Time series analysis of Air Passenger

In [34]:
```
import numpy as np
import pandas as pd
import matplotlib.pyplot as plt

from statsmodels.tsa.seasonal import seasonal_decompose
```

In [35]:
```
# Read the data
df1 = pd.read_csv('AirPassenger.csv')
```

In [36]:
```
# Check data types
df1.dtypes
```

Out[36]:
```
Year-Month    object
 Pax           int64
dtype: object
```

In [37]:
```
# We are providing inputs to tell pandas that we are trying to work with time series
df1 = pd.read_csv('AirPassenger.csv', parse_dates = ['Year-Month'])
```

In [38]:
```
df1.dtypes
```

Out[38]:
```
Year-Month    datetime64[ns]
 Pax                   int64
dtype: object
```

In [39]:
```
df1.head()
```

Out[39]:

	Year-Month	Pax
0	1949-01-01	112
1	1949-02-01	118
2	1949-03-01	132
3	1949-04-01	129
4	1949-05-01	121

In [40]:
```
# It is recommended that we make our time series reference as the index
df1 = pd.read_csv('AirPassenger.csv', parse_dates = ['Year-Month'], index_col = 'Year-Month')
```

In [41]:
```
df1.head()
```

Out[41]:

	Pax
Year-Month	
1949-01-01	112
1949-02-01	118
1949-03-01	132
1949-04-01	129
1949-05-01	121

In [42]:
```
# We can conveniently do slicing i.e. obtain data for a specific time period
df1['1951-04-01':'1952-03-01']
```

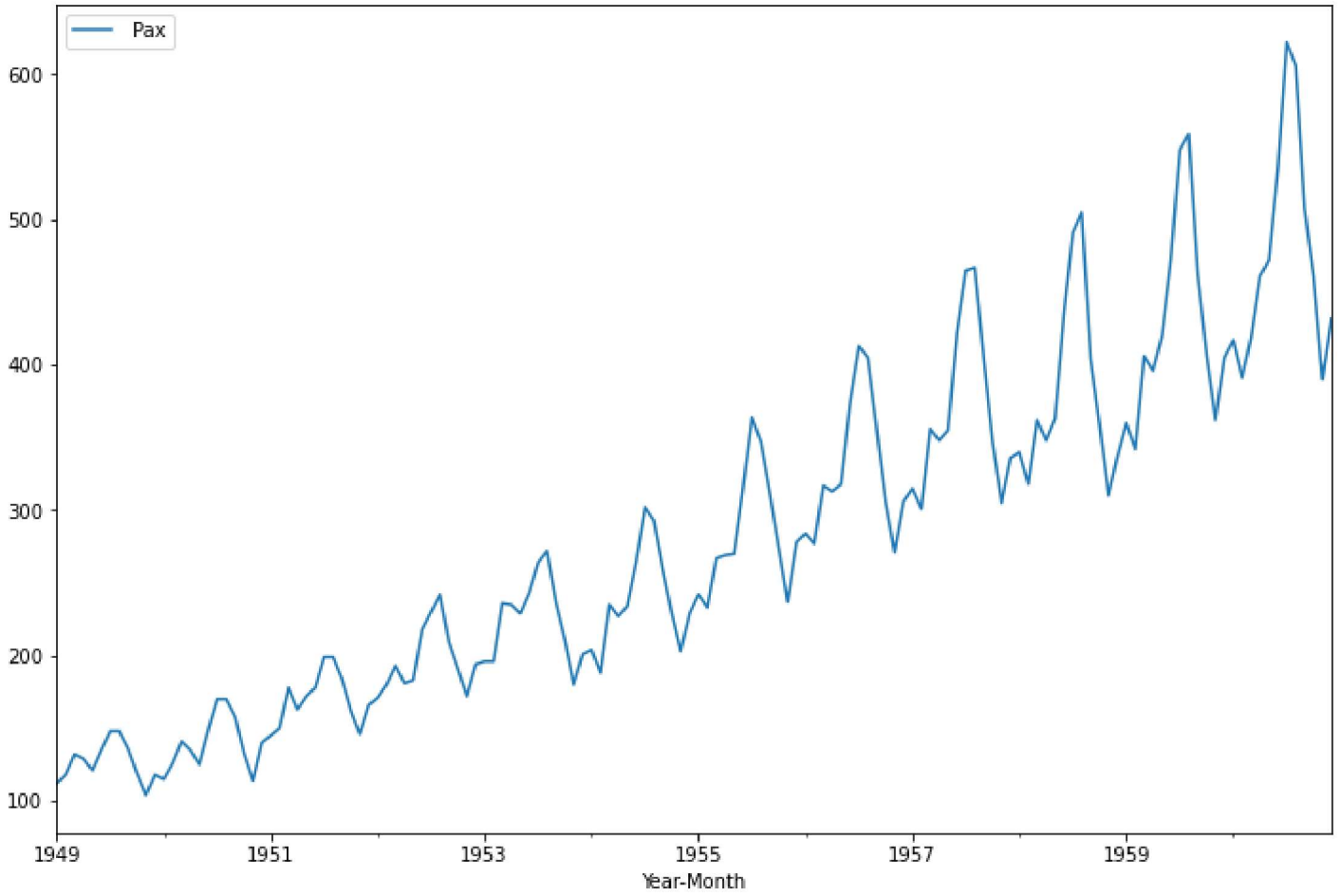
Out[42]:

Year-Month	Pax
1951-04-01	163
1951-05-01	172
1951-06-01	178
1951-07-01	199
1951-08-01	199
1951-09-01	184
1951-10-01	162
1951-11-01	146
1951-12-01	166
1952-01-01	171
1952-02-01	180
1952-03-01	193

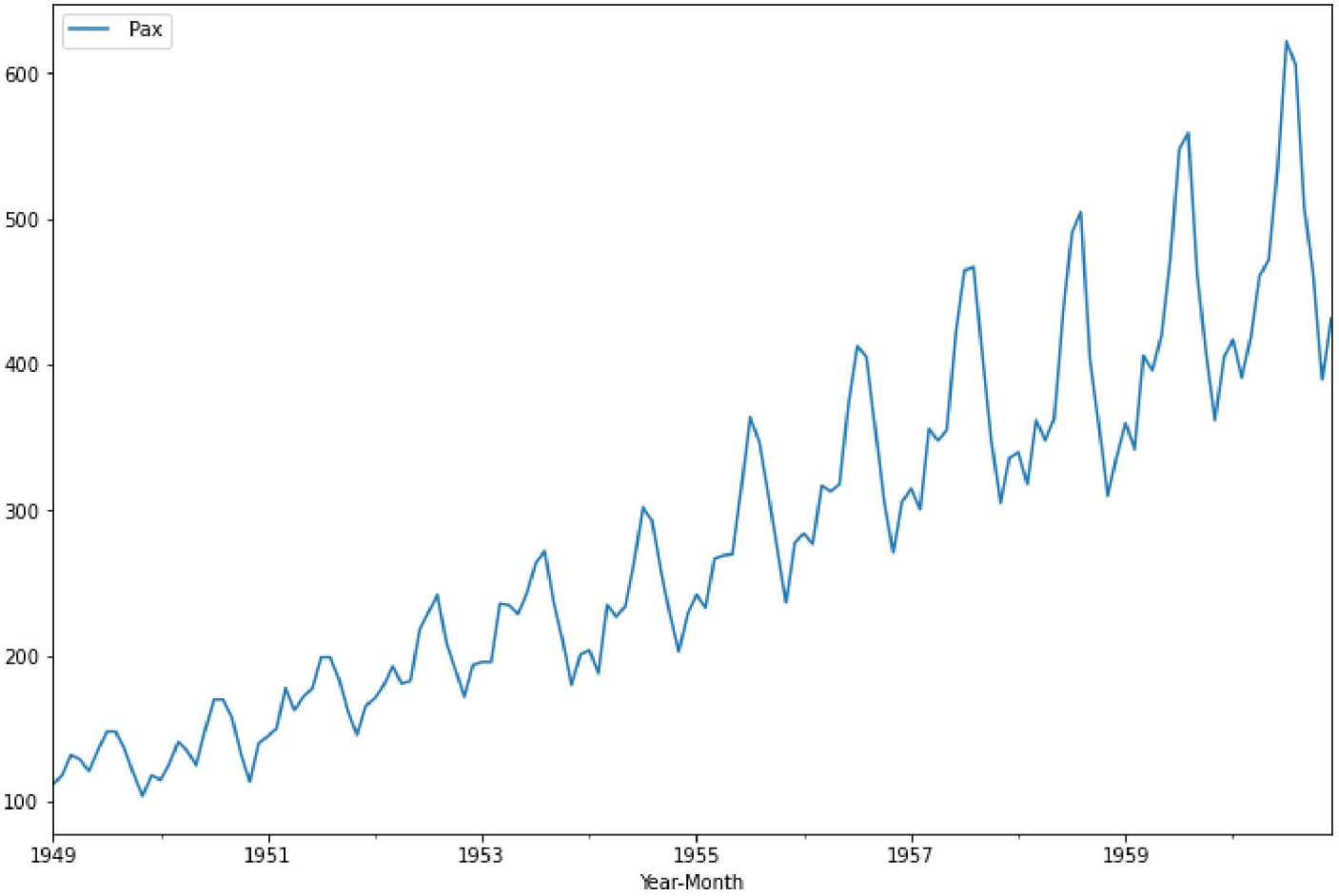
In [43]:
```
# We can check values corresponding to a specific time point
df1.loc['1960-05-01']
```

Out[43]:
```
Pax    472
Name: 1960-05-01 00:00:00, dtype: int64
```

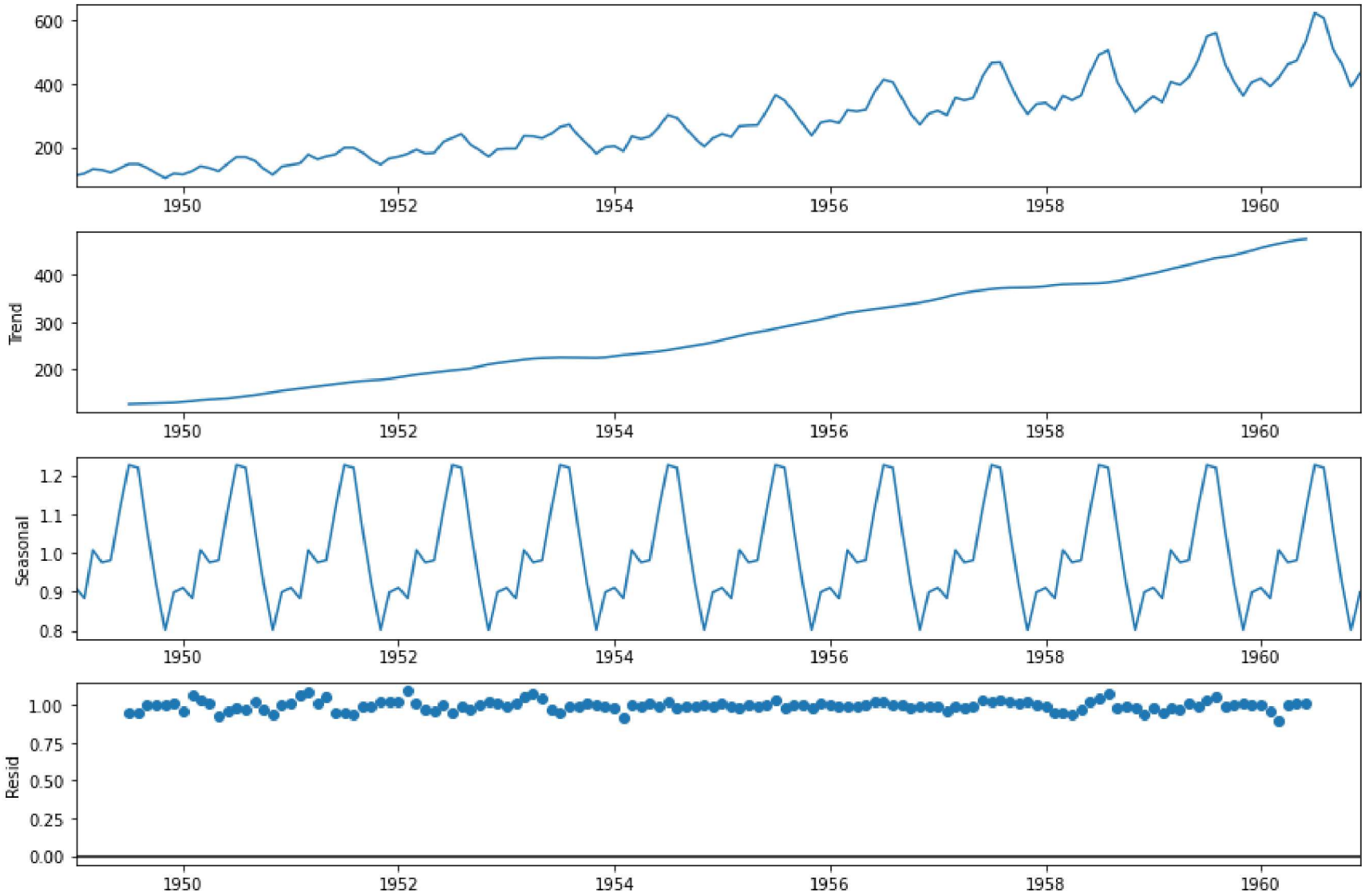
In [44]:
```
# Plot the time series
df1.plot()
plt.show()
```



In [45]:
```
# Increase the figure size
from pylab import rcParams
rcParams['figure.figsize'] = 12, 8
df1.plot()
plt.show()
```



In [46]:
```
# Decompose the time series multiplicatively
df1_mul_decompose = seasonal_decompose(df1,model="multiplicative")
df1_mul_decompose.plot()
plt.show()
```



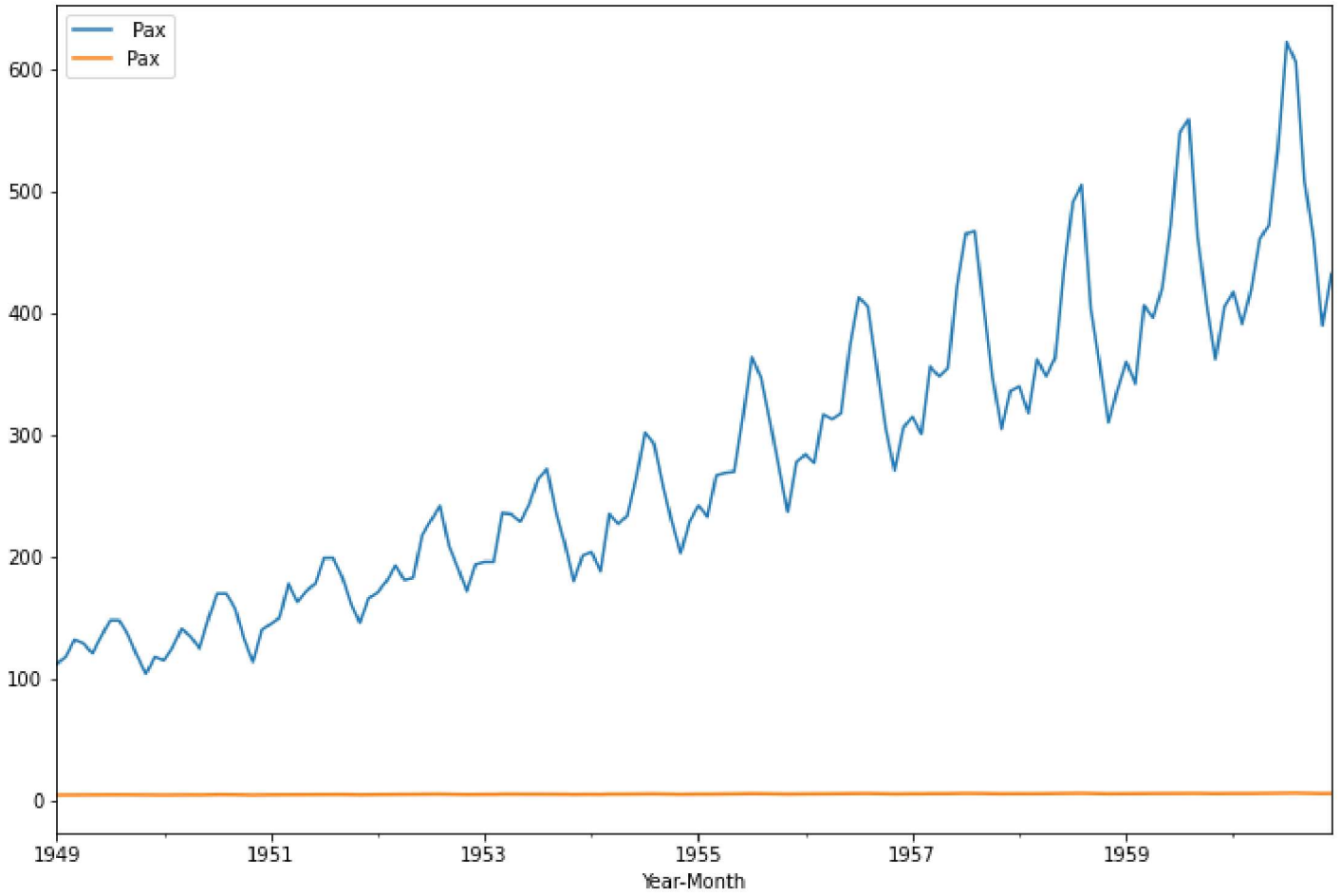
In [47]:
```
# Lets try to do log transformation
df1_log = df1.copy()
```

In [48]:
```
df1_log['Pax'] = np.log(df1)
```

In [49]:
```
df1_log.Pax
```

Out[49]:
```
Year-Month
1949-01-01    4.718499
1949-02-01    4.770685
1949-03-01    4.882802
1949-04-01    4.859812
1949-05-01    4.795791
                ...
1960-08-01    6.406880
1960-09-01    6.230481
1960-10-01    6.133398
1960-11-01    5.966147
1960-12-01    6.068426
Name: Pax, Length: 144, dtype: float64
```

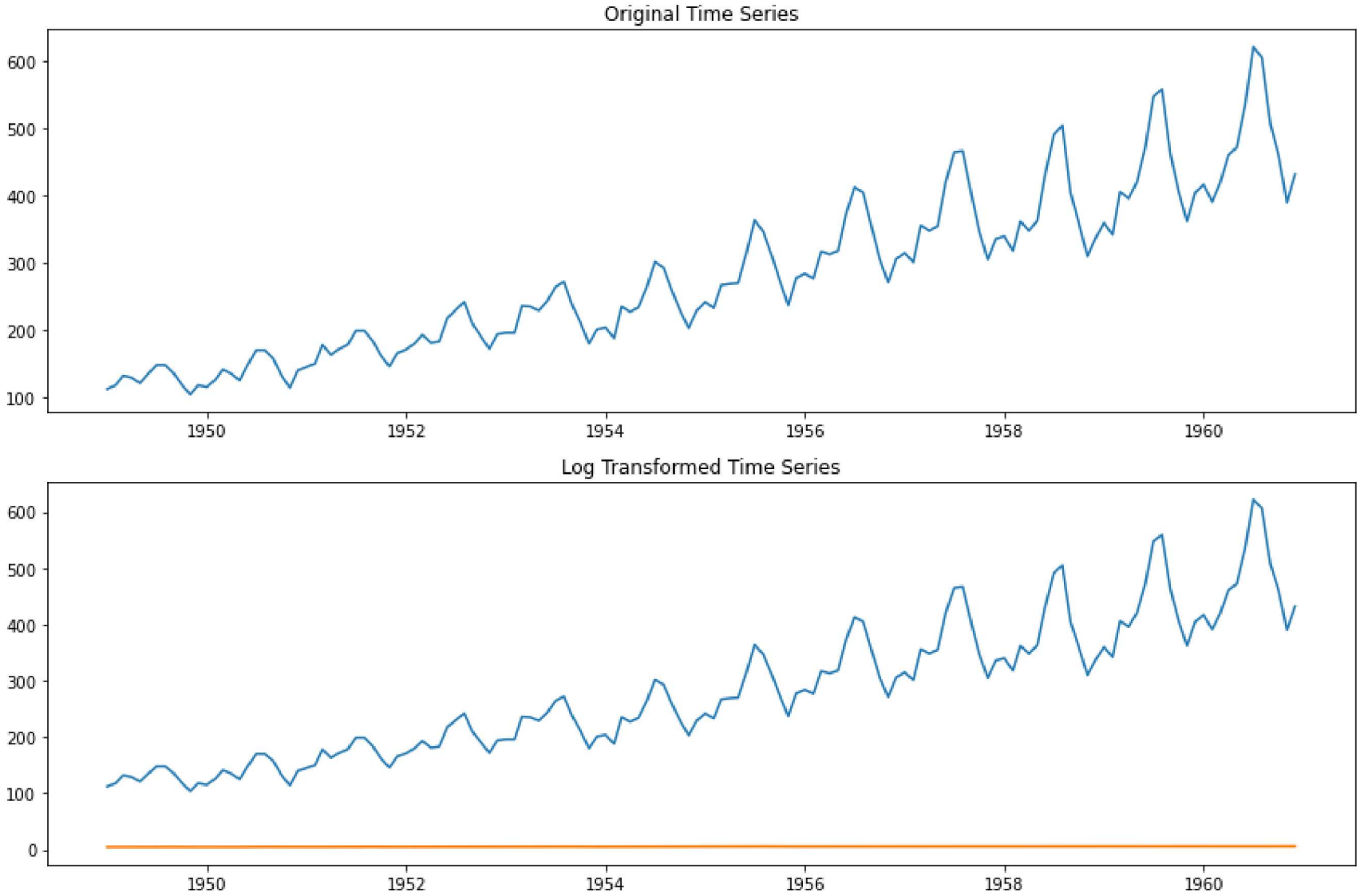
In [50]:
```
# Visualize the log transformed series
df1_log.plot()
plt.show()
```



In [51]:
```
# Compare with the original series

plt.subplot(2,1,1)
plt.title('Original Time Series')
plt.plot(df1)

plt.subplot(2,1,2)
plt.title('Log Transformed Time Series')
plt.plot(df1_log)
plt.tight_layout()
```



Analyzed by

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In [ ]: