import pandas as pd

import matplotlib.pyplot as plt

import seaborn as sns

# Read the data

df = pd.read\_csv('Weather\_Parameters\_Combined.csv')

# Convert Date to datetime

df['Date'] = pd.to\_datetime(df['Date'])

# Define thresholds

RAINFALL\_THRESHOLD = 20.1 # mm/h

WIND\_SPEED\_THRESHOLD = 5.57 # m/s

SWH\_THRESHOLD = 2.1 # meters

# Find extreme weather days

extreme\_days = df[

(df['Rainfall'] >= RAINFALL\_THRESHOLD) |

(df['Wind\_Speed (m/s)'] >= WIND\_SPEED\_THRESHOLD) |

(df['SWH'] >= SWH\_THRESHOLD)

]

# Calculate percentage of extreme days

total\_days = len(df)

extreme\_days\_count = len(extreme\_days)

extreme\_percentage = (extreme\_days\_count / total\_days) \* 100

print('Summary of Extreme Weather Analysis:')

print('Total number of days in dataset:', total\_days)

print('Number of extreme weather days:', extreme\_days\_count)

print('Percentage of extreme weather days: {:.2f}%'.format(extreme\_percentage))

# Count individual threshold exceedances

rainfall\_extremes = len(df[df['Rainfall'] >= RAINFALL\_THRESHOLD])

wind\_extremes = len(df[df['Wind\_Speed (m/s)'] >= WIND\_SPEED\_THRESHOLD])

swh\_extremes = len(df[df['SWH'] >= SWH\_THRESHOLD])

print('\

Breakdown of extreme events:')

print('Days with extreme rainfall (>=20.1 mm/h):', rainfall\_extremes)

print('Days with extreme wind speed (>=5.57 m/s):', wind\_extremes)

print('Days with extreme wave height (>=2.1 m):', swh\_extremes)

# Create a visualization of extreme events by month

extreme\_days['Month'] = extreme\_days['Date'].dt.month

monthly\_counts = extreme\_days['Month'].value\_counts().sort\_index()

plt.figure(figsize=(12, 6))

monthly\_counts.plot(kind='bar')

plt.title('Distribution of Extreme Weather Days by Month')

plt.xlabel('Month')

plt.ylabel('Number of Extreme Weather Days')

plt.xticks(range(12), ['Jan', 'Feb', 'Mar', 'Apr', 'May', 'Jun', 'Jul', 'Aug', 'Sep', 'Oct', 'Nov', 'Dec'], rotation=45)

plt.tight\_layout()

plt.show()