In [3]:
```
import numpy as np
import pandas as pd
import seaborn as sns
import matplotlib.pyplot as plt
```

In [35]:
```
df1=pd.read_csv('APIdataset.csv')
df1
```

Out[35]:

	Country Name	Country Code	Indicator Name	Indicator Code	1960	1961	19
0	Aruba	ABW	Population, total	SP.POP.TOTL	5.460800e+04	5.581100e+04	5.668200e-
1	Africa Eastern and Southern	AFE	Population, total	SP.POP.TOTL	1.306926e+08	1.341692e+08	1.378356e-
2	Afghanistan	AFG	Population, total	SP.POP.TOTL	8.622466e+06	8.790140e+06	8.969047e-
3	Africa Western and Central	AFW	Population, total	SP.POP.TOTL	9.725629e+07	9.931403e+07	1.014450e-
4	Angola	AGO	Population, total	SP.POP.TOTL	5.357195e+06	5.441333e+06	5.521400e-
5	Albania	ALB	Population, total	SP.POP.TOTL	1.608800e+06	1.659800e+06	1.711319e-

In [36]:
```
df1.head()
```

Out[36]:

	Country Name	Country Code	Indicator Name	Indicator Code	1960	1961	1962	
0	Aruba	ABW	Population, total	SP.POP.TOTL	54608.0	55811.0	56682.0	
1	Africa Eastern and Southern	AFE	Population, total	SP.POP.TOTL	130692579.0	134169237.0	137835590.0	141
2	Afghanistan	AFG	Population, total	SP.POP.TOTL	8622466.0	8790140.0	8969047.0	9
3	Africa Western and Central	AFW	Population, total	SP.POP.TOTL	97256290.0	99314028.0	101445032.0	103
4	Angola	AGO	Population, total	SP.POP.TOTL	5357195.0	5441333.0	5521400.0	5

5 rows × 68 columns

In [37]:
```
df1.tail()
```

Out[37]:

	Country Name	Country Code	Indicator Name	Indicator Code	1960	1961	1962	
261	Kosovo	XKX	Population, total	SP.POP.TOTL	947000.0	966000.0	994000.0	1022
262	Yemen, Rep.	YEM	Population, total	SP.POP.TOTL	5542459.0	5646668.0	5753386.0	5860
263	South Africa	ZAF	Population, total	SP.POP.TOTL	16520441.0	16989464.0	17503133.0	18042
264	Zambia	ZMB	Population, total	SP.POP.TOTL	3119430.0	3219451.0	3323427.0	3431
265	Zimbabwe	ZWE	Population, total	SP.POP.TOTL	3806310.0	3925952.0	4049778.0	4177

5 rows × 68 columns

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

Out[38]:
```
(266, 68)
```

In [39]:
```
df1.columns
```

Out[39]:
```
Index(['Country Name', 'Country Code', 'Indicator Name', 'Indicator Code',
       '1960', '1961', '1962', '1963', '1964', '1965', '1966', '1967', '19
68',
       '1969', '1970', '1971', '1972', '1973', '1974', '1975', '1976', '19
77',
       '1978', '1979', '1980', '1981', '1982', '1983', '1984', '1985', '19
86',
       '1987', '1988', '1989', '1990', '1991', '1992', '1993', '1994', '19
95',
       '1996', '1997', '1998', '1999', '2000', '2001', '2002', '2003', '20
04',
       '2005', '2006', '2007', '2008', '2009', '2010', '2011', '2012', '20
13',
       '2014', '2015', '2016', '2017', '2018', '2019', '2020', '2021', '20
22',
       '2023'],
      dtype='object')
```

In [12]:

```
df1.dtypes
```

Out[12]:

```
Data Source                      object
World Development Indicators     object
Unnamed: 2                       object
Unnamed: 3                       object
Unnamed: 4                      float64
Unnamed: 5                      float64
Unnamed: 6                      float64
Unnamed: 7                      float64
Unnamed: 8                      float64
Unnamed: 9                      float64
Unnamed: 10                     float64
Unnamed: 11                     float64
Unnamed: 12                     float64
Unnamed: 13                     float64
Unnamed: 14                     float64
Unnamed: 15                     float64
Unnamed: 16                     float64
Unnamed: 17                     float64
Unnamed: 18                     float64
Unnamed: 19                     float64
Unnamed: 20                     float64
Unnamed: 21                     float64
Unnamed: 22                     float64
Unnamed: 23                     float64
Unnamed: 24                     float64
Unnamed: 25                     float64
Unnamed: 26                     float64
Unnamed: 27                     float64
Unnamed: 28                     float64
Unnamed: 29                     float64
                                 ...   
Unnamed: 38                     float64
Unnamed: 39                     float64
Unnamed: 40                     float64
Unnamed: 41                     float64
Unnamed: 42                     float64
Unnamed: 43                     float64
Unnamed: 44                     float64
Unnamed: 45                     float64
Unnamed: 46                     float64
Unnamed: 47                     float64
Unnamed: 48                     float64
Unnamed: 49                     float64
Unnamed: 50                     float64
Unnamed: 51                     float64
Unnamed: 52                     float64
Unnamed: 53                     float64
Unnamed: 54                     float64
Unnamed: 55                     float64
Unnamed: 56                     float64
Unnamed: 57                     float64
Unnamed: 58                     float64
Unnamed: 59                     float64
Unnamed: 60                     float64
Unnamed: 61                     float64
Unnamed: 62                     float64
Unnamed: 63                     float64
Unnamed: 64                     float64
Unnamed: 65                     float64
Unnamed: 66                     float64
```

```
Unnamed: 67                    float64
Length: 68, dtype: object
```

In [40]:

```
df1.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 266 entries, 0 to 265
Data columns (total 68 columns):
Country Name      266 non-null object
Country Code      266 non-null object
Indicator Name    266 non-null object
Indicator Code    266 non-null object
1960              264 non-null float64
1961              264 non-null float64
1962              264 non-null float64
1963              264 non-null float64
1964              264 non-null float64
1965              264 non-null float64
1966              264 non-null float64
1967              264 non-null float64
1968              264 non-null float64
1969              264 non-null float64
1970              264 non-null float64
1971              264 non-null float64
1972              264 non-null float64
1973              264 non-null float64
1974              264 non-null float64
1975              264 non-null float64
1976              264 non-null float64
1977              264 non-null float64
1978              264 non-null float64
1979              264 non-null float64
1980              264 non-null float64
1981              264 non-null float64
1982              264 non-null float64
1983              264 non-null float64
1984              264 non-null float64
1985              264 non-null float64
1986              264 non-null float64
1987              264 non-null float64
1988              264 non-null float64
1989              264 non-null float64
1990              265 non-null float64
1991              265 non-null float64
1992              265 non-null float64
1993              265 non-null float64
1994              265 non-null float64
1995              265 non-null float64
1996              265 non-null float64
1997              265 non-null float64
1998              265 non-null float64
1999              265 non-null float64
2000              265 non-null float64
2001              265 non-null float64
2002              265 non-null float64
2003              265 non-null float64
2004              265 non-null float64
2005              265 non-null float64
2006              265 non-null float64
2007              265 non-null float64
2008              265 non-null float64
2009              265 non-null float64
2010              265 non-null float64
2011              265 non-null float64
2012              265 non-null float64
2013              265 non-null float64
```

```
2014              265 non-null float64
2015              265 non-null float64
2016              265 non-null float64
2017              265 non-null float64
2018              265 non-null float64
2019              265 non-null float64
2020              265 non-null float64
2021              265 non-null float64
2022              265 non-null float64
2023              0 non-null float64
dtypes: float64(64), object(4)
memory usage: 141.4+ KB
```

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

Out[41]:

	1960	1961	1962	1963	1964	1965
count	2.640000e+02	2.640000e+02	2.640000e+02	2.640000e+02	2.640000e+02	2.640000e+02
mean	1.172860e+08	1.188956e+08	1.210661e+08	1.237484e+08	1.264530e+08	1.291965e+08
std	3.695500e+08	3.740958e+08	3.808121e+08	3.895098e+08	3.982497e+08	4.071209e+08
min	2.646000e+03	2.888000e+03	3.171000e+03	3.481000e+03	3.811000e+03	4.161000e+03
25%	5.132212e+05	5.231345e+05	5.337595e+05	5.449288e+05	5.566630e+05	5.651150e+05
50%	3.757486e+06	3.887144e+06	4.023896e+06	4.139356e+06	4.224612e+06	4.277636e+06
75%	2.670606e+07	2.748694e+07	2.830289e+07	2.914708e+07	3.001684e+07	3.084892e+07
max	3.031474e+09	3.072422e+09	3.126850e+09	3.193429e+09	3.260442e+09	3.328209e+09

8 rows × 64 columns

In [42]:
```
df1.duplicated().sum()
```

Out[42]:
```
0
```

In [43]:
```
df1.isna().sum().any()
```

Out[43]:
```
True
```

In [44]:
```
df1=df1.fillna(method="ffill")
df1.head()
```

Out[44]:

	Country Name	Country Code	Indicator Name	Indicator Code	1960	1961	1962	
0	Aruba	ABW	Population, total	SP.POP.TOTL	54608.0	55811.0	56682.0	
1	Africa Eastern and Southern	AFE	Population, total	SP.POP.TOTL	130692579.0	134169237.0	137835590.0	141
2	Afghanistan	AFG	Population, total	SP.POP.TOTL	8622466.0	8790140.0	8969047.0	9
3	Africa Western and Central	AFW	Population, total	SP.POP.TOTL	97256290.0	99314028.0	101445032.0	103
4	Angola	AGO	Population, total	SP.POP.TOTL	5357195.0	5441333.0	5521400.0	5

5 rows × 68 columns

In [45]:
```
df1.isna().sum().any()
```

Out[45]:
```
True
```

In [46]:
```
df1['Country Name'].unique()
```

```
Out[46]: array(['Aruba', 'Africa Eastern and Southern', 'Afghanistan',
                'Africa Western and Central', 'Angola', 'Albania', 'Andorra',
                'Arab World', 'United Arab Emirates', 'Argentina', 'Armenia',
                'American Samoa', 'Antigua and Barbuda', 'Australia', 'Austria',
                'Azerbaijan', 'Burundi', 'Belgium', 'Benin', 'Burkina Faso',
                'Bangladesh', 'Bulgaria', 'Bahrain', 'Bahamas, The',
                'Bosnia and Herzegovina', 'Belarus', 'Belize', 'Bermuda',
                'Bolivia', 'Brazil', 'Barbados', 'Brunei Darussalam', 'Bhutan',
                'Botswana', 'Central African Republic', 'Canada',
                'Central Europe and the Baltics', 'Switzerland', 'Channel Islands',
                'Chile', 'China', "Cote d'Ivoire", 'Cameroon', 'Congo, Dem. Rep.',
                'Congo, Rep.', 'Colombia', 'Comoros', 'Cabo Verde', 'Costa Rica',
                'Caribbean small states', 'Cuba', 'Curacao', 'Cayman Islands',
                'Cyprus', 'Czechia', 'Germany', 'Djibouti', 'Dominica', 'Denmark',
                'Dominican Republic', 'Algeria',
                'East Asia & Pacific (excluding high income)',
                'Early-demographic dividend', 'East Asia & Pacific',
                'Europe & Central Asia (excluding high income)',
                'Europe & Central Asia', 'Ecuador', 'Egypt, Arab Rep.',
                'Euro area', 'Eritrea', 'Spain', 'Estonia', 'Ethiopia',
                'European Union', 'Fragile and conflict affected situations',
                'Finland', 'Fiji', 'France', 'Faroe Islands',
                'Micronesia, Fed. Sts.', 'Gabon', 'United Kingdom', 'Georgia',
                'Ghana', 'Gibraltar', 'Guinea', 'Gambia, The', 'Guinea-Bissau',
                'Equatorial Guinea', 'Greece', 'Grenada', 'Greenland', 'Guatemala',
                'Guam', 'Guyana', 'High income', 'Hong Kong SAR, China',
                'Honduras', 'Heavily indebted poor countries (HIPC)', 'Croatia',
                'Haiti', 'Hungary', 'IBRD only', 'IDA & IBRD total', 'IDA total',
                'IDA blend', 'Indonesia', 'IDA only', 'Isle of Man', 'India',
                'Not classified', 'Ireland', 'Iran, Islamic Rep.', 'Iraq',
                'Iceland', 'Israel', 'Italy', 'Jamaica', 'Jordan', 'Japan',
                'Kazakhstan', 'Kenya', 'Kyrgyz Republic', 'Cambodia', 'Kiribati',
                'St. Kitts and Nevis', 'Korea, Rep.', 'Kuwait',
                'Latin America & Caribbean (excluding high income)', 'Lao PDR',
                'Lebanon', 'Liberia', 'Libya', 'St. Lucia',
                'Latin America & Caribbean',
                'Least developed countries: UN classification', 'Low income',
                'Liechtenstein', 'Sri Lanka', 'Lower middle income',
                'Low & middle income', 'Lesotho', 'Late-demographic dividend',
                'Lithuania', 'Luxembourg', 'Latvia', 'Macao SAR, China',
                'St. Martin (French part)', 'Morocco', 'Monaco', 'Moldova',
                'Madagascar', 'Maldives', 'Middle East & North Africa', 'Mexico',
                'Marshall Islands', 'Middle income', 'North Macedonia', 'Mali',
                'Malta', 'Myanmar',
                'Middle East & North Africa (excluding high income)', 'Montenegro',
                'Mongolia', 'Northern Mariana Islands', 'Mozambique', 'Mauritania',
                'Mauritius', 'Malawi', 'Malaysia', 'North America', 'Namibia',
                'New Caledonia', 'Niger', 'Nigeria', 'Nicaragua', 'Netherlands',
                'Norway', 'Nepal', 'Nauru', 'New Zealand', 'OECD members', 'Oman',
                'Other small states', 'Pakistan', 'Panama', 'Peru', 'Philippines',
                'Palau', 'Papua New Guinea', 'Poland', 'Pre-demographic dividend',
                'Puerto Rico', "Korea, Dem. People's Rep.", 'Portugal', 'Paraguay',
                'West Bank and Gaza', 'Pacific island small states',
                'Post-demographic dividend', 'French Polynesia', 'Qatar',
                'Romania', 'Russian Federation', 'Rwanda', 'South Asia',
                'Saudi Arabia', 'Sudan', 'Senegal', 'Singapore', 'Solomon Islands',
                'Sierra Leone', 'El Salvador', 'San Marino', 'Somalia', 'Serbia',
                'Sub-Saharan Africa (excluding high income)', 'South Sudan',
                'Sub-Saharan Africa', 'Small states', 'Sao Tome and Principe',
                'Suriname', 'Slovak Republic', 'Slovenia', 'Sweden', 'Eswatini',
                'Sint Maarten (Dutch part)', 'Seychelles', 'Syrian Arab Republic',
                'Turks and Caicos Islands', 'Chad',
                'East Asia & Pacific (IDA & IBRD countries)',
                'Europe & Central Asia (IDA & IBRD countries)', 'Togo', 'Thailand',
                'Tajikistan', 'Turkmenistan',
                'Latin America & the Caribbean (IDA & IBRD countries)',
                'Timor-Leste', 'Middle East & North Africa (IDA & IBRD countries)',
                'Tonga', 'South Asia (IDA & IBRD)',
                'Sub-Saharan Africa (IDA & IBRD countries)', 'Trinidad and Tobago',
                'Tunisia', 'Turkiye', 'Tuvalu', 'Tanzania', 'Uganda', 'Ukraine',
                'Upper middle income', 'Uruguay', 'United States', 'Uzbekistan',
                'St. Vincent and the Grenadines', 'Venezuela, RB',
                'British Virgin Islands', 'Virgin Islands (U.S.)', 'Viet Nam',
                'Vanuatu', 'World', 'Samoa', 'Kosovo', 'Yemen, Rep.',
                'South Africa', 'Zambia', 'Zimbabwe'], dtype=object)
```

In [47]:
```
df1['Indicator Code'].unique()
```

Out[47]:
```
array(['SP.POP.TOTL'], dtype=object)
```

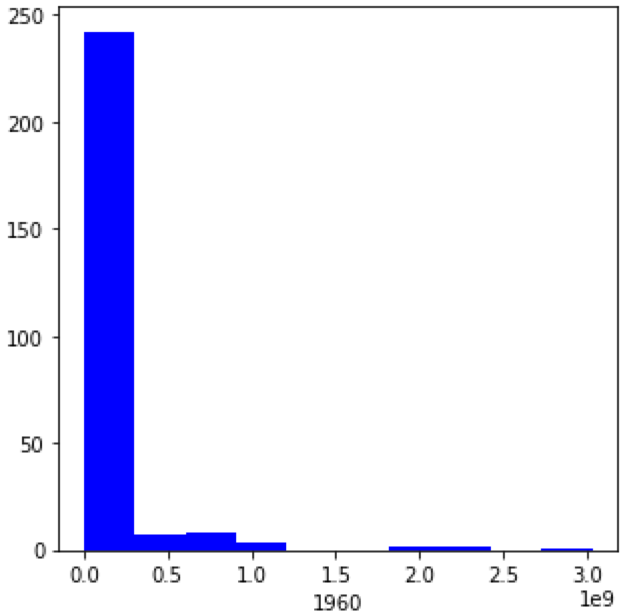
In [49]:
```
df1.drop(['Indicator Name','Indicator Code','Country Code'],axis=1,inplace=T
```

In [50]:
```
df1.columns
```

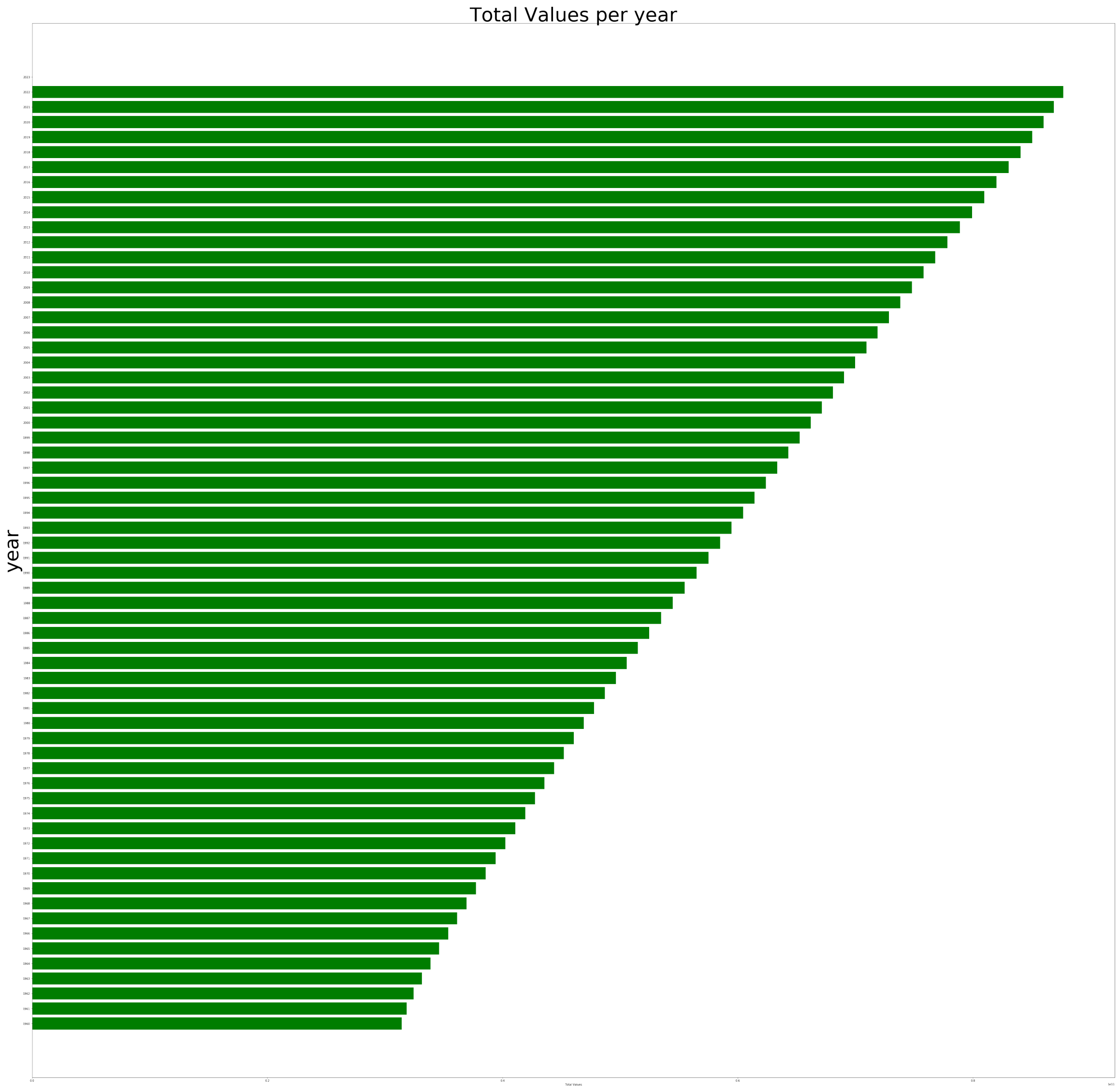
Out[50]:
```
Index(['Country Name', '1960', '1961', '1962', '1963', '1964', '1965', '19
66',
       '1967', '1968', '1969', '1970', '1971', '1972', '1973', '1974', '19
75',
       '1976', '1977', '1978', '1979', '1980', '1981', '1982', '1983', '19
84',
       '1985', '1986', '1987', '1988', '1989', '1990', '1991', '1992', '19
93',
       '1994', '1995', '1996', '1997', '1998', '1999', '2000', '2001', '20
02',
       '2003', '2004', '2005', '2006', '2007', '2008', '2009', '2010', '20
11',
       '2012', '2013', '2014', '2015', '2016', '2017', '2018', '2019', '20
20',
       '2021', '2022', '2023'],
      dtype='object')
```

In [53]:
```
cols=['1960', '1961', '1962', '1963', '1964', '1965', '1966',
       '1967', '1968', '1969', '1970', '1971', '1972', '1973', '1974', '1975
       '1976', '1977', '1978', '1979', '1980', '1981', '1982', '1983', '1984
       '1985', '1986', '1987', '1988', '1989', '1990', '1991', '1992', '1993
       '1994', '1995', '1996', '1997', '1998', '1999', '2000', '2001', '2002
       '2003', '2004', '2005', '2006', '2007', '2008', '2009', '2010', '2011
       '2012', '2013', '2014', '2015', '2016', '2017', '2018', '2019', '2020
       '2021', '2022', '2023']
```

In [56]:
```
for i in cols:
    fig=plt.figure(figsize=(5,5))
    plt.hist(df1[i],color='blue',bins=10)
    plt.xlabel(i)
    plt.show()
```



In [60]:
```
years=df1.columns[1:]
total_values=df1[years].sum()
plt.figure(figsize=(70,70))
plt.barh(years,total_values,color='green')
plt.xlabel("Total Values")
plt.ylabel('year',size=70)
plt.title("Total Values per year",size=70)
plt.show()
```



In [61]:

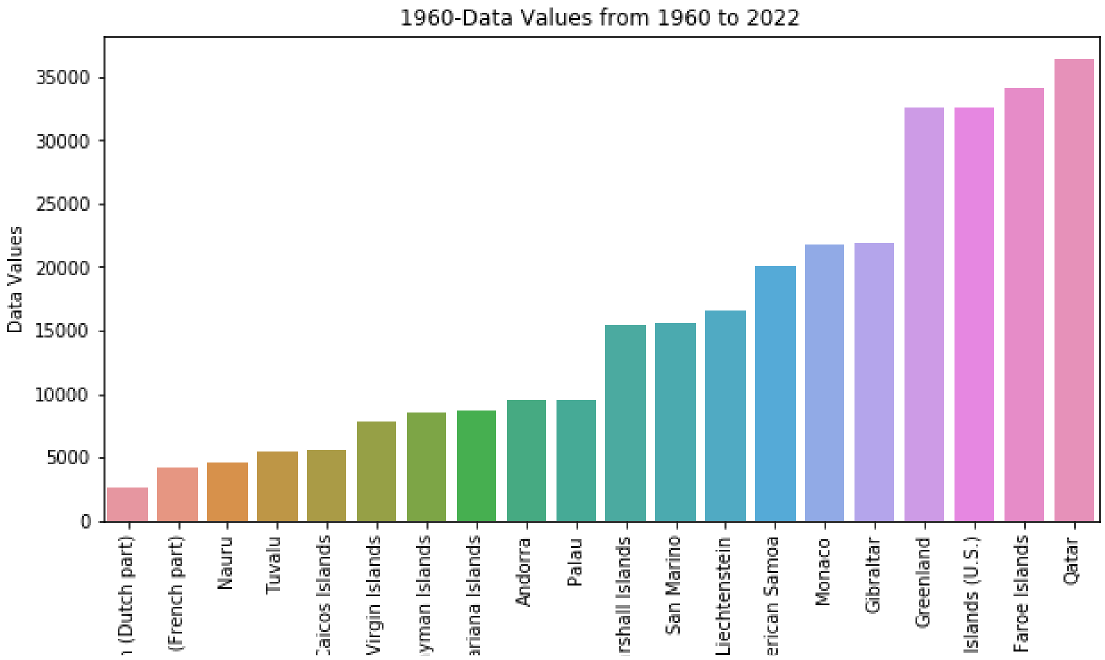
```
country_by_1960=df1.sort_values(by='1960').head(20)
country_by_1960
```

Out[61]:

	Country Name	1960	1961	1962	1963	1964	1965	1966	1967	'
225	Sint Maarten (Dutch part)	2646.0	2888.0	3171.0	3481.0	3811.0	4161.0	4531.0	4930.0	53
147	St. Martin (French part)	4135.0	4258.0	4388.0	4524.0	4666.0	4832.0	5044.0	5294.0	54
179	Nauru	4582.0	4753.0	4950.0	5198.0	5484.0	5804.0	6021.0	6114.0	62
245	Tuvalu	5404.0	5436.0	5471.0	5503.0	5525.0	5548.0	5591.0	5657.0	57
228	Turks and Caicos Islands	5604.0	5625.0	5633.0	5634.0	5642.0	5650.0	5652.0	5662.0	56
255	British Virgin Islands	7850.0	7885.0	7902.0	7919.0	7949.0	8018.0	8139.0	8337.0	86
52	Cayman Islands	8473.0	8626.0	8799.0	8985.0	9172.0	9366.0	9566.0	9771.0	99
164	Northern Mariana Islands	8702.0	8965.0	9252.0	9561.0	9890.0	10229.0	10577.0	10720.0	104
6	Andorra	9443.0	10216.0	11014.0	11839.0	12690.0	13563.0	14546.0	15745.0	170
188	Palau	9446.0	9639.0	9851.0	10076.0	10318.0	10563.0	10813.0	10992.0	110
155	Marshall Islands	15374.0	15867.0	16387.0	16947.0	17537.0	18154.0	18794.0	19665.0	210
212	San Marino	15556.0	15895.0	16242.0	16583.0	16926.0	17273.0	17588.0	17907.0	182
137	Liechtenstein	16472.0	16834.0	17221.0	17625.0	18058.0	18500.0	18957.0	19467.0	200
11	American Samoa	20085.0	20626.0	21272.0	21949.0	22656.0	23391.0	24122.0	24848.0	256
149	Monaco	21797.0	21907.0	22106.0	22442.0	22766.0	23022.0	23198.0	23281.0	234
84	Gibraltar	21822.0	21907.0	22249.0	22796.0	23347.0	23910.0	24477.0	25047.0	256
91	Greenland	32500.0	33700.0	35000.0	36400.0	37600.0	39200.0	40500.0	41900.0	434
256	Virgin Islands (U.S.)	32500.0	34300.0	35000.0	39800.0	40800.0	43500.0	46200.0	49100.0	557
78	Faroe Islands	34154.0	34572.0	34963.0	35385.0	35841.0	36346.0	36825.0	37234.0	376
200	Qatar	36385.0	40111.0	45123.0	50950.0	57531.0	64843.0	73102.0	82517.0	930

20 rows × 65 columns

In [64]:
```
country_by_1960_t=country_by_1960.set_index('Country Name').T
for country_name,data_values in country_by_1960_t.iterrows():
    fig=plt.figure(figsize=(10,5))
    sns.barplot(x=data_values.index,y=data_values.values)
    plt.xlabel('Countries')
    plt.ylabel('Data Values')
    plt.title(f"{country_name}-Data Values from 1960 to 2022")
    plt.xticks(rotation=90)
    plt.show()
```



In [66]:
```
country_by_2022=df1.sort_values(by='2022').head(20)
country_by_2022
```

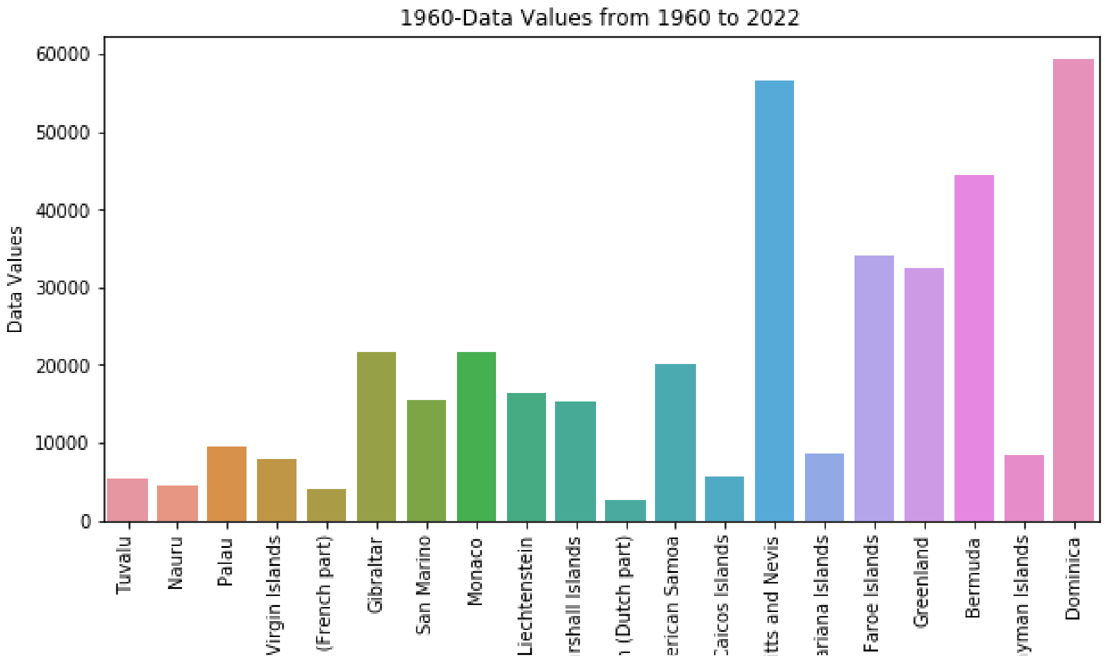
Out[66]:

	Country Name	1960	1961	1962	1963	1964	1965	1966	1967	'
245	Tuvalu	5404.0	5436.0	5471.0	5503.0	5525.0	5548.0	5591.0	5657.0	57
179	Nauru	4582.0	4753.0	4950.0	5198.0	5484.0	5804.0	6021.0	6114.0	62
188	Palau	9446.0	9639.0	9851.0	10076.0	10318.0	10563.0	10813.0	10992.0	110
255	British Virgin Islands	7850.0	7885.0	7902.0	7919.0	7949.0	8018.0	8139.0	8337.0	86
147	St. Martin (French part)	4135.0	4258.0	4388.0	4524.0	4666.0	4832.0	5044.0	5294.0	54
84	Gibraltar	21822.0	21907.0	22249.0	22796.0	23347.0	23910.0	24477.0	25047.0	256
212	San Marino	15556.0	15895.0	16242.0	16583.0	16926.0	17273.0	17588.0	17907.0	182
149	Monaco	21797.0	21907.0	22106.0	22442.0	22766.0	23022.0	23198.0	23281.0	234
137	Liechtenstein	16472.0	16834.0	17221.0	17625.0	18058.0	18500.0	18957.0	19467.0	200
155	Marshall Islands	15374.0	15867.0	16387.0	16947.0	17537.0	18154.0	18794.0	19665.0	210
225	Sint Maarten (Dutch part)	2646.0	2888.0	3171.0	3481.0	3811.0	4161.0	4531.0	4930.0	53
11	American Samoa	20085.0	20626.0	21272.0	21949.0	22656.0	23391.0	24122.0	24848.0	256
228	Turks and Caicos Islands	5604.0	5625.0	5633.0	5634.0	5642.0	5650.0	5652.0	5662.0	56
125	St. Kitts and Nevis	56660.0	56247.0	55404.0	54391.0	53255.0	52016.0	50683.0	49269.0	477
164	Northern Mariana Islands	8702.0	8965.0	9252.0	9561.0	9890.0	10229.0	10577.0	10720.0	104
78	Faroe Islands	34154.0	34572.0	34963.0	35385.0	35841.0	36346.0	36825.0	37234.0	376
91	Greenland	32500.0	33700.0	35000.0	36400.0	37600.0	39200.0	40500.0	41900.0	434
27	Bermuda	44400.0	45500.0	46600.0	47700.0	48900.0	50100.0	51000.0	52000.0	530
52	Cayman Islands	8473.0	8626.0	8799.0	8985.0	9172.0	9366.0	9566.0	9771.0	99
57	Dominica	59379.0	60395.0	61224.0	62031.0	62843.0	63744.0	64728.0	65760.0	668

20 rows × 65 columns

In [67]:

```
country_by_2022_t=country_by_2022.set_index('Country Name').T
for country_name,data_values in country_by_2022_t.iterrows():
    fig=plt.figure(figsize=(10,5))
    sns.barplot(x=data_values.index,y=data_values.values)
    plt.xlabel('Year')
    plt.ylabel('Data Values')
    plt.title(f"{country_name}-Data Values from 1960 to 2022")
    plt.xticks(rotation=90)
    plt.show()
```



In [ ]: