pd.read_csv('DOData.csv')
```

In [24]:
```
do_df.drop(columns=['Days']).plot(kind = 'bar')
```

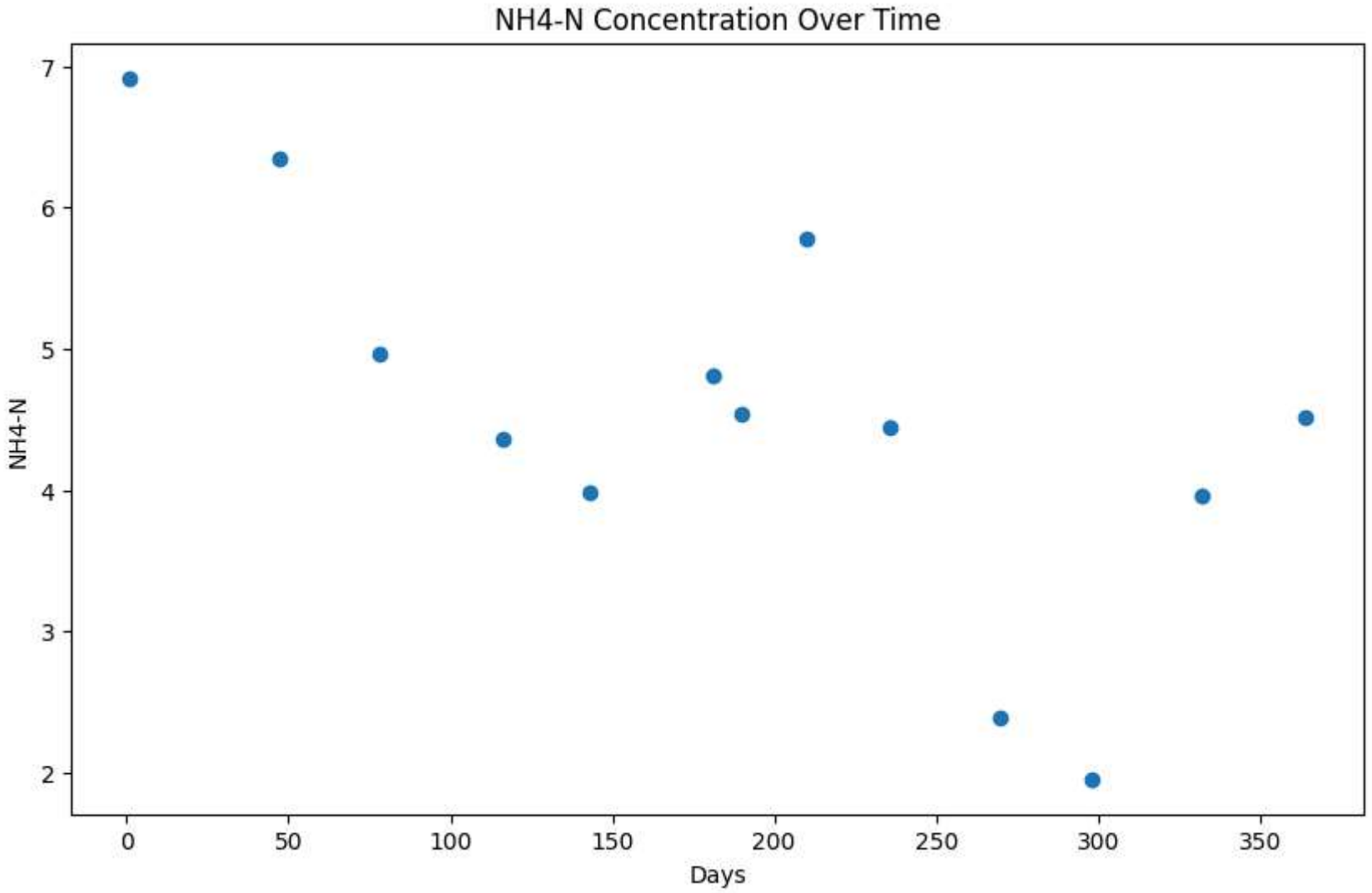
Out[24]: <Axes: >



In [32]:
```
# renaming nut_df to match with do_df
nut_df = nut_df.rename(columns={'Day Count': 'Days'})
```

In [35]:
```
plt.figure(figsize=(10, 6))
plt.scatter(nut_df['Days'], nut_df['NH4-N'])
plt.xlabel('Days')
plt.ylabel('NH4-N')
plt.title('NH4-N Concentration Over Time')
```

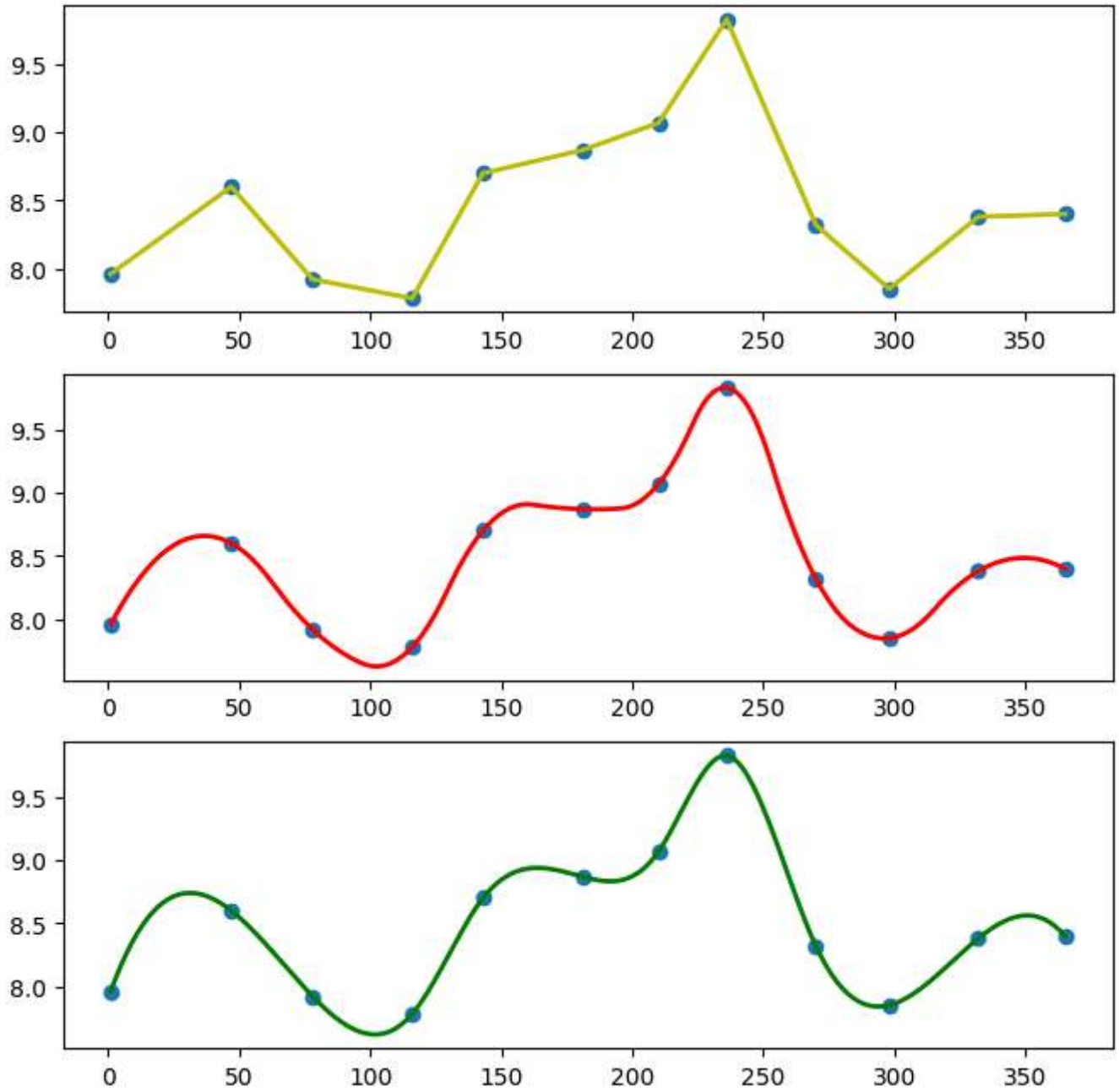
Out[35]:
```
Text(0.5, 1.0, 'NH4-N Concentration Over Time')
```



In [43]:
```
from scipy.interpolate import interp1d
import numpy as np
x = do_df['Days']
y = do_df['DO']

fig, ax = plt.subplots(3,1, figsize=(8,8))

# Linear interpolation
lp1 = interp1d(x,y,kind='linear')
```

```
xs = np.linspace(1,365,365)
ax[0].plot(x,y,'o')
ax[0].plot(xs, lp1(xs), '-y', lw=2, label='Linear Interpolation')

# quadratic interpolation
lp2 = interp1d(x,y,kind='quadratic')
xs = np.linspace(1,365,365)
ax[1].plot(x,y,'o')
ax[1].plot(xs, lp2(xs), '-r', lw=2, label='Quadratic Interpolation')

# cubic interpolation
lp3 = interp1d(x,y,kind='cubic')
xs = np.linspace(1,365,365)
ax[2].plot(x,y,'o')
ax[2].plot(xs, lp3(xs), '-g', lw=2, label='Cubic Interpolation')
```

Out[43]: [<matplotlib.lines.Line2D at 0x1aa99308d60>]



In [ ]: