Visualisation of World Population Distribution

Importing libraries and dataset

In [1]:
```
import numpy as np
import pandas as pd
import sklearn
import matplotlib.pyplot as plt
import plotly.express as px
import seaborn as sns
import warnings
warnings.filterwarnings('ignore')
```

In [2]:
```
dataset=pd.read_csv('C:\mahua\Projects\Prodigy Infotech\world_population.csv')
```

In [3]:
```
dataset
```

Out[3]:

	Rank	CCA3	Country	Capital	Continent	2022	2020	2015	2010	2000	1990	1980	1970	Area	Density	Growth_Rate	Percent_Population
0	36	AFG	Afghanistan	Kabul	Asia	41128771	38972230	33753499	28189672	19542982	10694796	12486631	10752971	652230	63.0587	1.0257	0.52
1	138	ALB	Albania	Tirana	Europe	2842321	2866849	2882481	2913399	3182021	3295066	2941651	2324731	28748	98.8702	0.9957	0.04
2	34	DZA	Algeria	Algiers	Africa	44903225	43451666	39543154	35856344	30774621	25518074	18739378	13795915	2381741	18.8531	1.0164	0.56
3	213	ASM	American Samoa	Pago Pago	Oceania	44273	46189	51368	54849	58230	47818	32886	27075	199	222.4774	0.9831	0.00
4	203	AND	Andorra	Andorra la Vella	Europe	79824	77700	71746	71519	66097	53569	35611	19860	468	170.5641	1.0100	0.00
...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
229	226	WLF	Wallis and Futuna	Mata-Utu	Oceania	11572	11655	12182	13142	14723	13454	11315	9377	142	81.4930	0.9953	0.00
230	172	ESH	Western Sahara	El Aaiún	Africa	575986	556048	491824	413296	270375	178529	116775	76371	266000	2.1654	1.0184	0.01
231	46	YEM	Yemen	Sanaa	Asia	33696614	32284046	28516545	24743946	18628700	13375121	9204938	6843607	527968	63.8232	1.0217	0.42
232	63	ZMB	Zambia	Lusaka	Africa	20017675	18927715	16248230	13792086	9891136	7686401	5720438	4281671	752612	26.5976	1.0280	0.25
233	74	ZWE	Zimbabwe	Harare	Africa	16320537	15669666	14154937	12839771	11834676	10113893	7049926	5202918	390757	41.7665	1.0204	0.20

234 rows × 17 columns

In [4]:
```
dataset.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 234 entries, 0 to 233
Data columns (total 17 columns):
 #   Column              Non-Null Count  Dtype
---  ------              --------------  -----
 0   Rank                234 non-null    int64
 1   CCA3                234 non-null    object
 2   Country             234 non-null    object
 3   Capital             234 non-null    object
 4   Continent           234 non-null    object
 5   2022                234 non-null    int64
 6   2020                234 non-null    int64
 7   2015                234 non-null    int64
 8   2010                234 non-null    int64
 9   2000                234 non-null    int64
 10  1990                234 non-null    int64
 11  1980                234 non-null    int64
 12  1970                234 non-null    int64
 13  Area                234 non-null    int64
 14  Density             234 non-null    float64
 15  Growth_Rate         234 non-null    float64
 16  Percent_Population  234 non-null    float64
dtypes: float64(3), int64(10), object(4)
memory usage: 31.2+ KB
```

In [5]:
```
dataset.describe()
```

Out[5]:

	Rank	2022	2020	2015	2010	2000	1990	1980	1970	Area	Density	Growth_Rate	Percent_Population
count	234.000000	2.340000e+02	2.340000e+02	2.340000e+02	2.340000e+02	2.340000e+02	2.340000e+02	2.340000e+02	2.340000e+02	2.340000e+02	234.000000	234.000000	234.000000
mean	117.500000	3.407441e+07	3.350107e+07	3.172996e+07	2.984524e+07	2.626947e+07	2.271022e+07	1.898462e+07	1.578691e+07	5.814494e+05	452.127044	1.009577	0.427051
std	67.694165	1.367664e+08	1.355899e+08	1.304050e+08	1.242185e+08	1.116982e+08	9.783217e+07	8.178519e+07	6.779509e+07	1.761841e+06	2066.121904	0.013385	1.714977
min	1.000000	5.100000e+02	5.200000e+02	5.640000e+02	5.960000e+02	6.510000e+02	7.000000e+02	7.330000e+02	7.520000e+02	1.000000e+00	0.026100	0.912000	0.000000
25%	59.250000	4.197385e+05	4.152845e+05	4.046760e+05	3.931490e+05	3.272420e+05	2.641158e+05	2.296142e+05	1.559970e+05	2.650000e+03	38.417875	1.001775	0.010000
50%	117.500000	5.559944e+06	5.493074e+06	5.307400e+06	4.942770e+06	4.292907e+06	3.825410e+06	3.141146e+06	2.604830e+06	8.119950e+04	95.346750	1.007900	0.070000
75%	175.750000	2.247650e+07	2.144798e+07	1.973085e+07	1.915957e+07	1.576230e+07	1.186923e+07	9.826054e+06	8.817329e+06	4.304258e+05	238.933250	1.016950	0.280000
max	234.000000	1.425887e+09	1.424930e+09	1.393715e+09	1.348191e+09	1.264099e+09	1.153704e+09	9.823725e+08	8.225344e+08	1.709824e+07	23172.266700	1.069100	17.880000

In [6]:
```
dataset.shape
```

Out[6]:
```
(234, 17)
```

In [7]:
```
dataset.head()
```

Out[7]:

	Rank	CCA3	Country	Capital	Continent	2022	2020	2015	2010	2000	1990	1980	1970	Area	Density	Growth_Rate	Percent_Population
0	36	AFG	Afghanistan	Kabul	Asia	41128771	38972230	33753499	28189672	19542982	10694796	12486631	10752971	652230	63.0587	1.0257	0.52
1	138	ALB	Albania	Tirana	Europe	2842321	2866849	2882481	2913399	3182021	3295066	2941651	2324731	28748	98.8702	0.9957	0.04
2	34	DZA	Algeria	Algiers	Africa	44903225	43451666	39543154	35856344	30774621	25518074	18739378	13795915	2381741	18.8531	1.0164	0.56
3	213	ASM	American Samoa	Pago Pago	Oceania	44273	46189	51368	54849	58230	47818	32886	27075	199	222.4774	0.9831	0.00
4	203	AND	Andorra	Andorra la Vella	Europe	79824	77700	71746	71519	66097	53569	35611	19860	468	170.5641	1.0100	0.00

In [8]:
```
dataset.tail()
```

Out[8]:

	Rank	CCA3	Country	Capital	Continent	2022	2020	2015	2010	2000	1990	1980	1970	Area	Density	Growth_Rate	Percent_Population
229	226	WLF	Wallis and Futuna	Mata-Utu	Oceania	11572	11655	12182	13142	14723	13454	11315	9377	142	81.4930	0.9953	0.00
230	172	ESH	Western Sahara	El Aaiún	Africa	575986	556048	491824	413296	270375	178529	116775	76371	266000	2.1654	1.0184	0.01
231	46	YEM	Yemen	Sanaa	Asia	33696614	32284046	28516545	24743946	18628700	13375121	9204938	6843607	527968	63.8232	1.0217	0.42
232	63	ZMB	Zambia	Lusaka	Africa	20017675	18927715	16248230	13792086	9891136	7686401	5720438	4281671	752612	26.5976	1.0280	0.25
233	74	ZWE	Zimbabwe	Harare	Africa	16320537	15669666	14154937	12839771	11834676	10113893	7049926	5202918	390757	41.7665	1.0204	0.20

>> The above dataset shows Continent 'Oceania'. Oceania is also commonly known as Australia.

In [9]:
```
dataset.isnull().any()
```

Out[9]:
```
Rank                 False
CCA3                 False
Country              False
Capital              False
Continent            False
2022                 False
2020                 False
2015                 False
2010                 False
2000                 False
1990                 False
1980                 False
1970                 False
Area                 False
Density              False
Growth_Rate          False
Percent_Population   False
dtype: bool
```

>> No Null Values

In [10]:
```
len(dataset)
```

Out[10]:
```
234
```

>> Length of the dataset tells about the number of countries in dataset

Data Visualisation

Correlation Matrix and Heatmap

In [11]:
```
corr_mat=dataset.corr()
corr_mat
```

Out[11]:

	Rank	2022	2020	2015	2010	2000	1990	1980	1970	Area	Density	Growth_Rate	Percent_Population
Rank	1.000000	-0.358361	-0.355854	-0.351222	-0.347461	-0.341057	-0.336152	-0.335246	-0.335379	-0.383774	0.129436	-0.224561	-0.358464
2022	-0.358361	1.000000	0.999946	0.999490	0.998629	0.994605	0.987228	0.980285	0.973162	0.453411	-0.027618	-0.020863	0.999999
2020	-0.355854	0.999946	1.000000	0.999763	0.999105	0.995583	0.988724	0.982121	0.975254	0.454993	-0.027358	-0.025116	0.999944
2015	-0.351222	0.999490	0.999763	1.000000	0.999783	0.997340	0.991594	0.985724	0.979414	0.458240	-0.026857	-0.032154	0.999487
2010	-0.347461	0.998629	0.999105	0.999783	1.000000	0.998593	0.993929	0.988786	0.983042	0.461936	-0.026505	-0.037983	0.998626
2000	-0.341057	0.994605	0.995583	0.997340	0.998593	1.000000	0.998336	0.995160	0.990956	0.473933	-0.026139	-0.050515	0.994598
1990	-0.336152	0.987228	0.988724	0.991594	0.993929	0.998336	1.000000	0.999042	0.996602	0.486764	-0.026224	-0.062397	0.987218
1980	-0.335246	0.980285	0.982121	0.985724	0.988786	0.995160	0.999042	1.000000	0.999194	0.498166	-0.026587	-0.072349	0.980273
1970	-0.335379	0.973162	0.975254	0.979414	0.983042	0.990956	0.996602	0.999194	1.000000	0.509940	-0.026881	-0.081313	0.973150
Area	-0.383774	0.453411	0.454993	0.458240	0.461936	0.473933	0.486764	0.498166	0.509940	1.000000	-0.063128	-0.013970	0.453284
Density	0.129436	-0.027618	-0.027358	-0.026857	-0.026505	-0.026139	-0.026224	-0.026587	-0.026881	-0.063128	1.000000	-0.069753	-0.027646
Growth_Rate	-0.224561	-0.020863	-0.025116	-0.032154	-0.037983	-0.050515	-0.062397	-0.072349	-0.081313	-0.013970	-0.069753	1.000000	-0.020930
Percent_Population	-0.358464	0.999999	0.999944	0.999487	0.998626	0.994598	0.987218	0.980273	0.973150	0.453284	-0.027646	-0.020930	1.000000

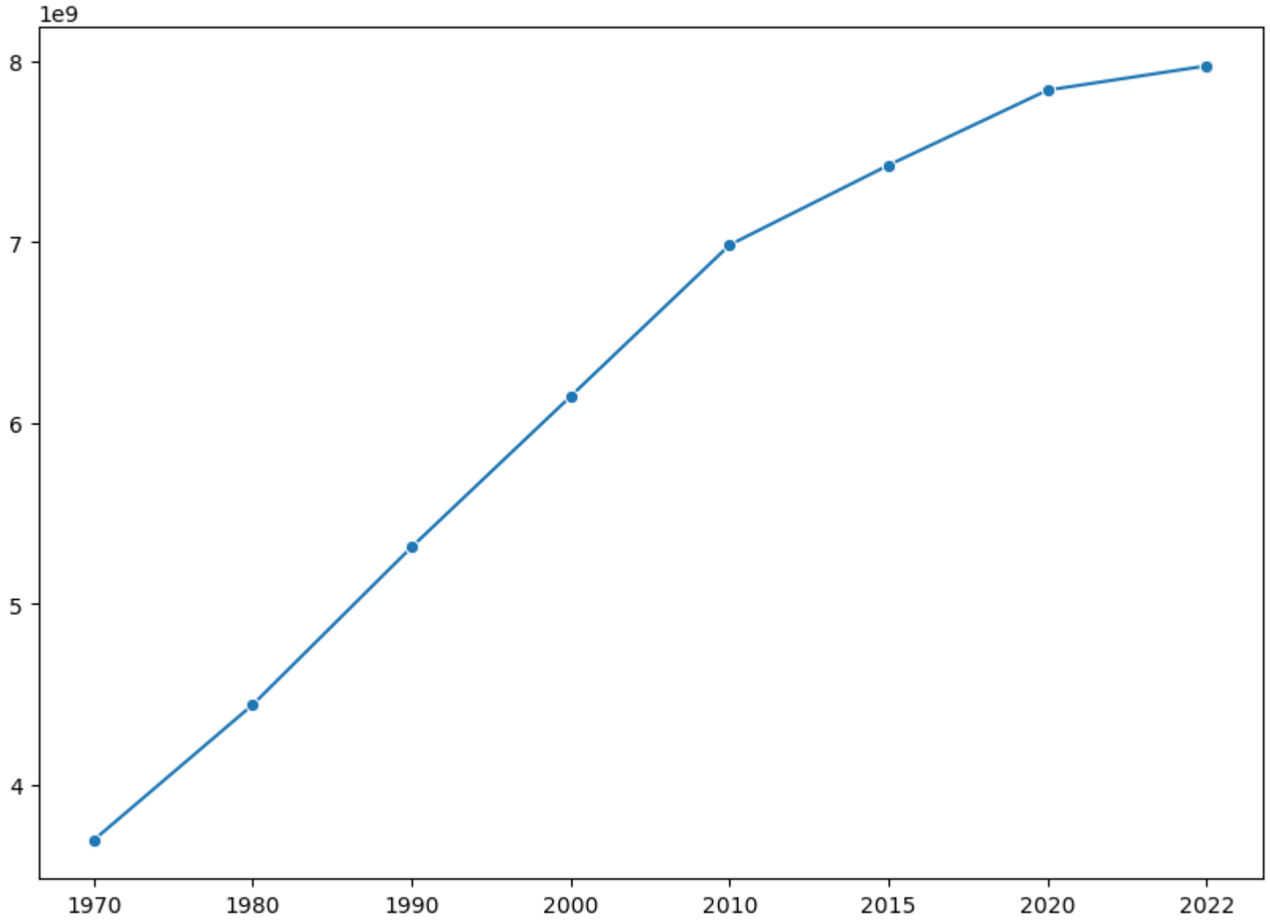
In [12]:
```
plt.figure(figsize=(20,9))
sns.heatmap(data=corr_mat,annot=True)
```

Out[12]:
```
<Axes: >
```

Trend in World Population 1970-2022

In [13]:
```
plt.figure(figsize=(10,7))
trend=dataset.iloc[:,5:13].sum()[::-1]
sns.lineplot(x=trend.index,y=trend.values,marker="o")
```

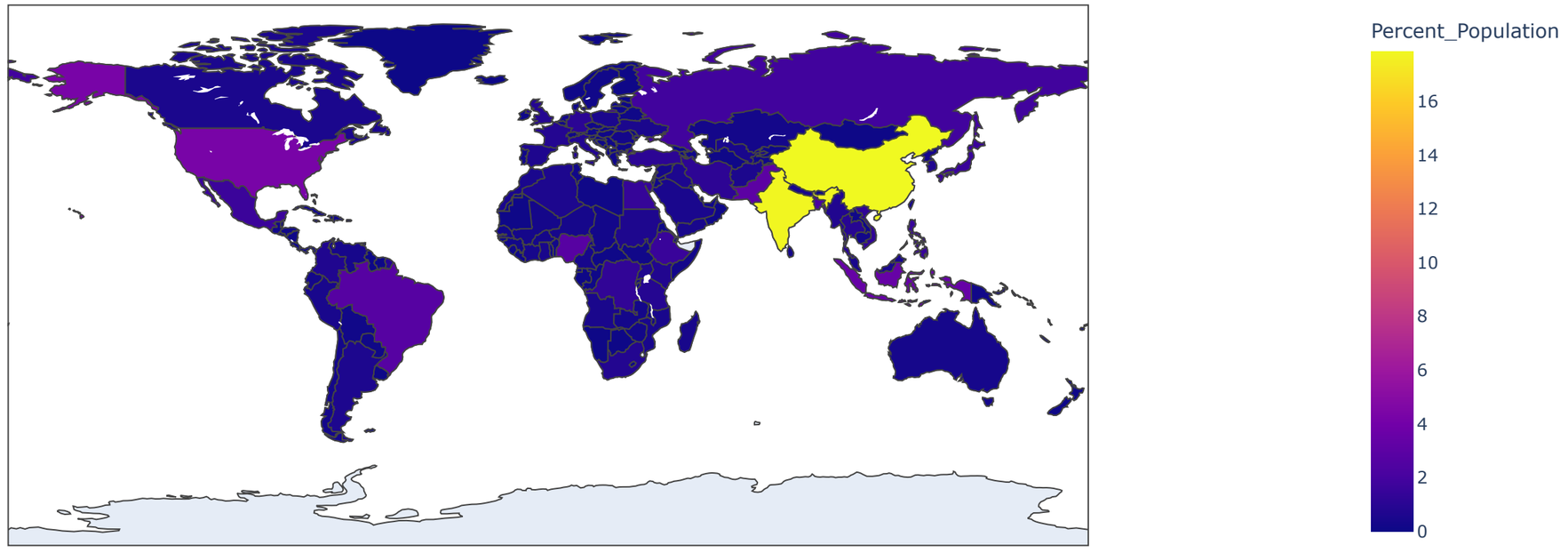
Out[13]:
```
<Axes: >
```



>> The population is increasing at a spike every decade.

World Population Percentage Distribution

In [14]:
```
fig = px.choropleth(dataset,locations='Country',locationmode='country names',color='Percent_Population',hover_name='Country')
fig.show()
```



Distribution with respect to Population Density

Countries with highest Population Density

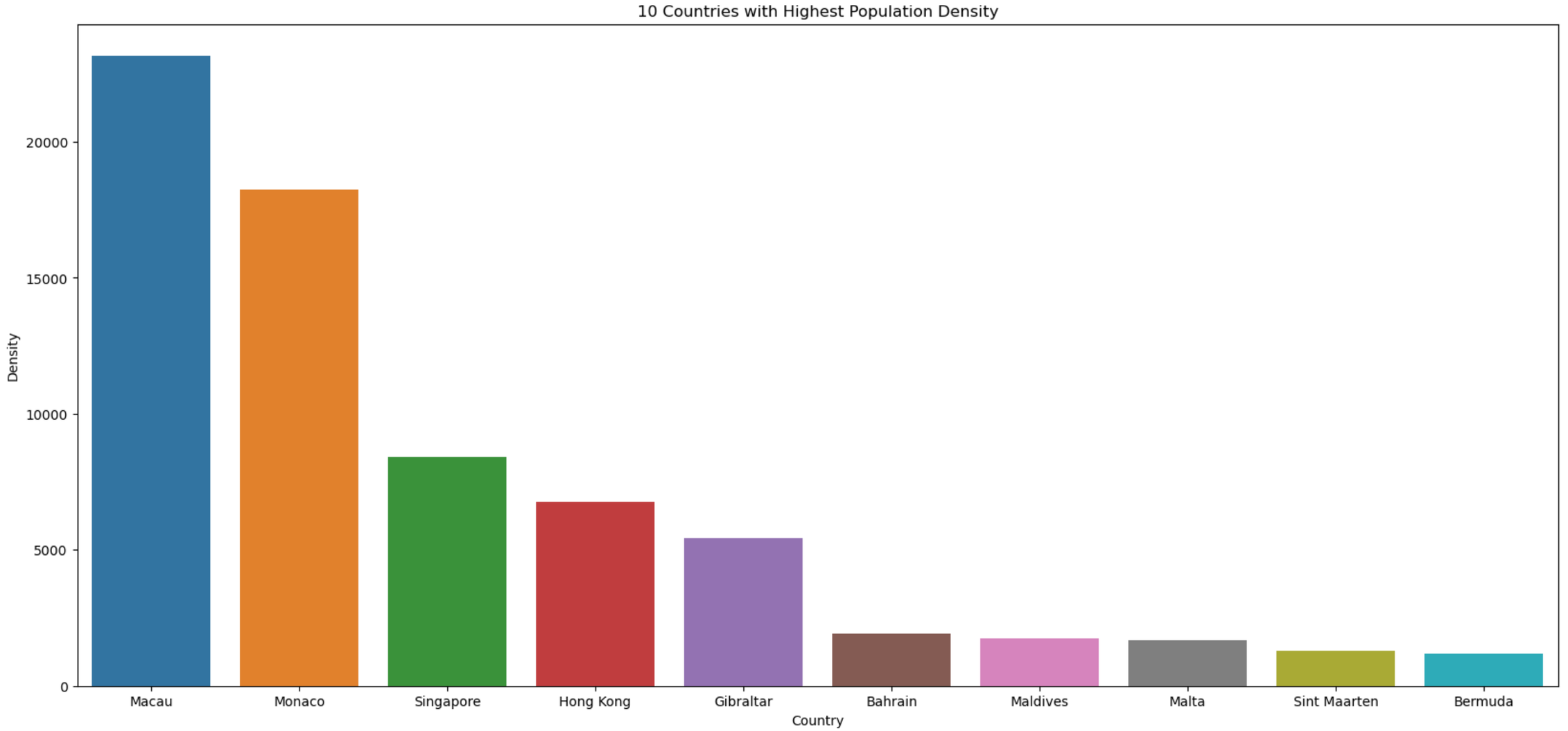
In [15]:
```
pd_high=dataset.sort_values(by='Density',ascending=False)
pd_high=pd_high.head(10)
pd_high
```

Out[15]:

	Rank	CCA3	Country	Capital	Continent	2022	2020	2015	2010	2000	1990	1980	1970	Area	Density	Growth_Rate	Percent_Population
119	167	MAC	Macau	Concelho de Macau	Asia	695168	676283	615239	557297	431896	350227	245332	247284	30	23172.2667	1.0125	0.01
134	217	MCO	Monaco	Monaco	Europe	36469	36922	36760	33178	32465	30329	27076	24270	2	18234.5000	0.9941	0.00
187	113	SGP	Singapore	Singapore	Asia	5975689	5909869	5650018	5163590	4053602	3022209	2400729	2061831	710	8416.4634	1.0058	0.07
89	104	HKG	Hong Kong	Hong Kong	Asia	7488865	7500958	7399838	7132438	6731195	5838574	4978544	3955072	1104	6783.3922	0.9992	0.09
76	219	GIB	Gibraltar	Gibraltar	Europe	32649	32709	32520	31262	27741	27317	28734	26685	6	5441.5000	0.9994	0.00
15	154	BHR	Bahrain	Manama	Asia	1472233	1477469	1362142	1213645	711442	517418	362595	222555	765	1924.4876	1.0061	0.02
123	174	MDV	Maldives	Malé	Asia	523787	514438	435582	361575	282507	224957	164887	123243	300	1745.9567	1.0045	0.01
125	173	MLT	Malta	Valletta	Europe	533286	515357	456579	418755	399212	365392	333587	315414	316	1687.6139	1.0124	0.01
188	214	SXM	Sint Maarten	Philipsburg	North America	44175	43621	40205	33034	30489	27845	12243	6260	34	1299.2647	1.0030	0.00
22	206	BMU	Bermuda	Hamilton	North America	64184	64031	63144	63447	61371	57470	53565	52019	54	1188.5926	1.0000	0.00

In [16]:
```
plt.figure(figsize=(20,9))
sns.barplot(data=pd_high,x='Country',y='Density')
plt.title("10 Countries with Highest Population Density")
```

Out[16]:
```
Text(0.5, 1.0, '10 Countries with Highest Population Density')
```



Countries with lowest population Density

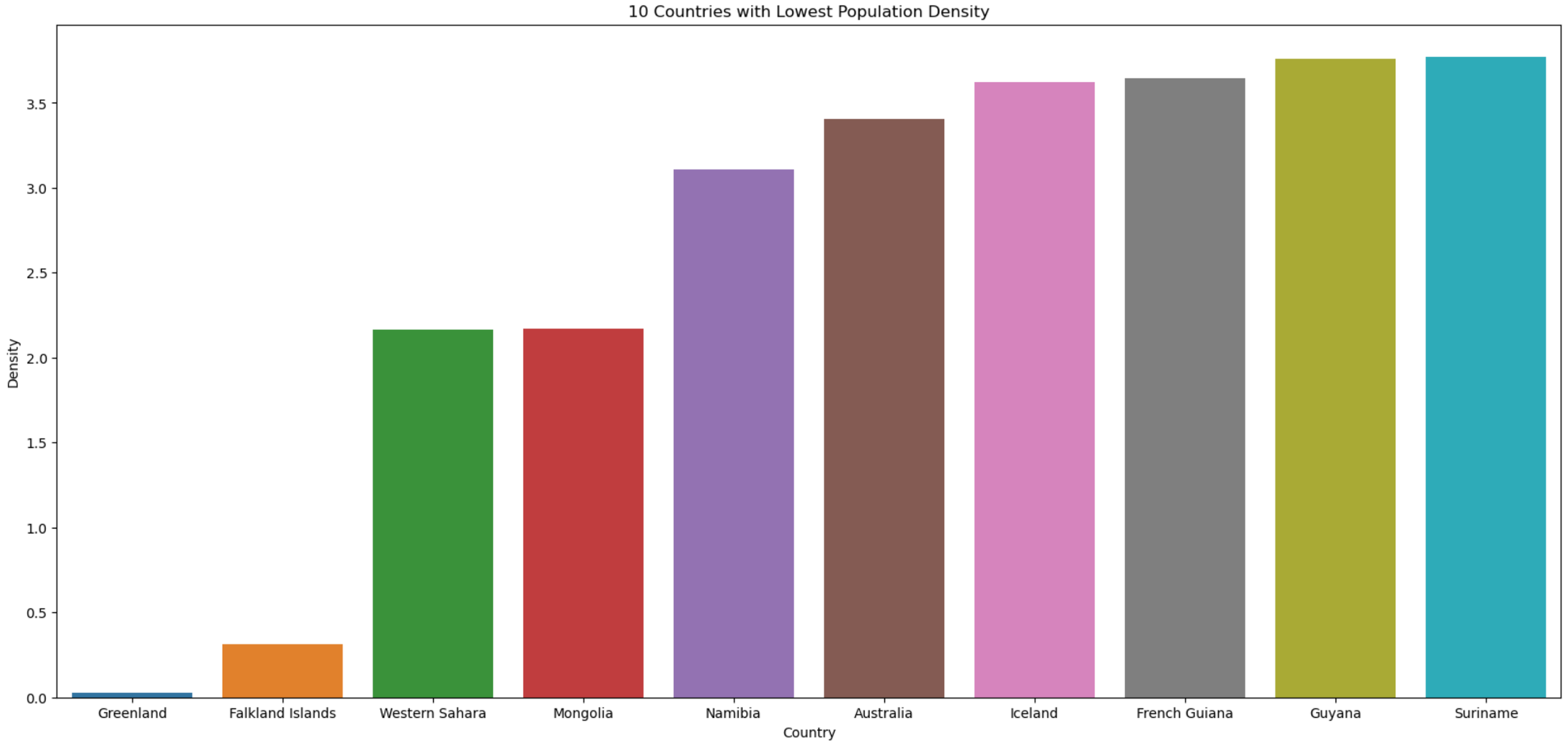
In [17]:
```
pd_low=dataset.sort_values(by='Density')
pd_low=pd_low.head(10)
pd_low
```

Out[17]:

	Rank	CCA3	Country	Capital	Continent	2022	2020	2015	2010	2000	1990	1980	1970	Area	Density	Growth_Rate	Percent_Population
78	208	GRL	Greenland	Nuuk	North America	56466	56026	55895	56351	56184	55599	50106	45434	2166086	0.0261	1.0040	0.00
64	231	FLK	Falkland Islands	Stanley	South America	3780	3747	3408	3187	3080	2332	2240	2274	12173	0.3105	1.0043	0.00
230	172	ESH	Western Sahara	El Aaiún	Africa	575986	556048	491824	413296	270375	178529	116775	76371	266000	2.1654	1.0184	0.01
135	134	MNG	Mongolia	Ulaanbaatar	Asia	3398366	3294335	2964749	2702520	2450979	2161433	1697780	1293880	1564110	2.1727	1.0151	0.04
141	145	NAM	Namibia	Windhoek	Africa	2567012	2489098	2282704	2099271	1819141	1369011	975994	754467	825615	3.1092	1.0146	0.03
11	55	AUS	Australia	Canberra	Oceania	26177413	25670051	23820236	22019168	19017963	17048003	14706322	12595034	7692024	3.4032	1.0099	0.33
91	179	ISL	Iceland	Reykjavík	Europe	372899	366669	331060	318333	281462	255019	228263	204468	103000	3.6204	1.0069	0.00
69	184	GUF	French Guiana	Cayenne	South America	304557	290969	257026	228453	164351	113931	66825	46484	83534	3.6459	1.0239	0.00
86	164	GUY	Guyana	Georgetown	South America	808726	797202	755031	747932	759051	747116	778176	705261	214969	3.7621	1.0052	0.01
199	170	SUR	Suriname	Paramaribo	South America	618040	607065	575475	546080	478998	412756	375112	379918	163820	3.7727	1.0082	0.01

In [18]:
```
plt.figure(figsize=(20,9))
sns.barplot(data=pd_low,x='Country',y='Density')
plt.title("10 Countries with Lowest Population Density")
```

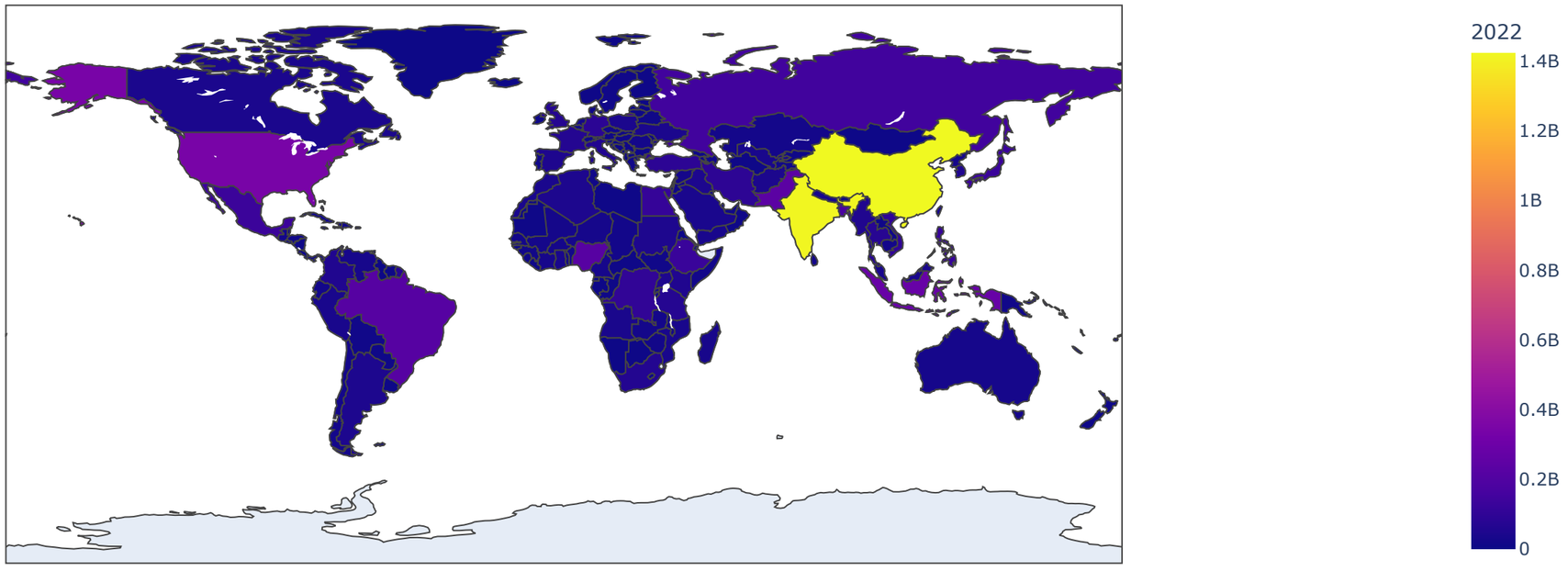
Out[18]:
```
Text(0.5, 1.0, '10 Countries with Lowest Population Density')
```



Population distribution of Countries in "Each Decade"

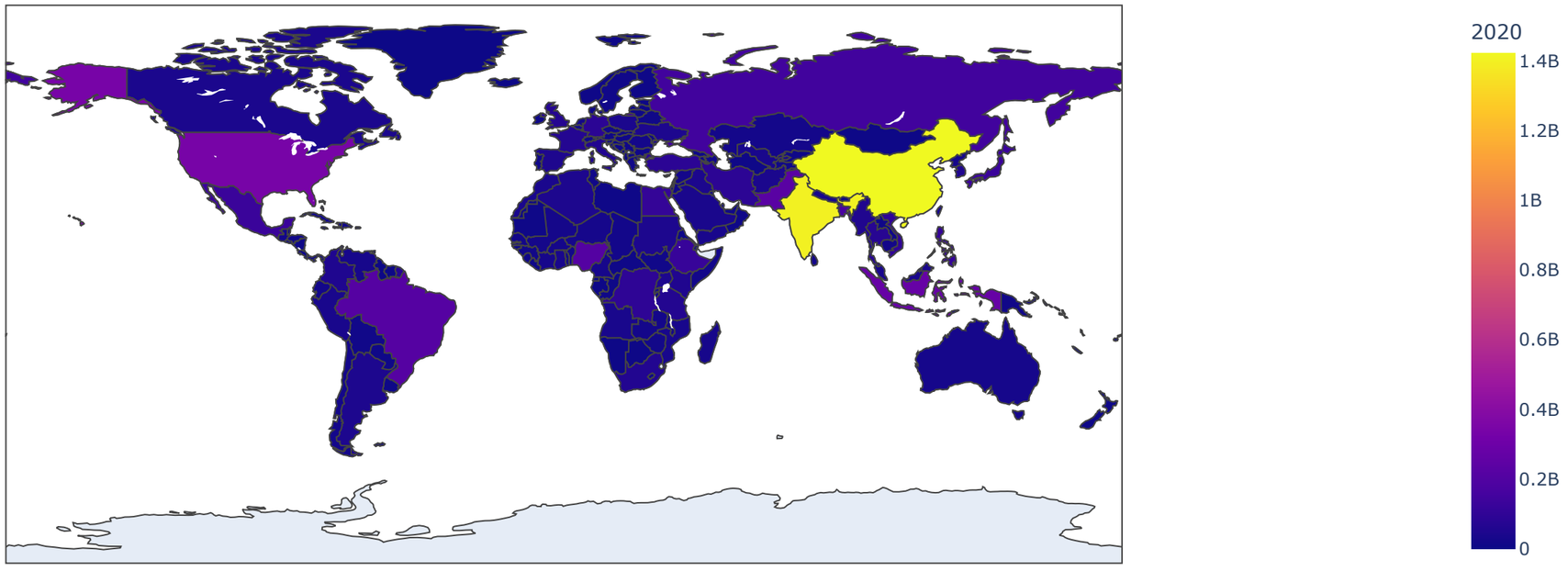
Population distribution 2022

In [19]:
```
fig=px.choropleth(dataset,locations='Country',locationmode='country names',color='2022',hover_name='Country')
fig.show()
```



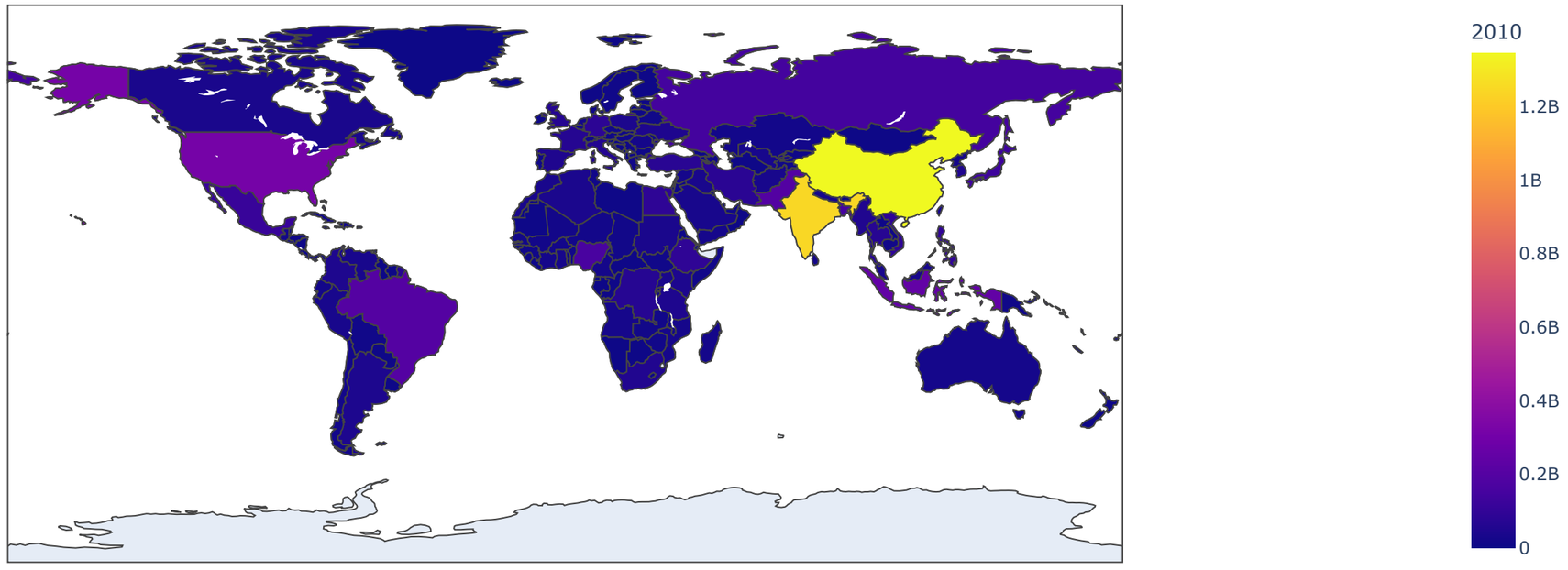
Population Distribution 2020

In [20]:
```
fig=px.choropleth(dataset,locations='Country',locationmode='country names',color='2020',hover_name='Country')
fig.show()
```



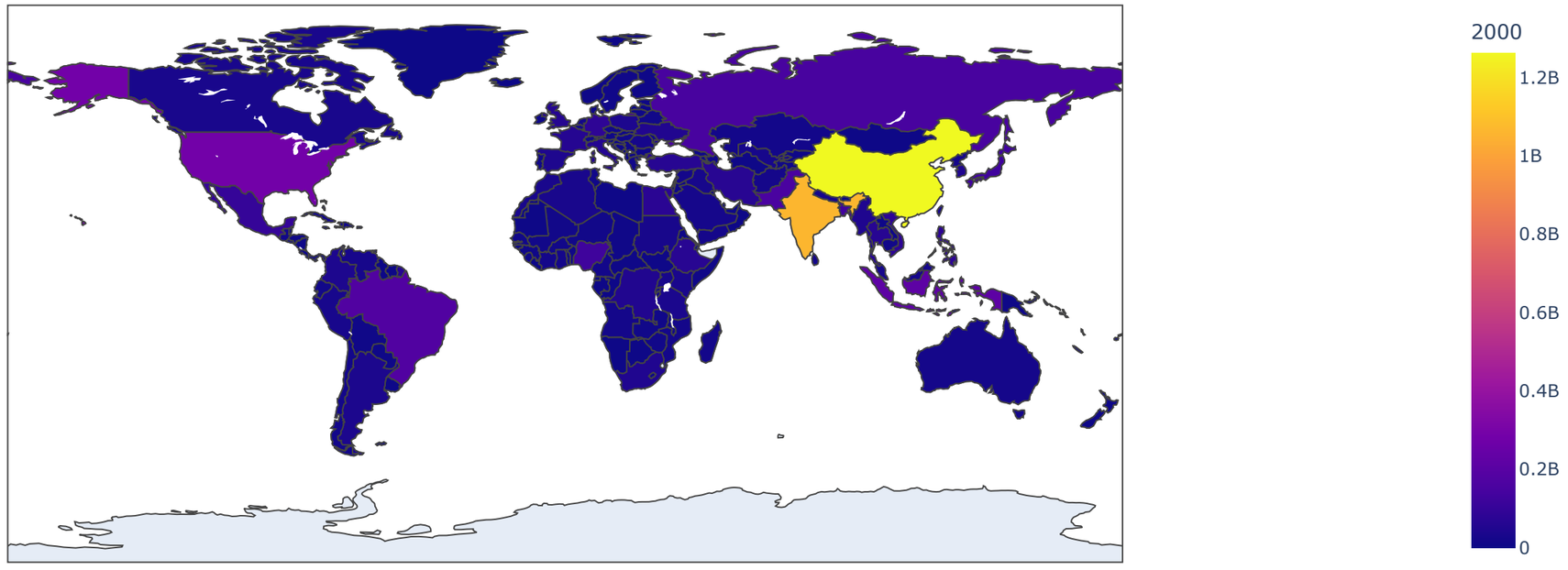
Population Distribution 2010

In [21]:
```
fig=px.choropleth(dataset,locations='Country',locationmode='country names',color='2010',hover_name='Country')
fig.show()
```



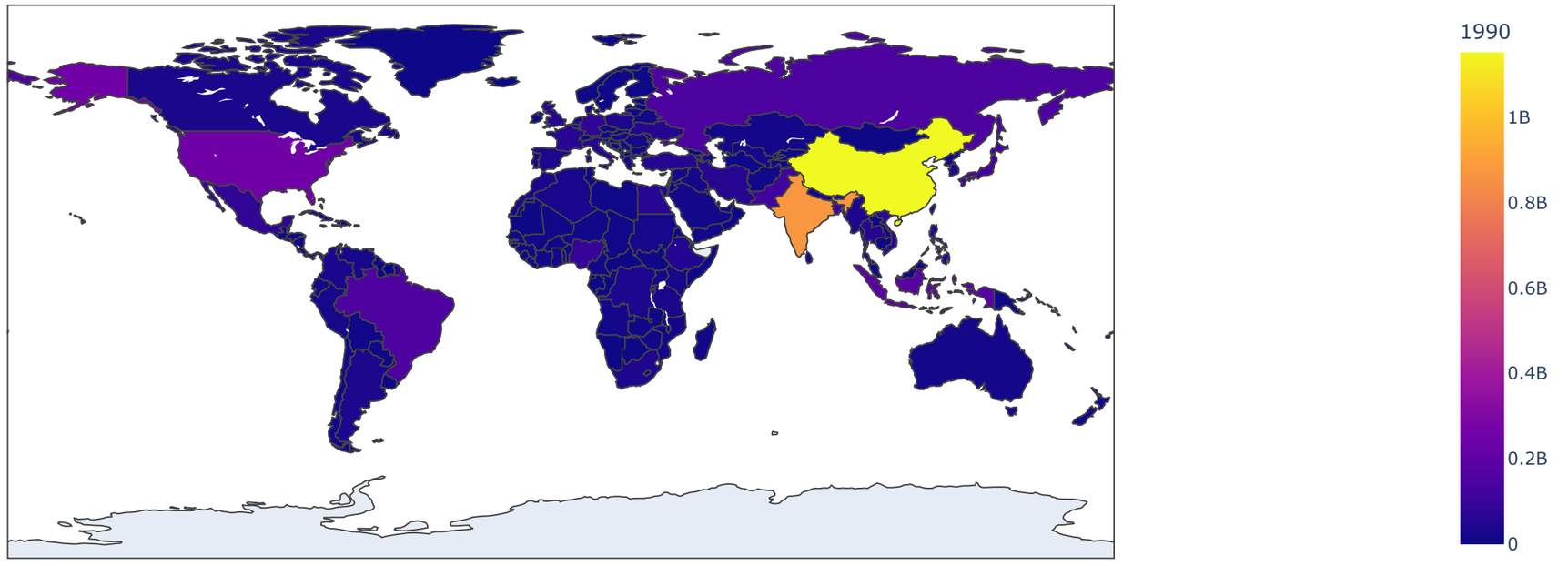
Population Distribution 2000

In [22]:
```
fig=px.choropleth(dataset,locations='Country',locationmode='country names',color='2000',hover_name='Country')
fig.show()
```



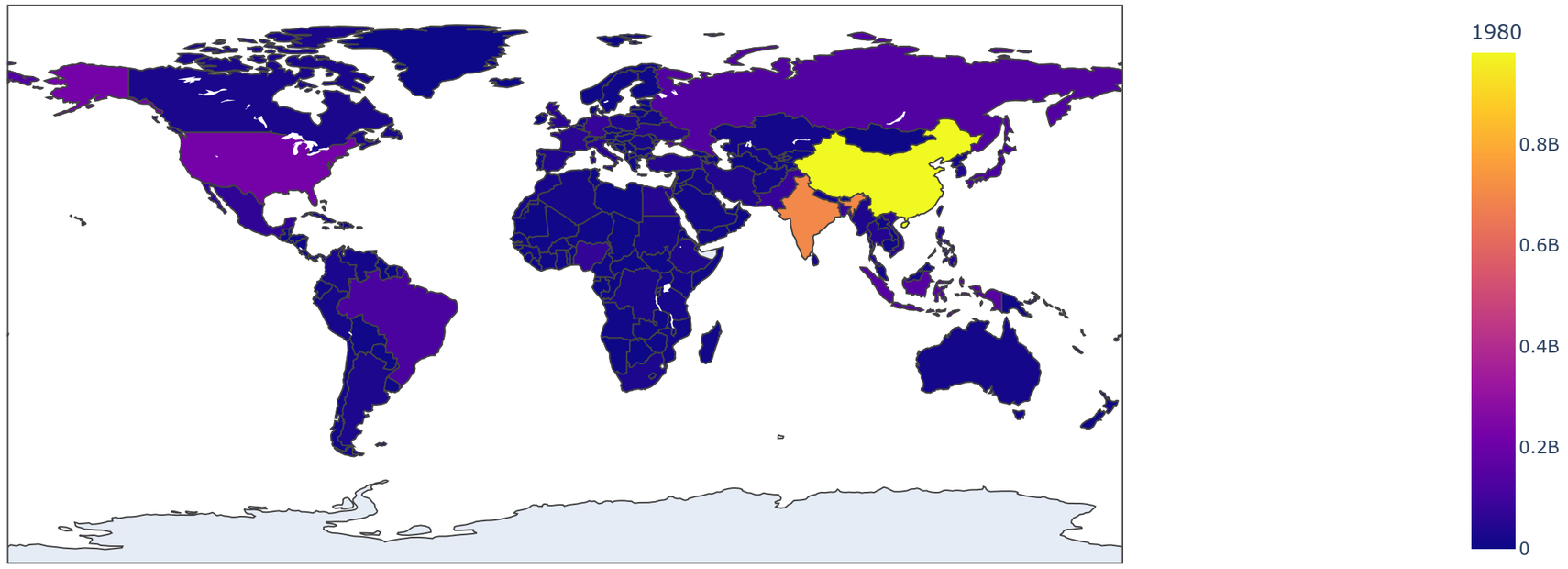
Population distribution 1990

In [23]:
```
fig=px.choropleth(dataset,locations='Country',locationmode='country names',color='1990',hover_name='Country')
fig.show()
```



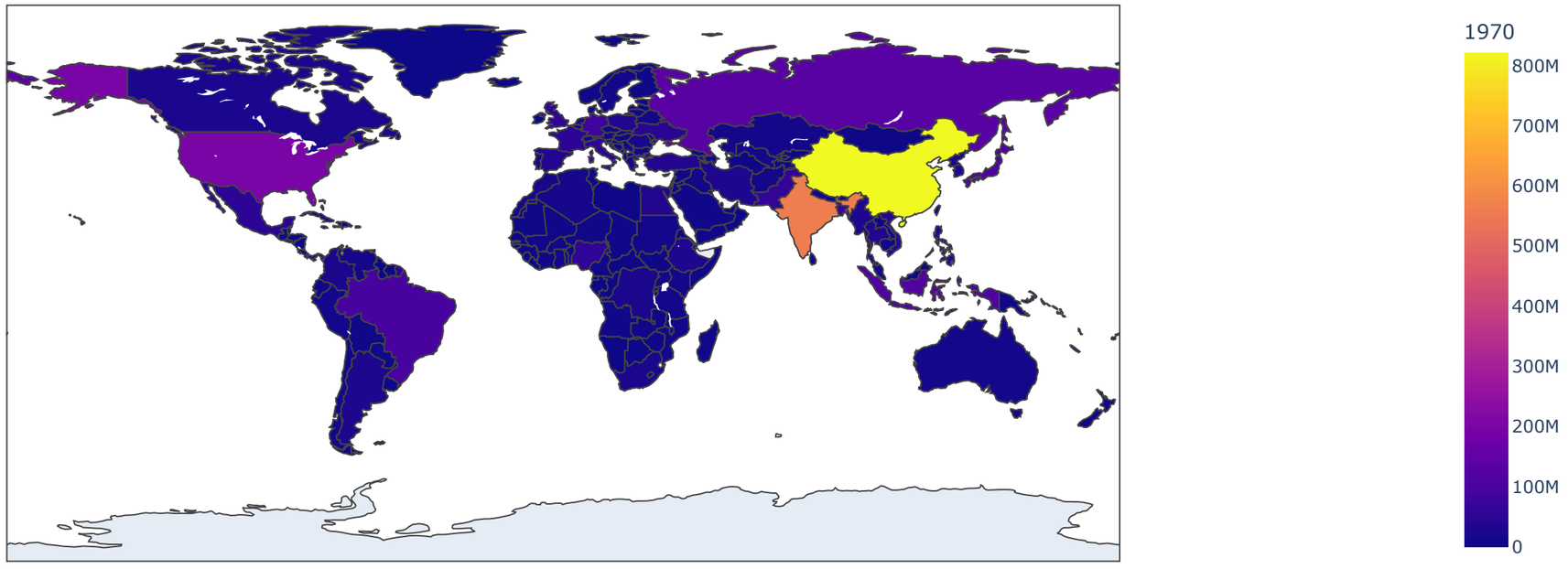
Population Distribution 1980

In [24]:
```
fig=px.choropleth(dataset,locations='Country',locationmode='country names',color='1980',hover_name='Country')
fig.show()
```



Population distribution 1970

In [25]:
```
fig=px.choropleth(dataset,locations='Country',locationmode='country names',color='1970',hover_name='Country')
fig.show()
```



Countries with Highest Population

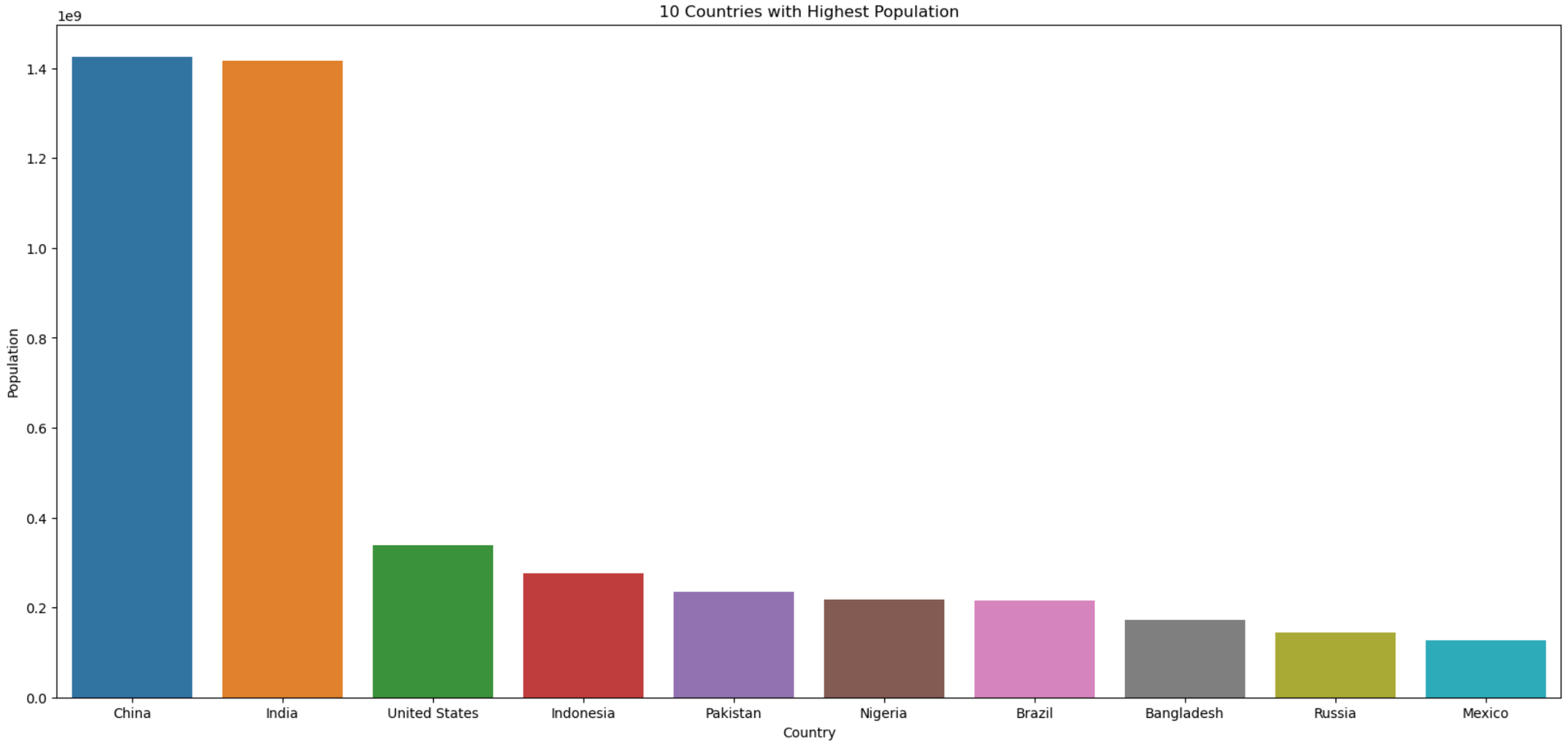
In [26]:
```
pop_high=dataset.sort_values(by="Rank")
pop_high=pop_high.head(10)
pop_high
```

Out[26]:

	Rank	CCA3	Country	Capital	Continent	2022	2020	2015	2010	2000	1990	1980	1970	Area	Density	Growth_Rate	Percent_Population
41	1	CHN	China	Beijing	Asia	1425887337	1424929781	1393715448	1348191368	1264099069	1153704252	982372466	822534450	9706961	146.8933	1.0000	17.88
92	2	IND	India	New Delhi	Asia	1417173173	1396387127	1322866505	1240613620	1059633675	870452165	696828385	557501301	3287590	431.0675	1.0068	17.77
221	3	USA	United States	Washington, D.C.	North America	338289857	335942003	324607776	311182845	282398554	248083732	223140018	200328340	9372610	36.0935	1.0038	4.24
93	4	IDN	Indonesia	Jakarta	Asia	275501339	271857970	259091970	244016173	214072421	182159874	148177096	115228394	1904569	144.6529	1.0064	3.45
156	5	PAK	Pakistan	Islamabad	Asia	235824862	227196741	210969298	194454498	154369924	115414069	80624057	59290872	881912	267.4018	1.0191	2.96
149	6	NGA	Nigeria	Abuja	Africa	218541212	208327405	183995785	160952853	122851984	95214257	72951439	55569264	923768	236.5759	1.0241	2.74
27	7	BRA	Brazil	Brasilia	South America	215313498	213196304	205188205	196353492	175873720	150706446	122288383	96369875	8515767	25.2841	1.0046	2.70
16	8	BGD	Bangladesh	Dhaka	Asia	171186372	167420951	157830000	148391139	129193327	107147651	83929765	67541860	147570	1160.0350	1.0108	2.15
171	9	RUS	Russia	Moscow	Europe	144713314	145617329	144668389	143242599	146844839	148005704	138257420	130093010	17098242	8.4636	0.9973	1.81
131	10	MEX	Mexico	Mexico City	North America	127504125	125998302	120149897	112532401	97873442	81720428	67705186	50289306	1964375	64.9082	1.0063	1.60

In [27]:
```
plt.figure(figsize=(20,9))
sns.barplot(data=pop_high,x='Country',y='2022')
plt.ylabel("Population")
plt.title("10 Countries with Highest Population")
```

Out[27]:
```
Text(0.5, 1.0, '10 Countries with Highest Population')
```



>> As per observation, constantly China and India are leading in terms of population

Countries with Least Population

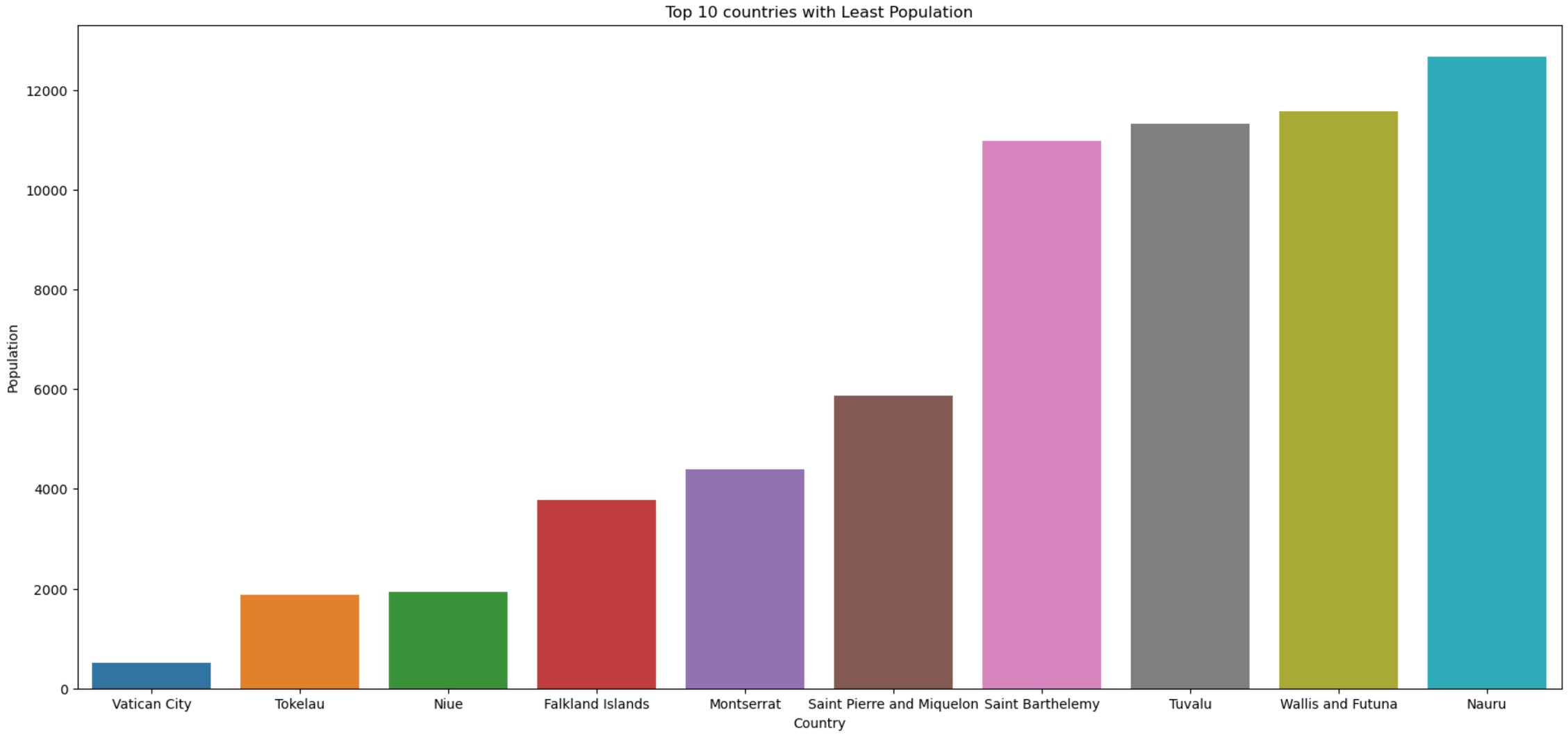
In [28]:
```
pop_low=dataset.sort_values(by="Rank",ascending=False)
pop_low=pop_low.head(10)
pop_low
```

Out[28]:

	Rank	CCA3	Country	Capital	Continent	2022	2020	2015	2010	2000	1990	1980	1970	Area	Density	Growth_Rate	Percent_Population
226	234	VAT	Vatican City	Vatican City	Europe	510	520	564	596	651	700	733	752	1	510.0000	0.9980	0.0
209	233	TKL	Tokelau	Nukunonu	Oceania	1871	1827	1454	1367	1666	1669	1647	1714	12	155.9167	1.0119	0.0
150	232	NIU	Niue	Alofi	Oceania	1934	1942	1847	1812	2074	2533	3637	5185	260	7.4385	0.9985	0.0
64	231	FLK	Falkland Islands	Stanley	South America	3780	3747	3408	3187	3080	2332	2240	2274	12173	0.3105	1.0043	0.0
137	230	MSR	Montserrat	Brades	North America	4390	4500	5059	4938	5138	10805	11452	11402	102	43.0392	0.9939	0.0
177	229	SPM	Saint Pierre and Miquelon	Saint-Pierre	North America	5862	5906	5978	6052	6274	6324	6106	5537	242	24.2231	0.9964	0.0
173	228	BLM	Saint Barthelemy	Gustavia	North America	10967	10681	9643	8988	7082	5168	2983	2417	21	522.2381	1.0098	0.0
216	227	TUV	Tuvalu	Funafuti	Oceania	11312	11069	10877	10550	9638	9182	7731	5814	26	435.0769	1.0096	0.0
229	226	WLF	Wallis and Futuna	Mata-Utu	Oceania	11572	11655	12182	13142	14723	13454	11315	9377	142	81.4930	0.9953	0.0
142	225	NRU	Nauru	Yaren	Oceania	12668	12315	11185	10241	10377	9598	7635	6663	21	603.2381	1.0125	0.0

In [29]:
```
plt.figure(figsize=(20,9))
sns.barplot(data=pop_low,x='Country',y='2022')
plt.ylabel("Population")
plt.title("Top 10 countries with Least Population")
```

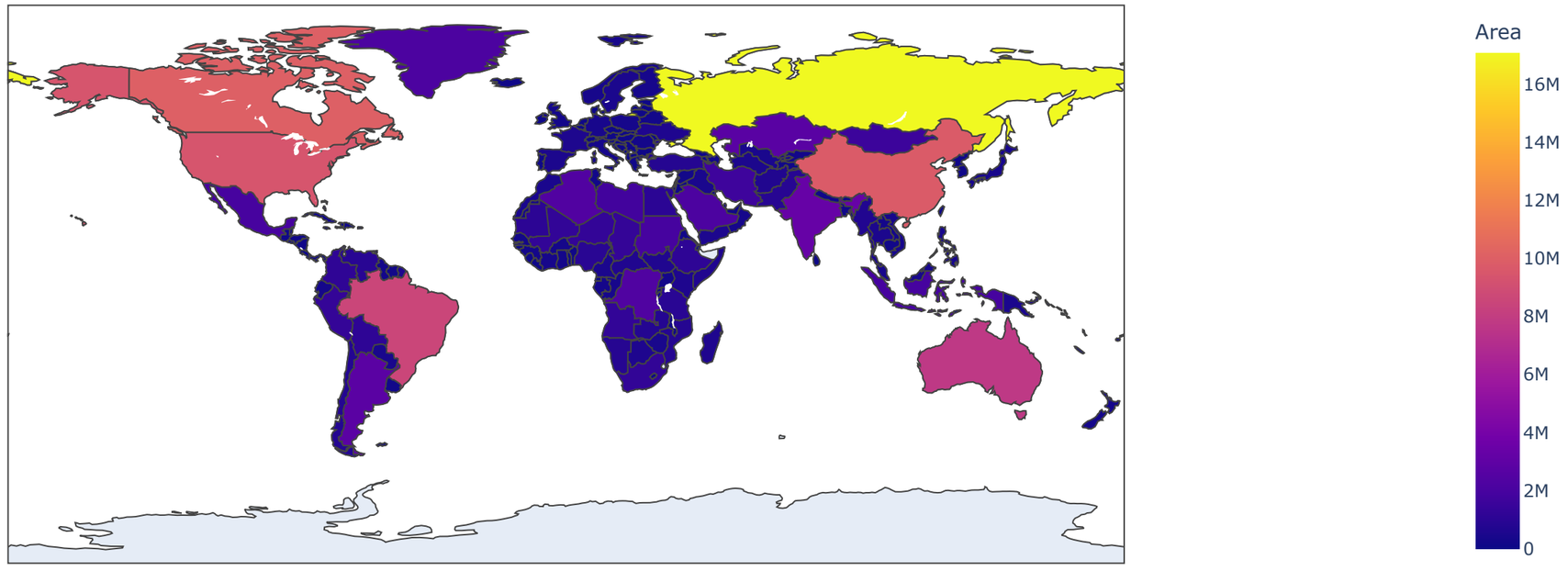
Out[29]:
```
Text(0.5, 1.0, 'Top 10 countries with Least Population')
```



>> Vatican City & Tokelau are Countries with Least Population

Distribution with respect to Area

In [30]:
```
fig = px.choropleth(dataset,locations='Country',locationmode='country names',color='Area',hover_name='Country')
fig.show()
```



Countries with Largest Area

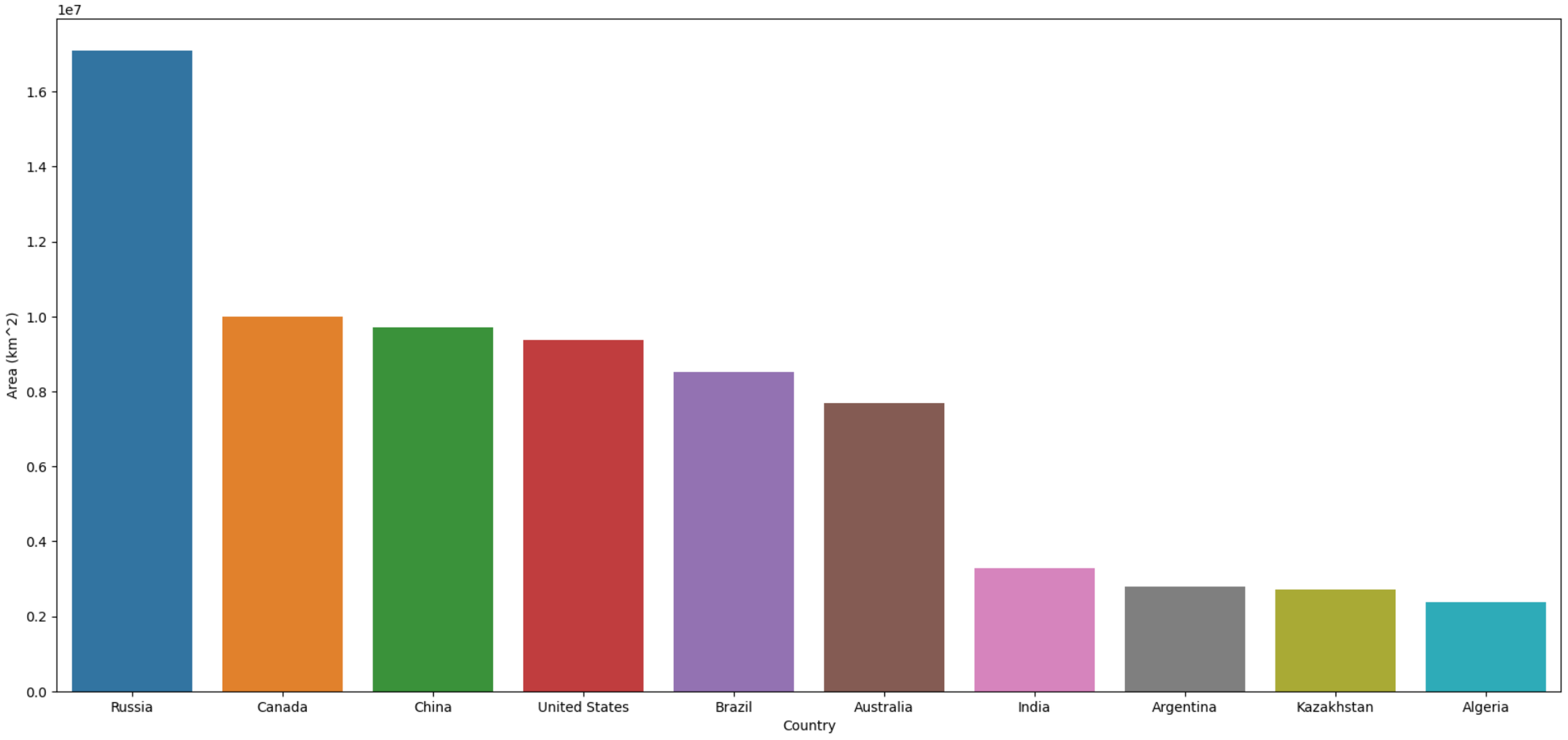
In [31]:
```
area_high=dataset.sort_values(by="Area",ascending=False)
area_high=area_high.head(10)
area_high
```

Out[31]:

	Rank	CCA3	Country	Capital	Continent	2022	2020	2015	2010	2000	1990	1980	1970	Area	Density	Growth_Rate	Percent_Population
171	9	RUS	Russia	Moscow	Europe	144713314	145617329	144668389	143242599	146844839	148005704	138257420	130093010	17098242	8.4636	0.9973	1.81
35	39	CAN	Canada	Ottawa	North America	38454327	37888705	35732126	33963412	30683313	27657204	24511510	21434577	9984670	3.8513	1.0078	0.48
41	1	CHN	China	Beijing	Asia	1425887337	1424929781	1393715448	1348191368	1264099069	1153704252	982372466	822534450	9706961	146.8933	1.0000	17.88
221	3	USA	United States	Washington, D.C.	North America	338289857	335942003	324607776	311182845	282398554	248083732	223140018	200328340	9372610	36.0935	1.0038	4.24
27	7	BRA	Brazil	Brasilia	South America	215313498	213196304	205188205	196353492	175873720	150706446	122288383	96369875	8515767	25.2841	1.0046	2.70
11	55	AUS	Australia	Canberra	Oceania	26177413	25670051	23820236	22019168	19017963	17048003	14706322	12595034	7692024	3.4032	1.0099	0.33
92	2	IND	India	New Delhi	Asia	1417173173	1396387127	1322866505	1240613620	1059633675	870452165	696828385	557501301	3287590	431.0675	1.0068	17.77
8	33	ARG	Argentina	Buenos Aires	South America	45510318	45036032	43257065	41100123	37070774	32637657	28024803	23842803	2780400	16.3683	1.0052	0.57
105	66	KAZ	Kazakhstan	Nursultan	Asia	19397998	18979243	17835909	16627837	15236253	16866563	14172710	12265305	2724900	7.1188	1.0105	0.24
2	34	DZA	Algeria	Algiers	Africa	44903225	43451666	39543154	35856344	30774621	25518074	18739378	13795915	2381741	18.8531	1.0164	0.56

In [32]:
```
plt.figure(figsize=(20,9))
sns.barplot(data=area_high,x='Country',y='Area')
plt.ylabel("Area (km^2)")
```

Out[32]:
```
Text(0, 0.5, 'Area (km^2)')
```



>> Russia has the Largest Area.

Countries with Least Area

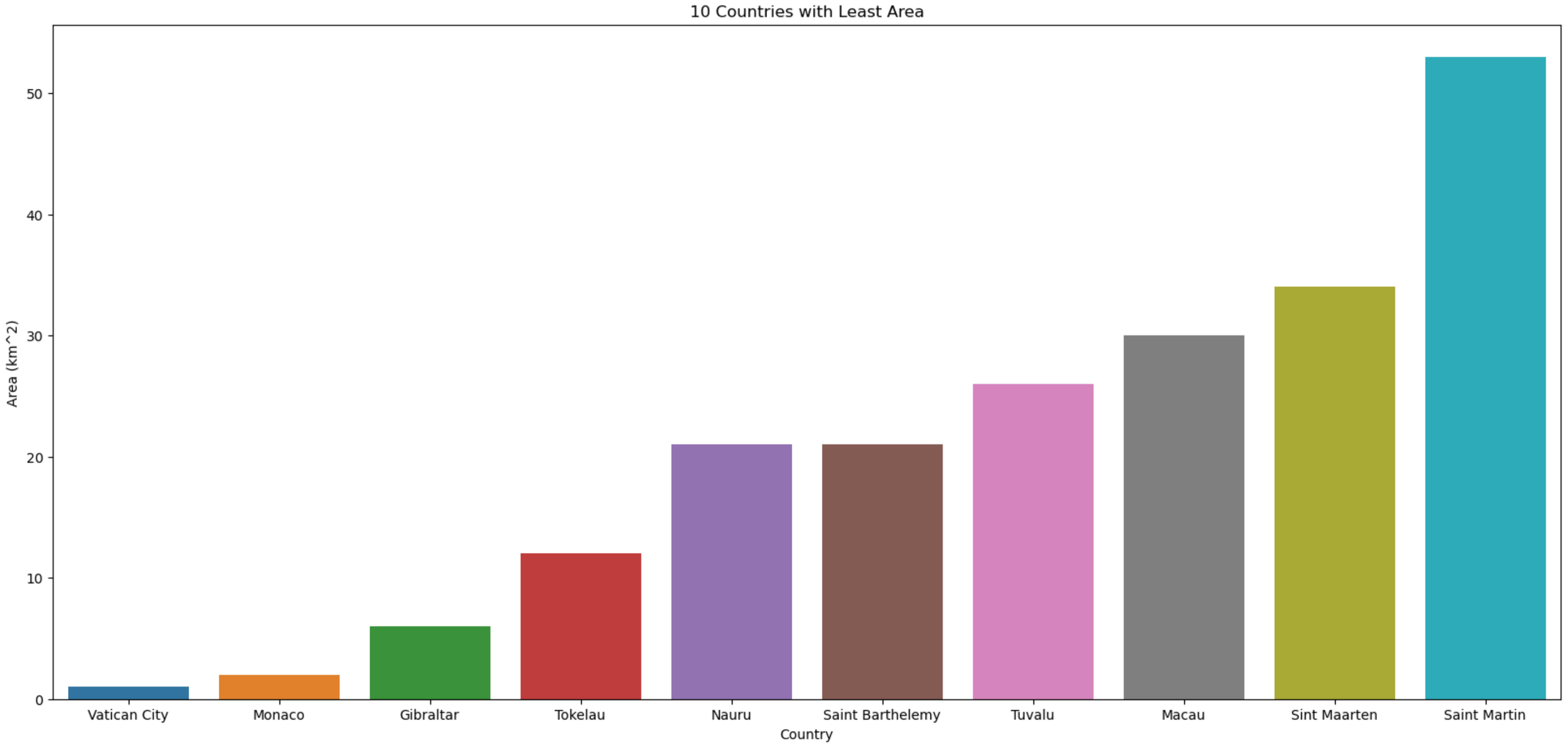
In [33]:
```
area_low=dataset.sort_values(by="Area")
area_low=area_low.head(10)
area_low
```

Out[33]:

	Rank	CCA3	Country	Capital	Continent	2022	2020	2015	2010	2000	1990	1980	1970	Area	Density	Growth_Rate	Percent_Population
226	234	VAT	Vatican City	Vatican City	Europe	510	520	564	596	651	700	733	752	1	510.0000	0.9980	0.00
134	217	MCO	Monaco	Monaco	Europe	36469	36922	36760	33178	32465	30329	27076	24270	2	18234.5000	0.9941	0.00
76	219	GIB	Gibraltar	Gibraltar	Europe	32649	32709	32520	31262	27741	27317	28734	26685	6	5441.5000	0.9994	0.00
209	233	TKL	Tokelau	Nukunonu	Oceania	1871	1827	1454	1367	1666	1669	1647	1714	12	155.9167	1.0119	0.00
142	225	NRU	Nauru	Yaren	Oceania	12668	12315	11185	10241	10377	9598	7635	6663	21	603.2381	1.0125	0.00
173	228	BLM	Saint Barthelemy	Gustavia	North America	10967	10681	9643	8988	7082	5168	2983	2417	21	522.2381	1.0098	0.00
216	227	TUV	Tuvalu	Funafuti	Oceania	11312	11069	10877	10550	9638	9182	7731	5814	26	435.0769	1.0096	0.00
119	167	MAC	Macau	Concelho de Macau	Asia	695168	676283	615239	557297	431896	350227	245332	247284	30	23172.2667	1.0125	0.01
188	214	SXM	Sint Maarten	Philipsburg	North America	44175	43621	40205	33034	30489	27845	12243	6260	34	1299.2647	1.0030	0.00
176	220	MAF	Saint Martin	Marigot	North America	31791	32552	35020	36458	29610	28127	7776	5802	53	599.8302	0.9951	0.00

In [34]:
```
plt.figure(figsize=(20,9))
sns.barplot(data=area_low,x='Country',y='Area')
plt.ylabel("Area (km^2)")
plt.title("10 Countries with Least Area")
```

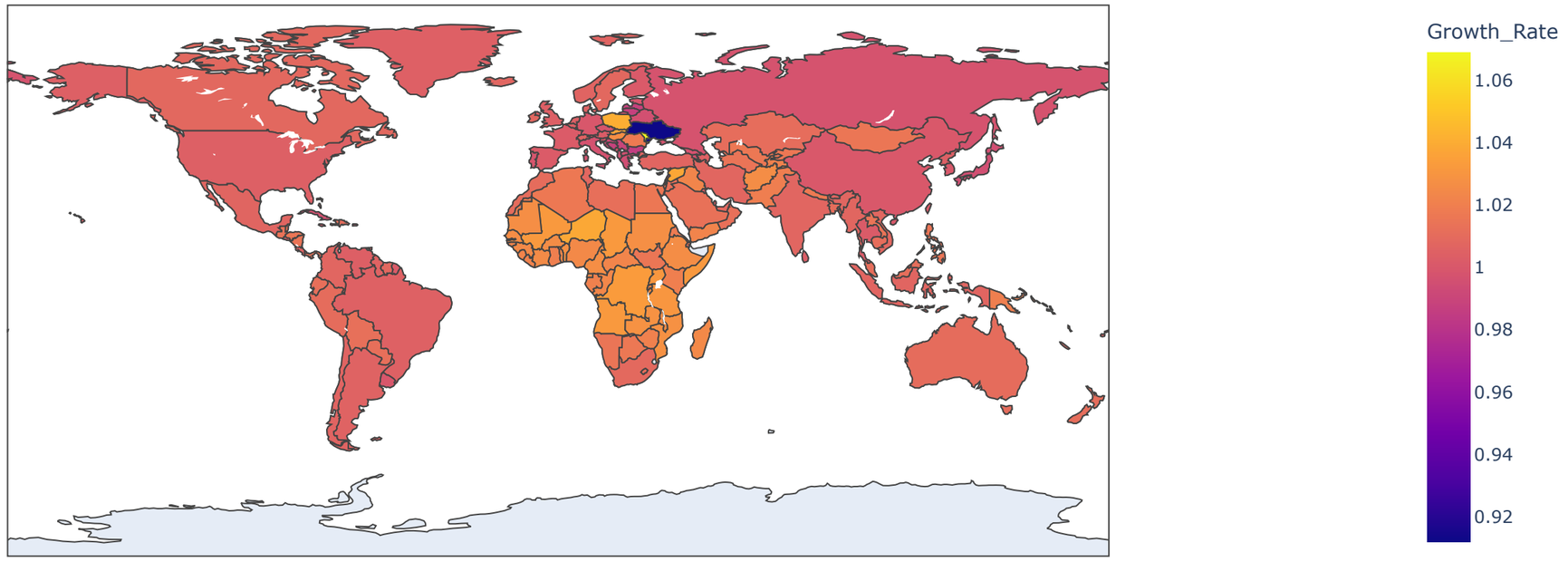
Out[34]:
```
Text(0.5, 1.0, '10 Countries with Least Area')
```



>> Vatican City has Least Area of all the countries

Distribution with respect to Growth Rate

In [35]:
```
fig = px.choropleth(dataset,locations='Country',locationmode='country names',color='Growth_Rate',hover_name='Country')
fig.show()
```



Countries with Highest Growth Rate

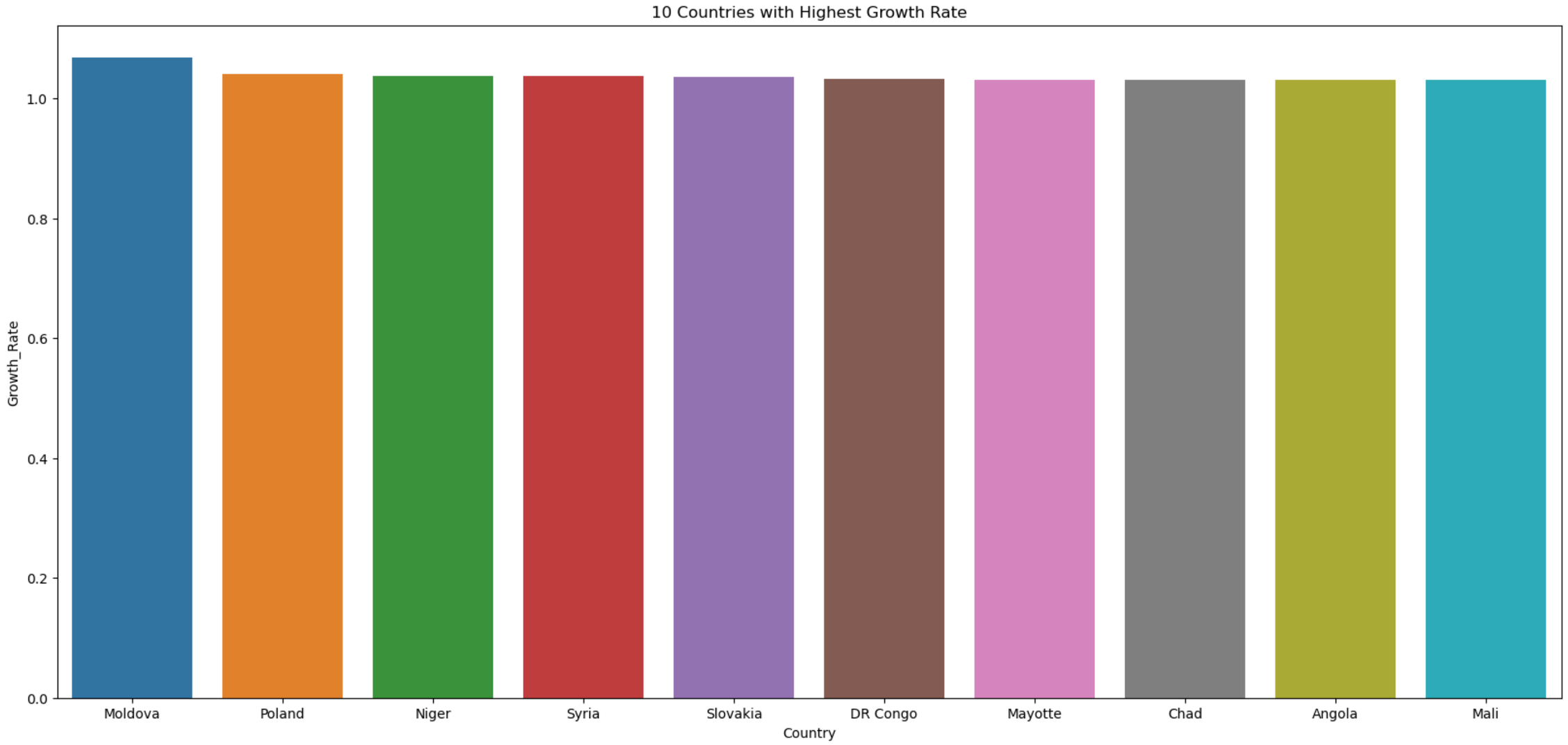
In [36]:
```
gr_high=dataset.sort_values(by='Growth_Rate',ascending=False)
gr_high=gr_high.head(10)
gr_high
```

Out[36]:

	Rank	CCA3	Country	Capital	Continent	2022	2020	2015	2010	2000	1990	1980	1970	Area	Density	Growth_Rate	Percent_Population
133	135	MDA	Moldova	Chisinau	Europe	3272996	3084847	3277388	3678186	4251573	4480199	4103240	3711140	33846	96.7026	1.0691	0.04
164	37	POL	Poland	Warsaw	Europe	39857145	38428366	38553146	38597353	38504431	38064255	35521429	32482943	312679	127.4698	1.0404	0.50
148	54	NER	Niger	Niamey	Africa	26207977	24333639	20128124	16647543	11622665	8370647	6173177	4669708	1267000	20.6851	1.0378	0.33
202	60	SYR	Syria	Damascus	Asia	22125249	20772595	19205178	22337563	16307654	12408996	8898954	6319199	185180	119.4797	1.0376	0.28
189	116	SVK	Slovakia	Bratislava	Europe	5643453	5456681	5424444	5396424	5376690	5261305	4973883	4522867	49037	115.0856	1.0359	0.07
55	15	COD	DR Congo	Kinshasa	Africa	99010212	92853164	78656904	66391257	48616317	35987541	26708686	20151733	2344858	42.2244	1.0325	1.24
130	182	MYT	Mayotte	Mamoudzou	Africa	326101	305587	249545	211786	159215	92659	52233	35383	374	871.9278	1.0319	0.00
39	69	TCD	Chad	N'Djamena	Africa	17723315	16644701	14140274	11894727	8259137	5827069	4408230	3667394	1284000	13.8032	1.0316	0.22
5	42	AGO	Angola	Luanda	Africa	35588987	33428485	28127721	23364185	16394062	11828638	8330047	6029700	1246700	28.5466	1.0315	0.45
124	59	MLI	Mali	Bamako	Africa	22593590	21224040	18112907	15529181	11239101	8945026	7372581	6153587	1240192	18.2178	1.0314	0.28

In [37]:
```
plt.figure(figsize=(20,9))
sns.barplot(data=gr_high,x='Country',y='Growth_Rate')
plt.title("10 Countries with Highest Growth Rate")
```

Out[37]:
```
Text(0.5, 1.0, '10 Countries with Highest Growth Rate')
```



>> Moldova is the country with Highest Growth Rate

Countries with Least Growth Rate

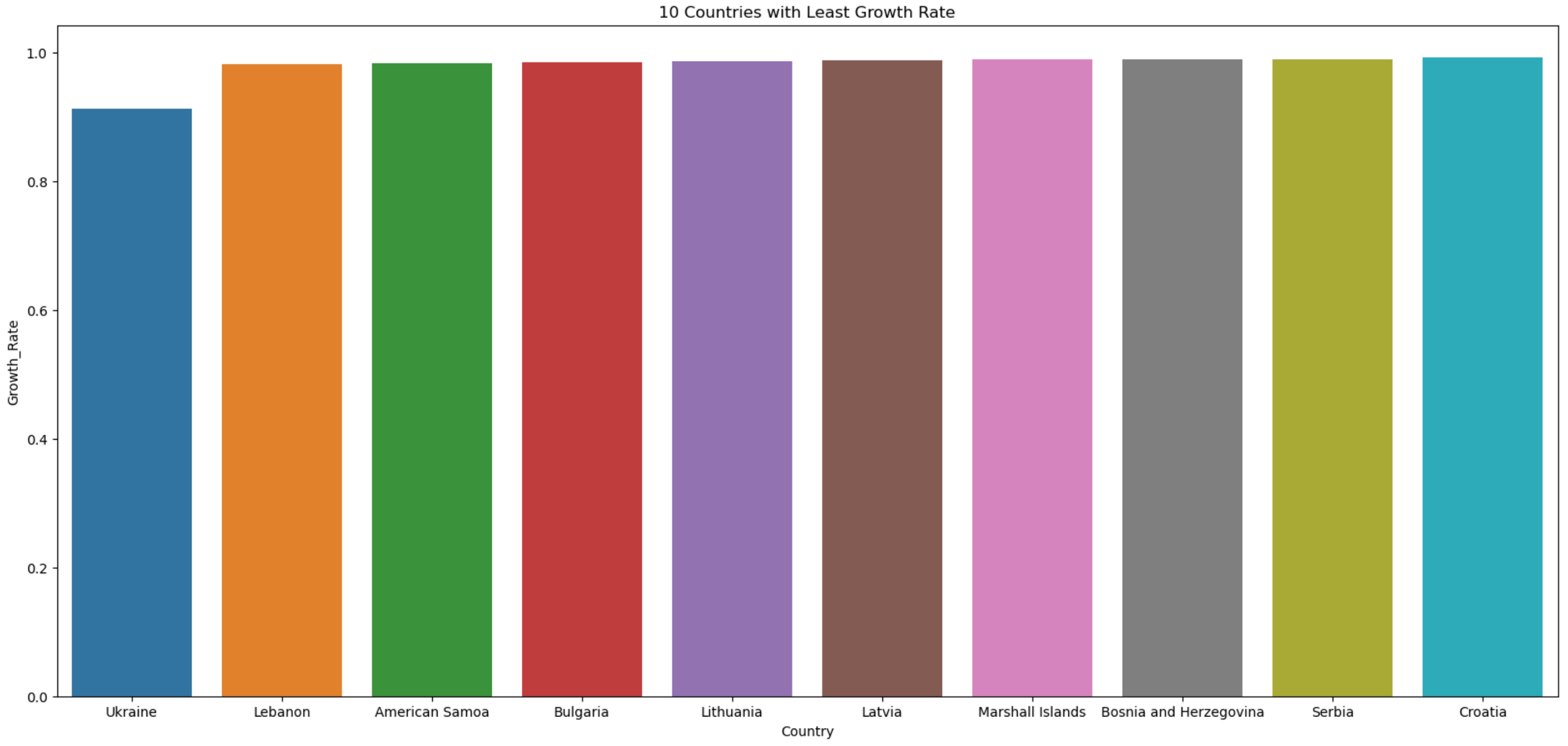
In [38]:
```
gr_low=dataset.sort_values(by='Growth_Rate')
gr_low=gr_low.head(10)
gr_low
```

Out[38]:

	Rank	CCA3	Country	Capital	Continent	2022	2020	2015	2010	2000	1990	1980	1970	Area	Density	Growth_Rate	Percent_Population
218	38	UKR	Ukraine	Kiev	Europe	39701739	43909666	44982564	45683020	48879755	51589817	49973920	47279086	603500	65.7858	0.9120	0.50
112	119	LBN	Lebanon	Beirut	Asia	5489739	5662923	6398940	4995800	4320642	3593700	2963702	2381791	10452	525.2334	0.9816	0.07
3	213	ASM	American Samoa	Pago Pago	Oceania	44273	46189	51368	54849	58230	47818	32886	27075	199	222.4774	0.9831	0.00
30	108	BGR	Bulgaria	Sofia	Europe	6781953	6979175	7309253	7592273	8097691	8767778	8980606	8582950	110879	61.1654	0.9849	0.09
117	141	LTU	Lithuania	Vilnius	Europe	2750055	2820267	2963765	3139019	3599637	3785847	3521206	3210147	65300	42.1142	0.9869	0.03
111	151	LVA	Latvia	Riga	Europe	1850651	1897052	1991955	2101530	2392530	2689391	2572037	2397414	64559	28.6660	0.9876	0.02
126	215	MHL	Marshall Islands	Majuro	Oceania	41569	43413	49410	53416	54224	46047	31988	23969	181	229.6630	0.9886	0.00
25	137	BIH	Bosnia and Herzegovina	Sarajevo	Europe	3233526	3318407	3524324	3811088	4179350	4494310	4199820	3815561	51209	63.1437	0.9886	0.04
184	105	SRB	Serbia	Belgrade	Europe	7221365	7358005	7519496	7653748	7935022	7987529	7777010	7193533	88361	81.7257	0.9897	0.09
46	130	HRV	Croatia	Zagreb	Europe	4030358	4096868	4254815	4368682	4548434	4873707	4680144	4492638	56594	71.2153	0.9927	0.05

In [39]:
```
plt.figure(figsize=(20,9))
sns.barplot(data=gr_low,x='Country',y='Growth_Rate')
plt.title("10 Countries with Least Growth Rate")
```

Out[39]:
```
Text(0.5, 1.0, '10 Countries with Least Growth Rate')
```



>> Ukraine has Least Growth Rate

Visualisation with respect to Continents

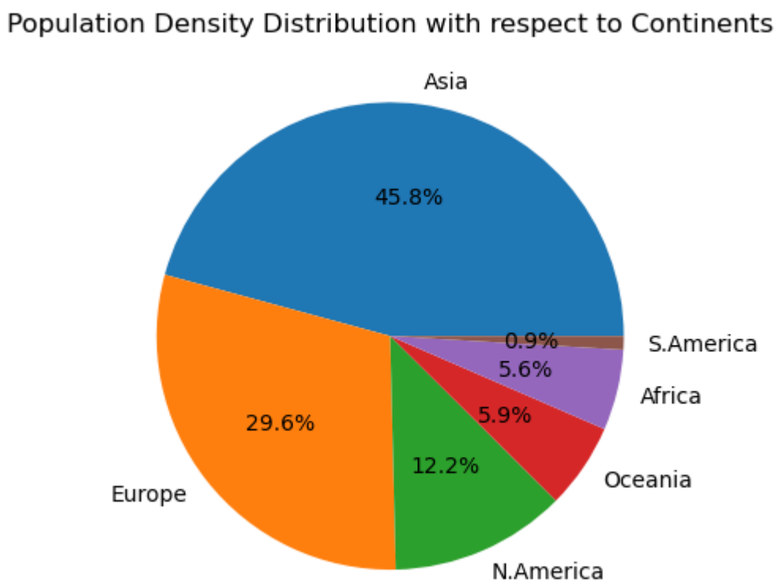
Population Analysis with respect to Continents

In [40]:
```
continent_df=dataset.groupby('Continent').mean().sort_values(by="Density",ascending = False)
continent_df.Density
```

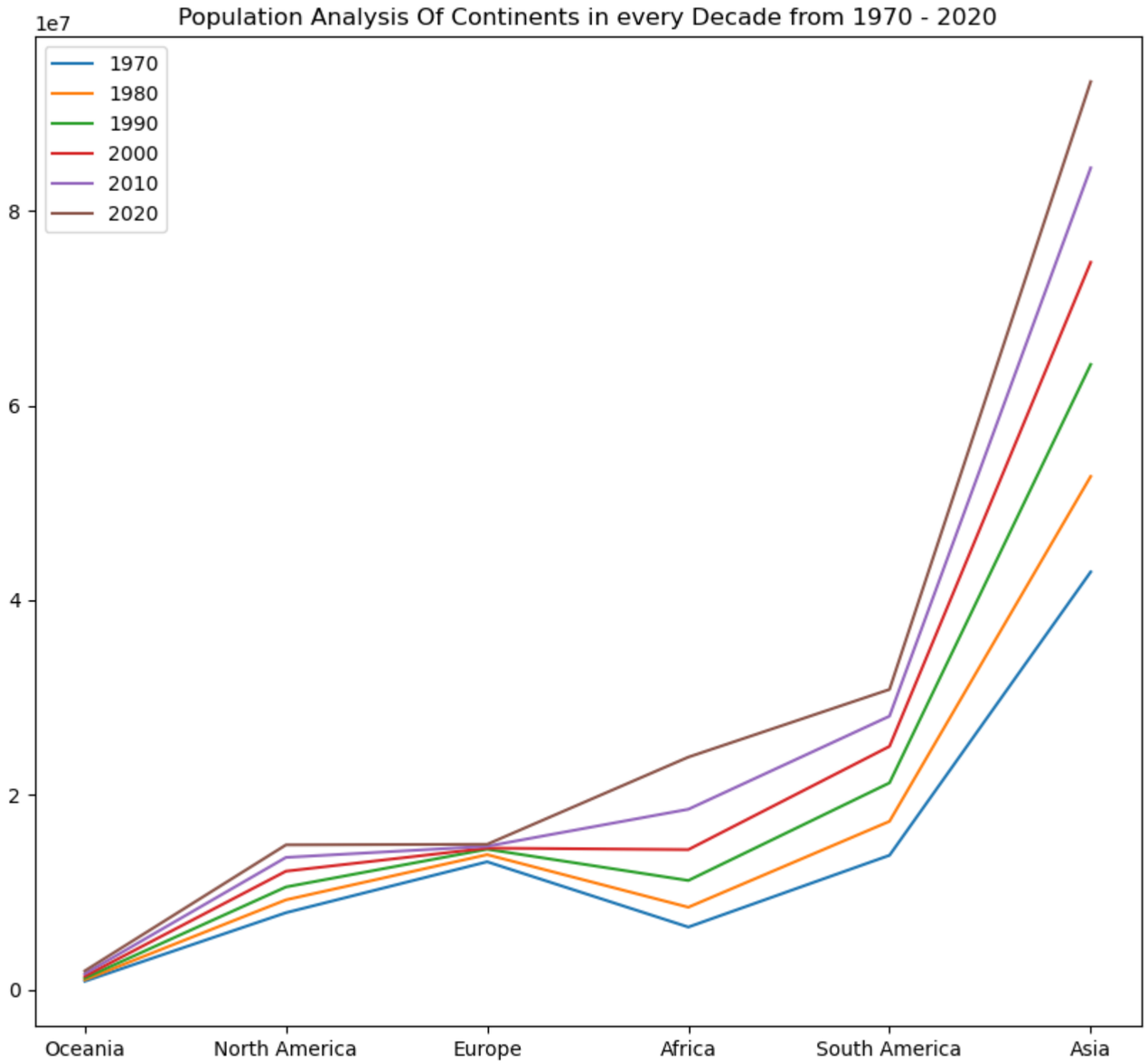
Out[40]:
```
Continent
Asia             1025.024136
Europe            663.324742
North America     272.761758
Oceania           132.543065
Africa            125.047646
South America      20.971979
Name: Density, dtype: float64
```

In [41]:
```
plt.pie(continent_df.Density,labels=['Asia','Europe','N.America','Oceania','Africa','S.America'],autopct="%1.1f%%")
plt.title("Population Density Distribution with respect to Continents")
```

Out[41]:
```
Text(0.5, 1.0, 'Population Density Distribution with respect to Continents')
```



In [42]:
```
continent_df.sort_values(by='2020',inplace = True)
plt.figure(figsize=(10,9))
pop_features=['2020','2010','2000','1990','1980','1970']
pop_features.reverse()
for feature in pop_features:
    plt.plot(continent_df[feature],label = feature)
plt.legend()
plt.title('Population Analysis Of Continents in every Decade from 1970 - 2020')
plt.show()
```

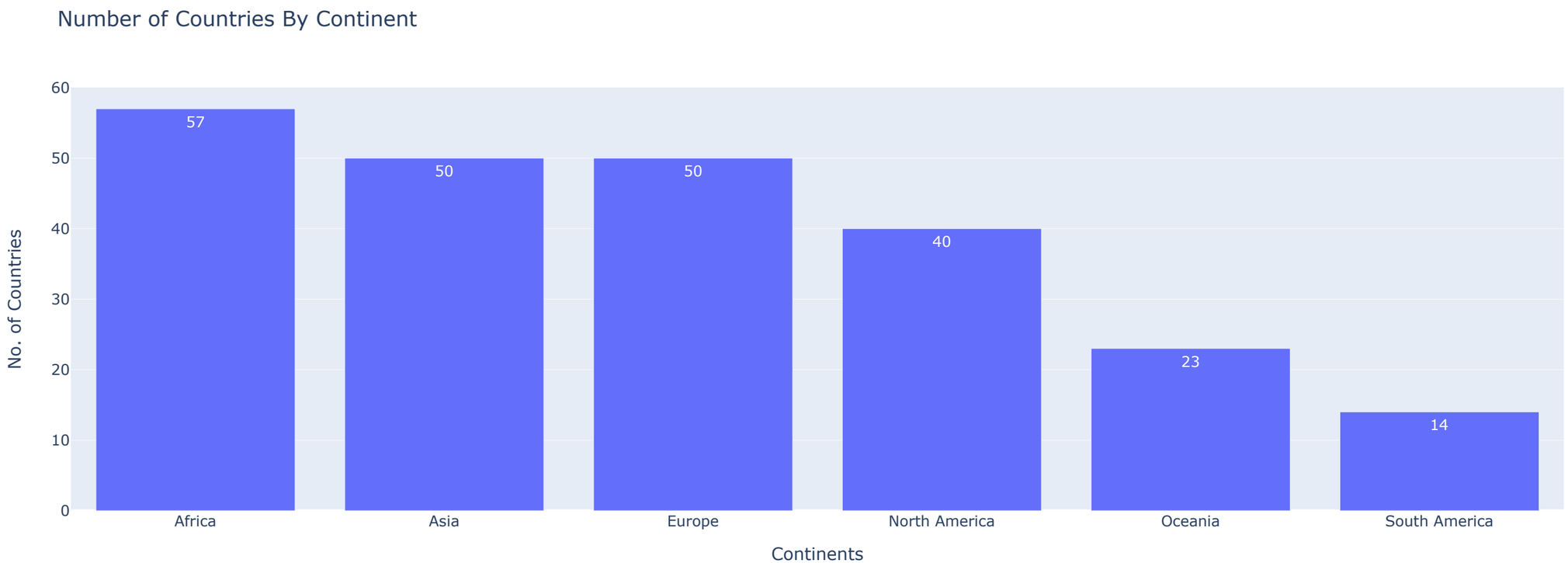


>> Asia is the Continent that constantly has Highest Population

>> Oceania is the Continent that constantly has Least Population

Number of Countries within the Continent

In [43]:
```
country=dataset['Continent'].value_counts()
fig=px.bar(x=country.index,y=country.values,text=country.values,title= 'Number of Countries By Continent')
fig.update_layout(xaxis_title="Continents",yaxis_title='No. of Countries')
fig.show()
```



>> Africa has 57 Countries which is most for any continent

>> South America has 14 Countries which is least for any continent