In [1]:

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

Drought Cleaning

In [2]:

```
drought_df = pd.read_csv(r"C:\Users\Kamalachandran\Desktop\Intern\task\task 5\Drought.csv")
drought_df.head()
```

Out[2]:

	coordinates	name	description	htmldescription	alertlevel	alertscore	episodealertlevel	episodealertscore	country	fromdate	...	severitytext	source	iso3	eventtype	GDACS ID	Name	Countries
0	[11.087, 53.882]	Drought in Germany, Denmark, France, Latvia, P...	Drought in Germany, Denmark, France, Latvia, P...	Green Drought in Germany, Denmark, France, Lat...	Green	1	Green	0.25	Germany, Denmark, France, Latvia, Poland, Sweden	2017-07-21T00:00:00	...	Minor impact for agricultural drought in 80936...	GDO	DEU	DR	DR 1012168	Central Northern Europe-2018	Germany, Denmark, France, Latvia, Poland, Sweden
1	[11.087, 53.882]	Drought in Germany, Denmark, France, Latvia, P...	Drought in Germany, Denmark, France, Latvia, P...	Green Drought in Germany, Denmark, France, Lat...	Green	1	Green	0.25	Germany, Denmark, France, Latvia, Poland, Sweden	2017-07-21T00:00:00	...	Minor impact for agricultural drought in 80936...	GDO	DEU	DR	DR 1012168	Central Northern Europe-2018	Germany, Denmark, France, Latvia, Poland, Sweden
2	[11.087, 53.882]	Drought in Germany, Denmark, France, Latvia, P...	Drought in Germany, Denmark, France, Latvia, P...	Green Drought in Germany, Denmark, France, Lat...	Green	1	Green	0.25	Germany, Denmark, France, Latvia, Poland, Sweden	2017-07-21T00:00:00	...	Minor impact for agricultural drought in 80936...	GDO	DEU	DR	DR 1012168	Central Northern Europe-2018	Germany, Denmark, France, Latvia, Poland, Sweden
3	[11.087, 53.882]	Drought in Germany, Denmark, France, Latvia, P...	Drought in Germany, Denmark, France, Latvia, P...	Green Drought in Germany, Denmark, France, Lat...	Green	1	Green	0.25	Germany, Denmark, France, Latvia, Poland, Sweden	2017-07-21T00:00:00	...	Minor impact for agricultural drought in 80936...	GDO	DEU	DR	DR 1012168	Central Northern Europe-2018	Germany, Denmark, France, Latvia, Poland, Sweden
4	[11.087, 53.882]	Drought in Germany, Denmark, France, Latvia, P...	Drought in Germany, Denmark, France, Latvia, P...	Green Drought in Germany, Denmark, France, Lat...	Green	1	Green	0.25	Germany, Denmark, France, Latvia, Poland, Sweden	2017-07-21T00:00:00	...	Minor impact for agricultural drought in 80936...	GDO	DEU	DR	DR 1012168	Central Northern Europe-2018	Germany, Denmark, France, Latvia, Poland, Sweden

5 rows × 22 columns

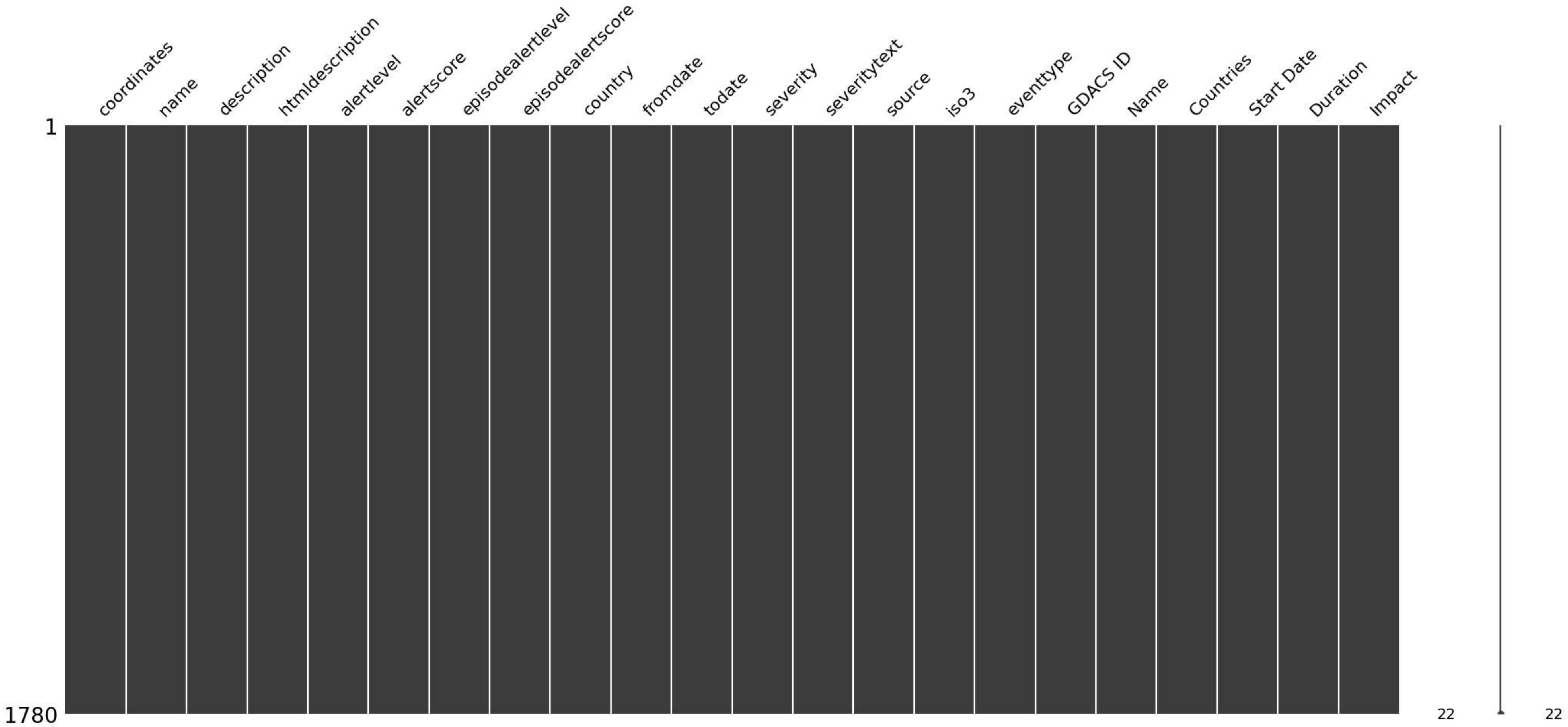
In [3]:

```
drought_df.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 1780 entries, 0 to 1779
Data columns (total 22 columns):
 #   Column             Non-Null Count  Dtype  
---  ------             --------------  -----  
 0   coordinates        1780 non-null   object 
 1   name               1780 non-null   object 
 2   description        1780 non-null   object 
 3   htmldescription    1780 non-null   object 
 4   alertlevel         1780 non-null   object 
 5   alertscore         1780 non-null   int64  
 6   episodealertlevel  1780 non-null   object 
 7   episodealertscore  1780 non-null   float64
 8   country            1780 non-null   object 
 9   fromdate           1780 non-null   object 
 10  todate             1780 non-null   object 
 11  severity           1780 non-null   float64
 12  severitytext       1780 non-null   object 
 13  source             1780 non-null   object 
 14  iso3               1780 non-null   object 
 15  eventtype          1780 non-null   object 
 16  GDACS ID           1780 non-null   object 
 17  Name               1780 non-null   object 
 18  Countries          1780 non-null   object 
 19  Start Date         1780 non-null   object 
 20  Duration           1780 non-null   object 
 21  Impact             1780 non-null   object 
dtypes: float64(2), int64(1), object(19)
memory usage: 306.1+ KB
```

In [4]:

```
msn.matrix(drought_df);
```



In [5]:

```python
#Check for duplicate rows
duplicate_rows = drought_df.duplicated()

# Count of duplicate rows
print(f"Number of duplicate rows: {duplicate_rows.sum()}")

print("Shape of DataFrame Before Removing Duplicates: ", drought_df.shape)

# Drop the duplicates
drought_df = drought_df.drop_duplicates()

# Checking the shape of the data after dropping duplicates
print("Shape of DataFrame After Removing Duplicates: ", drought_df.shape)
```

```
Number of duplicate rows: 1540
Shape of DataFrame Before Removing Duplicates:  (1780, 22)
Shape of DataFrame After Removing Duplicates:  (240, 22)
```

In [6]:

```python
drought_df.drop(['name', 'description', 'Name'], axis=1, inplace=True)
drought_df = drought_df.rename(columns={"htmldescription": "description"})
```

```
In [7]:  drought_df.drop(['Countries'], axis=1, inplace=True)
```

```
In [8]:  print(f"Same value count between 'severitytext' and 'Impact' (must be 1780): {(drought_df['severitytext'] == drought_df['Impact']).sum()}")

         drought_df.drop(['severitytext'], axis=1, inplace=True)
```

```
Same value count between 'severitytext' and 'Impact' (must be 1780): 240
```

```
In [9]:  print(f"Same value count between 'alertlevel' and 'episodealertlevel' (must be 1780): {(drought_df['alertlevel'] == drought_df['episodealertlevel']).sum()}")

         drought_df.drop(['episodealertlevel'], axis=1, inplace=True)
```

```
Same value count between 'alertlevel' and 'episodealertlevel' (must be 1780): 240
```

```
In [10]: drought_df.drop(['Start Date'], axis=1, inplace=True)
```

```
In [11]: drought_df['Duration'] = drought_df['Duration'].str.split('(').str[0].str.split().str[0]
         drought_df = drought_df.rename(columns={"Duration": "Duration (Days)"})
```

```
In [12]: drought_df = drought_df.rename(columns={"severity": "severity (km2)"})
```

```
In [13]: longitude = []
         latitude = []
         for i in drought_df['coordinates']:
             longitude.append(i.split(',')[0][1:].strip())
             latitude.append(i.split(',')[1][:-1].strip())

         drought_df['longitude'] = longitude
         drought_df['latitude'] = latitude
         drought_df.drop(['coordinates'], axis=1, inplace=True)
```

```
In [14]: for c in drought_df.columns:
             print(f"Unique values count. Column: {c} | Count: {drought_df[c].nunique()}")
```

```
Unique values count. Column: description | Count: 240
Unique values count. Column: alertlevel | Count: 3
Unique values count. Column: alertscore | Count: 3
Unique values count. Column: episodealertscore | Count: 10
Unique values count. Column: country | Count: 129
Unique values count. Column: fromdate | Count: 92
Unique values count. Column: todate | Count: 133
Unique values count. Column: severity (km2) | Count: 237
Unique values count. Column: source | Count: 1
Unique values count. Column: iso3 | Count: 77
Unique values count. Column: eventtype | Count: 1
Unique values count. Column: GDACS ID | Count: 240
Unique values count. Column: Duration (Days) | Count: 130
Unique values count. Column: Impact | Count: 237
Unique values count. Column: longitude | Count: 239
Unique values count. Column: latitude | Count: 235
```

```
In [15]: print(drought_df[['source', 'eventtype']].head())
         drought_df.drop(['source', 'eventtype'], axis=1, inplace=True)
```

```
  source eventtype
0     GDO        DR
5     GDO        DR
7     GDO        DR
13    GDO        DR
18    GDO        DR
```

In [16]:

```
drought_df[['alertscore', 'episodealertscore', 'severity (km2)', 'Duration (Days)', 'longitude', 'latitude']] = drought_df[['alertscore', 'episodealertscore', 'severity (km2)', 'Duration (Day
drought_df[['fromdate', 'todate']] = drought_df[['fromdate', 'todate']].apply(pd.to_datetime)
```

In [17]:

```
drought_df.dtypes
```

Out[17]:

```
description                   object
alertlevel                    object
alertscore                   float64
episodealertscore            float64
country                       object
fromdate              datetime64[ns]
todate                datetime64[ns]
severity (km2)               float64
iso3                          object
GDACS ID                      object
Duration (Days)              float64
Impact                        object
longitude                    float64
latitude                     float64
dtype: object
```

In [18]:

```
drought_df.columns = drought_df.columns.str.capitalize()
```

In [19]:

```
drought_df.to_csv("Drought_clean.csv", index=False)
```

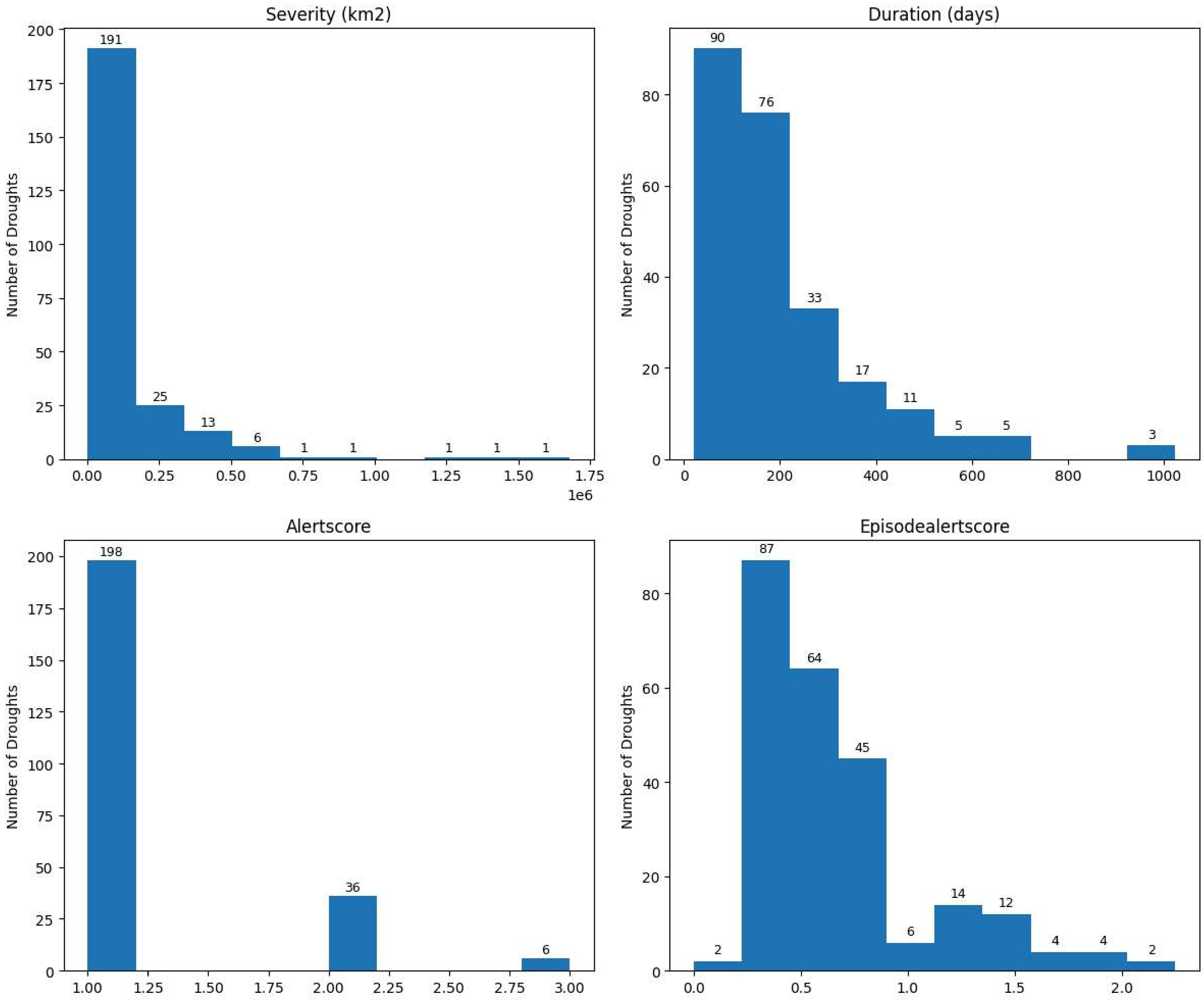
In [20]:

```
print(drought_df['Alertlevel'].value_counts())
print("------------------------------------")
print(drought_df['Country'].value_counts())
print("------------------------------------")
print(drought_df['Iso3'].value_counts())
```

```
Alertlevel
Green     198
Orange     36
Red         6
Name: count, dtype: int64
------------------------------------
Country
United States                                                                                                    12
Brazil                                                                                                           11
Australia                                                                                                        10
China                                                                                                             7
Russia                                                                                                            7
                                                                                                                 ..
Afghanistan, Islamic Republic of Iran, Kyrgyzstan, Kazakhstan, Pakistan, Tajikistan, Turkmenistan, Uzbekistan     1
Austria, Belgium, Czech Republic, Germany, Denmark, France, Luxembourg, Netherlands, Poland, Sweden               1
Tanzania, Uganda                                                                                                  1
The Bahamas, Belize, Cuba, Guatemala, Mexico                                                                      1
Ethiopia                                                                                                          1
Name: count, Length: 129, dtype: int64
------------------------------------
Iso3
CHN    13
USA    12
ARG    12
BRA    11
AUS    10
       ..
BFA     1
MDA     1
GIN     1
IRQ     1
BHS     1
Name: count, Length: 77, dtype: int64
```

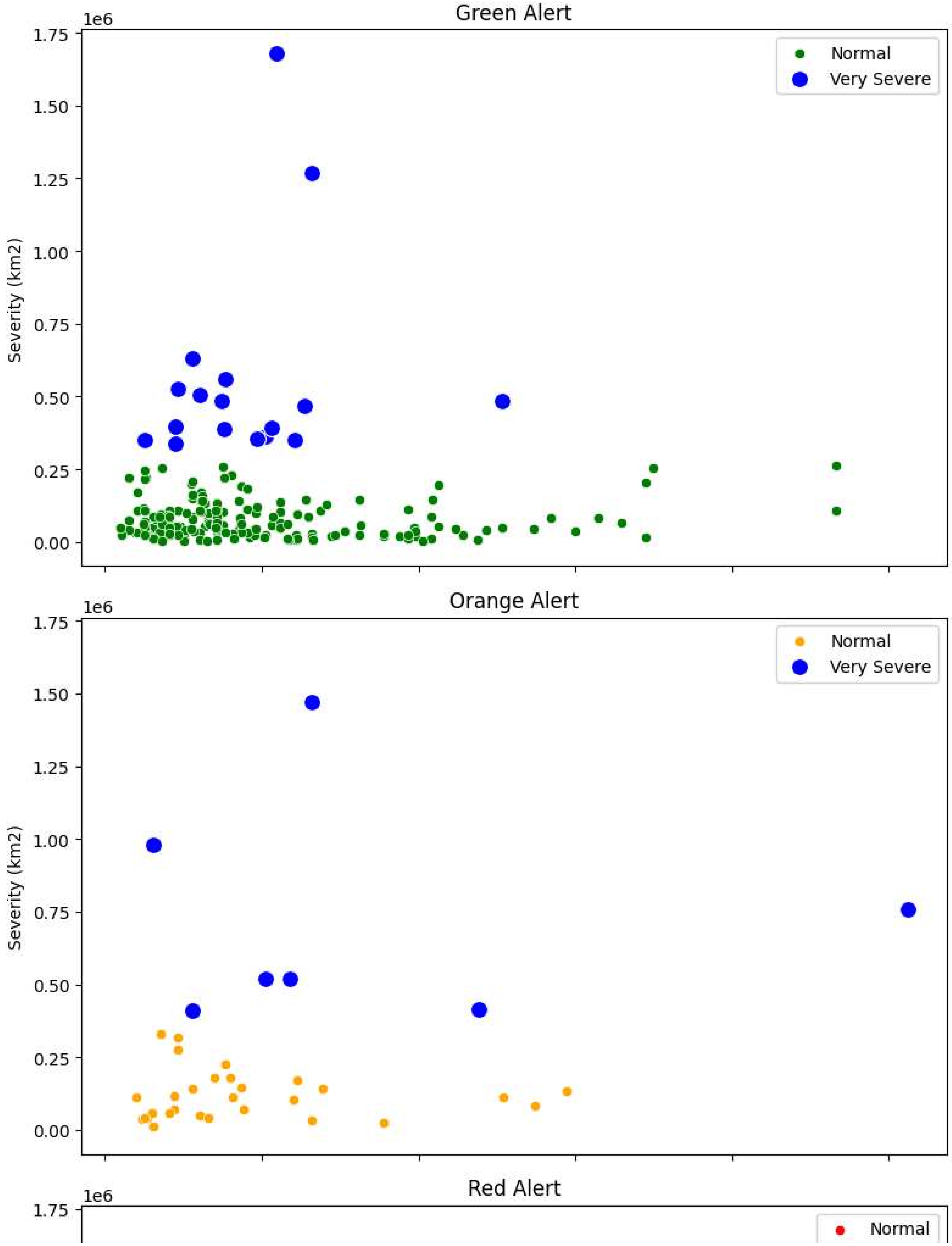
In [21]:

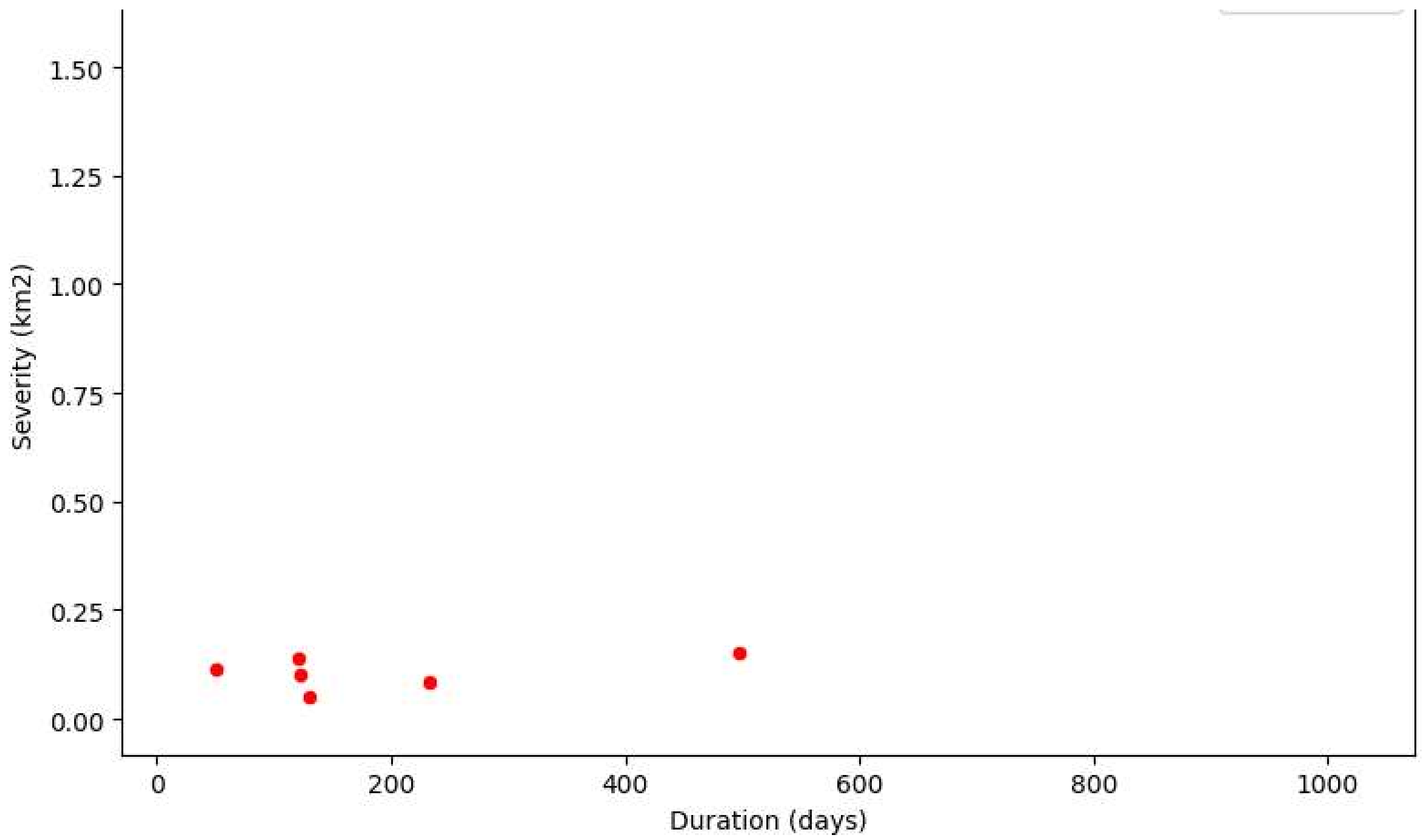
```python
cols = ['Severity (km2)', 'Duration (days)', 'Alertscore', 'Episodealertscore']

fig, axes = plt.subplots(2, 2, figsize=(12, 10))
axes = axes.flatten()

for i, col in enumerate(cols):
    counts, bins, patches = axes[i].hist(drought_df[col])
    axes[i].set_ylabel("Number of Droughts")
    axes[i].set_title(col)

    for count, patch in zip(counts, patches):
        height = patch.get_height()
        if height > 0:  # show only if bar exists
            axes[i].text(patch.get_x() + patch.get_width()/2, height + 1, str(int(height)),
                         ha='center', va='bottom', fontsize=9)

plt.tight_layout()
plt.savefig("charts/severity_histogram.png")
plt.show()
```


Severity (km2)
Number of Droughts
0
25
50
75
100
125
150
175
200
191
25
13
6
1
1
1
1
1
0.00
0.25
0.50
0.75
1.00
1.25
1.50
1.75
1e6
Duration (days)
Number of Droughts
0
20
40
60
80
90
76
33
17
11
5
5
3
0
200
400
600
800
1000
Alertscore
Number of Droughts
0
25
50
75
100
125
150
175
200
198
36
6
1.00
1.25
1.50
1.75
2.00
2.25
2.50
2.75
3.00
Episodealertscore
Number of Droughts
0
20
40
60
80
2
87
64
45
6
14
12
4
4
2
0.0
0.5
1.0
1.5
2.0

In [22]:

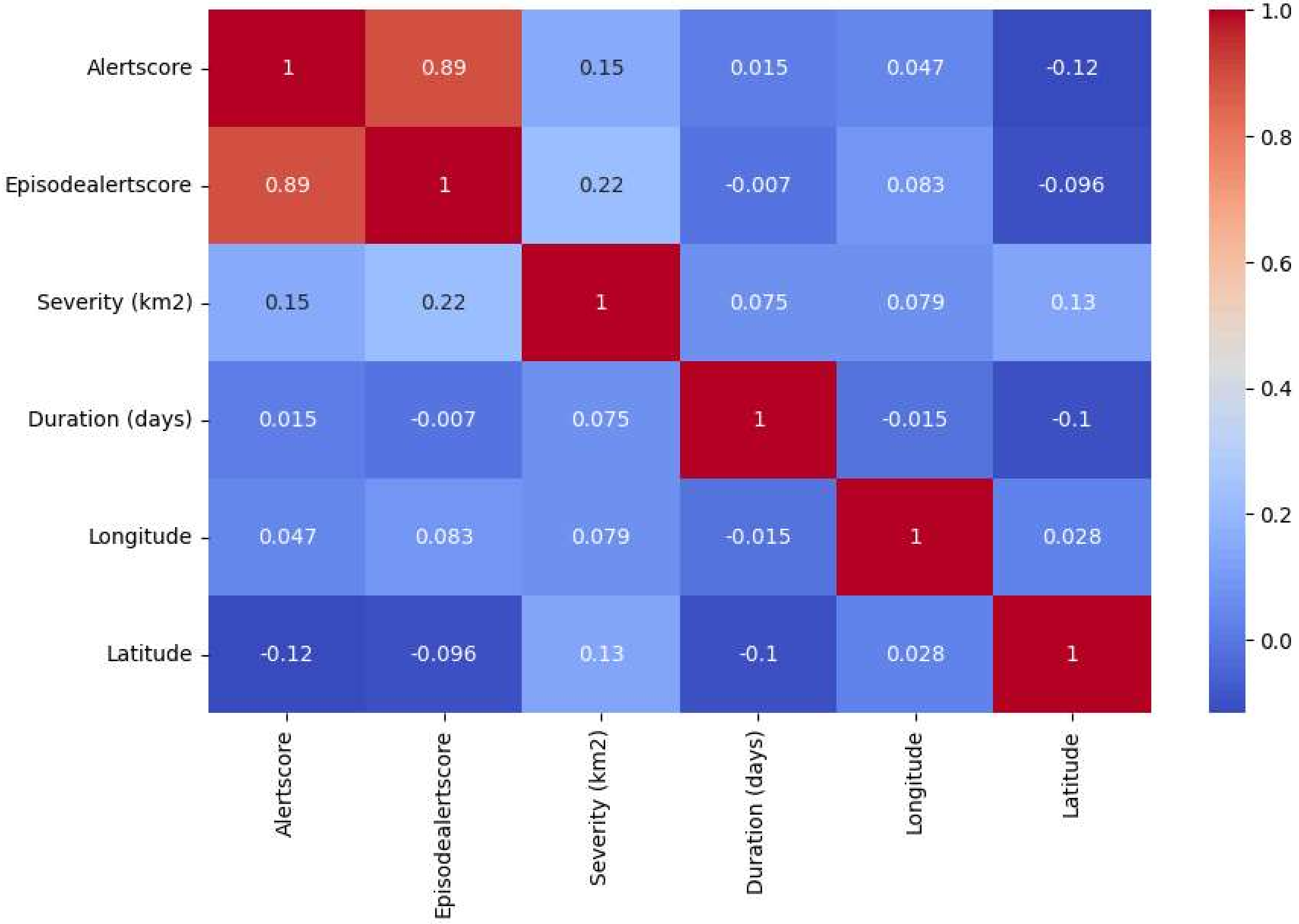
```
alert_levels = ['Green', 'Orange', 'Red']
colors = ['green', 'orange', 'red']

severity_threshold = drought_df['Severity (km2)'].quantile(0.9)

fig, axes = plt.subplots(3, 1, figsize=(8, 15), sharex=True, sharey=True)

for i in range(3):
    # Filter data for the current alert level
    data = drought_df[drought_df['Alertlevel'] == alert_levels[i]]

    # Split into normal and very severe
    normal = data[data['Severity (km2)'] <= severity_threshold]
    severe = data[data['Severity (km2)'] > severity_threshold]

    # Plot normal points
    sns.scatterplot(x='Duration (days)', y='Severity (km2)', data=normal, color=colors[i], ax=axes[i], label='Normal')

    # Highlight very severe points
    sns.scatterplot(x='Duration (days)', y='Severity (km2)', data=severe, color='blue', s=100, ax=axes[i], label='Very Severe')

    axes[i].set_title(f"{alert_levels[i].capitalize()} Alert")
    axes[i].legend()

plt.tight_layout()
plt.savefig("charts/scatter_duration_severity.png")
plt.show()
```


Green Alert
1e6
1.75
1.50
1.25
1.00
0.75
0.50
0.25
0.00
Severity (km2)
Normal
Very Severe
Orange Alert
1e6
1.75
1.50
1.25
1.00
0.75
0.50
0.25
0.00
Severity (km2)
Normal
Very Severe
Red Alert
1e6
1.75
Normal



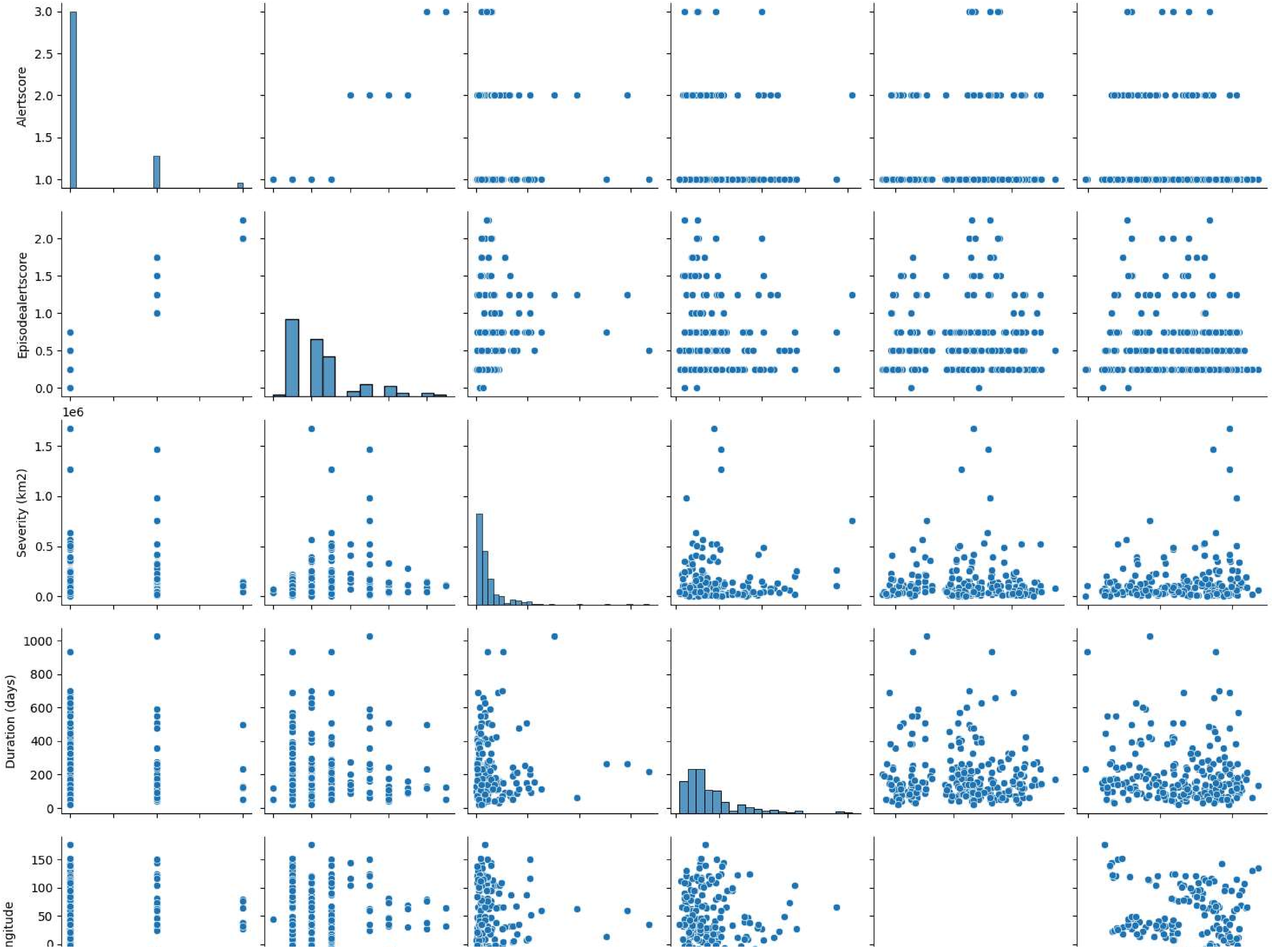
In [23]:

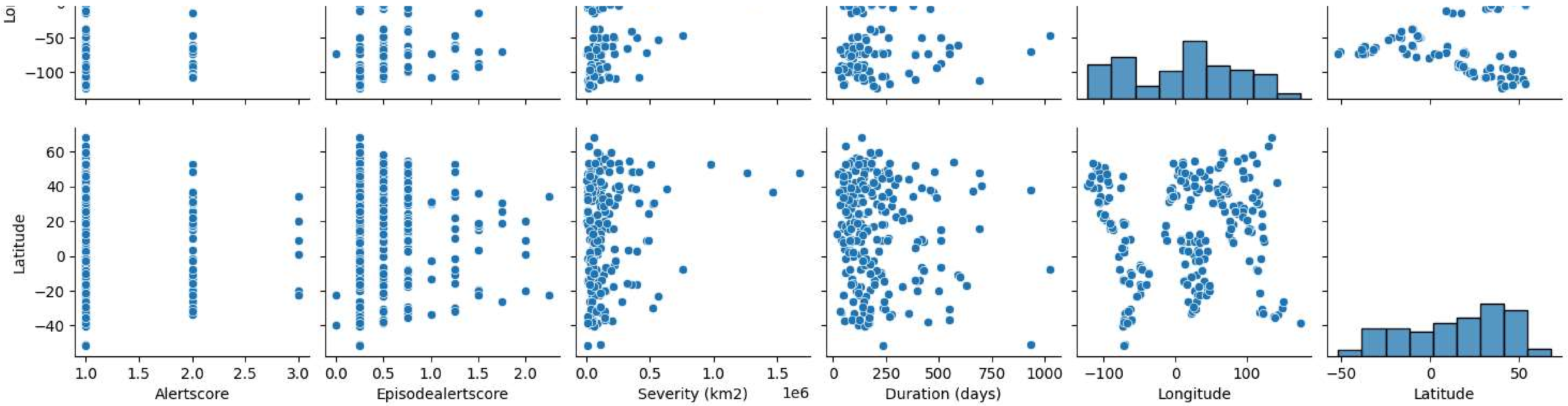
```
plt.figure(figsize=(10,6))
sns.heatmap(drought_df[['Alertscore','Episodealertscore','Severity (km2)','Duration (days)','Longitude','Latitude']].corr(),
            annot=True, cmap="coolwarm")
plt.savefig("charts/correlation_heatmap.png")
plt.show()
```



In [24]:

```
sns.pairplot(drought_df[['Alertscore','Episodealertscore','Severity (km2)','Duration (days)','Longitude','Latitude']])
plt.savefig("charts/pairplot_drought.png")
plt.show()
```


Alertscore
3.0
2.5
2.0
1.5
1.0
Episodealertscore
2.0
1.5
1.0
0.5
0.0
1e6
Severity (km2)
1.5
1.0
0.5
0.0
Duration (days)
1000
800
600
400
200
0
ngitude
150
100
50
0


Lo
0
−50
−100
60
40
20
0
−20
−40
Latitude
1.0
1.5
2.0
2.5
3.0
Alertscore
0.0
0.5
1.0
1.5
2.0
Episodealertscore
0.0
0.5
1.0
1.5
Severity (km2)
1e6
0
250
500
750
1000
Duration (days)
−100
0
100
Longitude
−50
0
50
Latitude