Sustainability Index: Top Ten Most Populous Countries

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Title/Main Goal: Sustainability Index: Rating Sustainability of the Top 10 Populous Countries

Background: As countries advance and adjust to growing populations, they must be aware of how they use their natural resources and what issues they are instilling on future generations. These natural resources are both renewable, such as trees and crops, and nonrenewable, like metal ores and fossil fuels. These resources are vital to both growing and established economies, and for providing an adequate standard of living for all. Moreover, although renewable resources can be generated again and again they also require energy and water, which are two important reagents, one of which is beginning to dwindle at astonishing rates. Additionally, generating renewable resources adds waste emissions through the land, water, and air. These emissions damage existing resources and result in hazardous living conditions and ailments for those within their vicinity. Sustainability of the following countries will be based off land use, emissions, waste, and water consumption: China, India, United States, Indonesia, Brazil, Pakistan, Bangladesh, Nigeria, Russia, and Japan. These countries are the top ten most populous, and accordingly are some of the most critical countries to adopt sustainable practices due to the vast number of people inhabiting them and their influence over other developed and developing countries. Four categories were picked on the basis of importance to a sustainable future: land use, emissions, water, and waste. Next, two indicators were chosen for each category: percentage forested land and arable land and permanent crops for land use, methane and carbon dioxide emitted for emissions, freshwater and access to sanitation facilities for water, and percent of population with access to waste collection services and municipal waste collected for waste.

Scope/Characteristics:

China:

Indicator	Value	Ranking of Each Indicator
Forested land	22%	4
Arable land and permanent crops	0.12 ha/person	8
Methane emissions	0.0013 kt of CO_2 equivalent/person/year	8
Carbon Dioxide emissions	6.3 Mg/person/year	8
Freshwater extracted	421 m^3/person/year	6
Access to sanitation facilities	65.3%	4
Percent of population with access to waste collection services	100%	10
Municipal waste collected	0.12 ton/person/year	9
Total Score		**57/80**

China's current population is 1.31 billion people and is projected to reach 1.4 billion by around 2025.[1] At present, with half of the country's people already living in cities, the economy is

growing at around ten percent a year and has been doing so for quite some time.[1] Although this trend has rescued millions from poverty, it has also unleashed an immense hunger for goods, resources, and energy. Carbon dioxide emissions are at a rate of 6.31 Mg/person/year. China is currently responsible for around one fourth of energy-related CO_2 emissions worldwide, and is already the world's largest producer of greenhouse gases, ahead of the U.S. Sixteen out of the 20 cities with the worst air quality around the globe were Chinese.[1] China's CH_4 emission are 0.001251 kt of CO_2 equivalent/person/year, a majority can be attributed to the rice fields.[1] Other factors such as low forested land, low arable land and permanent crops, low fresh water extracted, moderate access to sanitation facilities, high percent of population with access to waste collection services, and low municipal waste collected in tons by person also contribute greatly to the measurement of sustainability of this country. Even though there are indicators negatively showing the sustainability of China, the country is mindful of the problem and has begun to take action to remedy it. There are many implementations of renewable energy and resources such as wind energy and hydroelectricity in order to improve efficiency and reduce emissions to the atmosphere.

India:

Indicator	Value	Ranking of Each Indicator
Forested land	23%	4
Arable land and permanent crops	0.15 ha/person	8
Methane emissions	0.0005 kt of CO_2 equivalent/person/year	10
Carbon Dioxide emissions	1.77 Mg/person/year	9
Freshwater extracted	671 m^3/person/year	5
Access to sanitation facilities	36%	3
Percent of population with access to waste collection services	51.1%	3
Municipal waste collected	0.2 ton/person/year	8
Total Score		**50/80**

Even though the percentage of CO_2 (1.77 Mg/person/year) and CH_4 (5.48 $\times 10^{-4}$ kt of CO_2 equivalent/person/year) emission per cap in India are relatively low, there are other factors contribute greatly to the measurement of India's sustainability. India makes up 2.4 percent of the world's land, while supporting 16 percent of the world's population.[2] The compounding result is a severely unsustainable use of natural resources for several generations. India is experiencing rapid and widespread environmental degradation at alarming rates. Tremendous pressure is placed upon the country's land and natural resources to support the massive overpopulation. Mismanagement and overuse of India's once abundant forests has resulted in desertification, contamination, and soil depletion throughout the subcontinent, leaving only 23.02 % of forested land. Drought is having severe consequences for the people of Rajasthan, who have endured chronic shortages of water. In 2003, one-fifth of the villages in Rajasthan reported that they had no access to a reliable water source.[2] Fresh water extracted is being extracted at a rate of 671 m^3

per person each year. This affects the availability of safe drinking water, the success of the livestock population, and the security of basic food sources.

United States:

Indicator	Value	Ranking of Each Indicator
Forested land	33.2%	6
Arable land and permanent crops	0.58 ha/person	4
Methane emissions	0.0018 kt of CO_2 equivalent/person/year	7
Carbon Dioxide emissions	18.1 Mg/person/year	6
Freshwater extracted	1590 m^3/person/year	3
Access to sanitation facilities	99.98%	10
Percent of population with access to waste collection services	100%	10
Municipal waste collected	0.74 ton/person/year	5
Total Score		**51/80**

U.S. emissions of heat-trapping carbon dioxide have risen 6% in the last two years.[3] CO_2 emission per capita is moderately high at 18.2 Mg/person/year compared to the rest of the world. CO_2 is the primary gas emitted from fossil fuel combustion, and represents the largest share of U.S. total greenhouse gas emissions.[4] The process of generating electricity is the single largest source of CO_2 emissions in the United States, representing 42 percent of total CO_2 emissions from all CO_2 emissions sources across the United States.[4] Methane emissions is 0.00175 kt of CO_2 equivalent/person/year. Methane (CH_4) is the second most prevalent greenhouse gas emitted in the United States from human activities.[3] In 2012, CH_4 accounted for about 9% of all U.S. greenhouse gas emissions from human activities.[4] At the rate of deforestation currently in the United States, only one-fourth of the forests standing today will be standing in 70 years, considering forested land is only 33.18% of the area. There are other factors such as arable land and permanent crops: 0.577 ha/person, large amounts of fresh water extracted: 1590 m^3, high access to sanitation facilities: 99.98%, percent of population with access to waste collection services: 100 %, and moderate levels of municipal waste collected in tons per person (0.743) contributing positively to sustainability measurement in the United States.

Indonesia:

Indicator	Value	Ranking of Each Indicator
Forested land	52.1%	8
Arable land and permanent crops	0.17 ha/person	8
Methane emissions	0.00097 kt of CO_2 equivalent/person/year	8
Carbon Dioxide emissions	1.92Mg/person/year	9

Freshwater extracted	7 m^3/person/year	10
Access to sanitation facilities	58.8%	4
Percent of population with access to waste collection services	69%	5
Municipal waste collected	0.04 ton/person/year	10
Total Score		**62/80**

Indonesia is among the world's top three greenhouse gas emitters because of deforestation, peat industry, land degradation, and forest fires.[5] An increase of global temperatures has already resulted in prolonged drought, heavy rainfall leading to floods, and tidal waves in Indonesia.[5] Indonesia's total annual carbon dioxide emissions stand at 3.014 billion tons after the United States and China. Most of the CO_2 emissions in Indonesia come from forestry and land use, and are estimated to account for a staggering 2.563 billion tonnes. Indonesia's rainforests are being stripped rapidly because of illegal logging and palm oil plantations for bio-fuels, and some environmentalists say they could be wiped out altogether within the next 15 years.[6]

Brazil

Indicator	Value	Ranking of Each Indicator
Forested land	62.4%	9
Arable land and permanent crops	0.36 ha/person	6
Methane emissions	0.0023 kt of CO_2 equivalent/person/year	6
Carbon Dioxide emissions	2.25 Mg/person/year	9
Freshwater extracted	269 m^3/person/year	8
Access to sanitation facilities	81%	6
Percent of population with access to waste collection services	87%	7
Municipal waste collected	0.28 ton/person/year	7
Total Score		**58/80**

Brazil is the fourth most populated country in the world with not only a large land area but also an ever growing population. Due to Brazil's vast size and population, it is one of the key countries that needs to focus on sustainability and set an example for other developing nations. As of 2005 their population was over 185 million people, with waste being collected at a rate of 51 million tons per year, or 0.028 tons per person per year. The most current data for Brazil's municipal waste collection system was 2007, and was reaching 87% of its population. This high percentage of people being reached by the collection system makes the waste collection rate more accurate. In terms of greenhouse gas emissions, Brazil is emitting 419,754,000 megagrams (Mg) of CO_2 a year (2.25 Mg per person). They are also emitting methane at a rate of 443,289 kt of CO_2 equivalent per year (0.002373 kt of CO_2 equivalent/person/year). This is the highest

methane emissions on a per capita basis out of the top ten most populous countries. The biggest contributor is agriculture through manure management, municipal solid waste, and natural gas systems.[7] On average Brazilians are extracting 269 m^3 (269000 liters) of freshwater per person per year, with 81% of the country having access to some form of an improved sanitation facility. They have a total of 66,500,000 hectares of arable land (0.36 hectares per capita). Lastly, Brazil still has 62% of its land area covered in forests, due to the large region of amazon rainforest.

Pakistan:

Indicator	Value	Ranking of Each Indicator
Forested land	2.2%	1
Arable land and permanent crops	0.14 ha/person	8
Methane emissions	0.00098 kt of CO_2 equivalent/person/year	8
Carbon Dioxide emissions	1.02 Mg/person/year	10
Freshwater extracted	1161 m^3/person/year	4
Access to sanitation facilities	47.6%	3
Percent of population with access to waste collection services	55%	3
Municipal waste collected	0.127 ton/person/year	9
Total Score		**46/80**

Pakistan has a population of over 158 million people making it the fifth most populous country in the world. Pakistan has a very low amount of forested area totaling to only 2.2% of the land. This low forest amount can be attributed to the four large deserts called the Thar, Cholistan, Thall, and Kharan.[8] They also have 22,300,000 hectares of arable land (0.14 hectares per person). Pakistan's high yearly freshwater withdraws of 183500 million cubic meters, can be mainly attributed to agriculture production which used 94% of the freshwater in 2011.[9] They also have a low percentage of both access to sanitation facilities at 47.6% and access to waste collection services at 55% of the population.[10] This poses a problem especially since waste is being collected at 0.127 tons per person per year and that only accounts for the half the nation that has access to waste collection.[10] It has been estimated that 3.9% of Pakistan's GDP has been lost because of poor sanitation and water facilities.[10] Only 50% of households get piped drinking water and for the most part that water is contaminated with sewage, resulting in hepatitis and gastroenteritis.[10] Poor water and sanitation causes upwards of 97,000 people a year. Pakistan is producing 161,396,000 Mg of CO_2 per year (1.02 Mg/person/year), and 155,236 of methane in kt of CO_2 equivalent per year.[2]

Bangladesh:

Indicator	Value	Ranking of Each Indicator
Forested land	11.1%	3

Arable land and permanent crops	0.55 ha/person	5
Methane emissions	0.0067 kt of CO_2 equivalent/person/year	5
Carbon Dioxide emissions	3.66 Mg/person/year	9
Freshwater extracted	2342 m^3/person/year	2
Access to sanitation facilities	57%	4
Percent of population with access to waste collection services	20%	1
Municipal waste collected	1.47 ton/person/year	4
Total Score		**33/80**

Bangladesh is only 14,700 hectares in land area but has the seventh largest population of over 15 million people. Bangladesh is considered one of the most densely populated countries, with a majority of its people working in the agriculture industry.[11] This large agricultural sector has led to 0.55 hectares of arable land per person with 11.1% of the lands covered in forests. Freshwater is being extracted at a rate of 2,342 m^3 per person each year. They are emitting 3.66 Mg of CO_2 per person per year and 0.0067 of methane in kt of CO_2 equivalent/person/year. This has raised concern in Bangladesh since over 60 million people could be displaced if the sea levels continue to rise.[12] While 57% of the country has access to improved sanitation facilities, only 20% has access to waste collection services. This has led to the municipal waste collection per person per year to be over 1.4 tons.

Nigeria:

Indicator	Value	Ranking of Each Indicator
Forested land	9.9%	3
Arable land and permanent crops	0.28 ha/person	7
Methane emissions	0.00062 kt of CO_2 equivalent/person/year	10
Carbon Dioxide emissions	0.56 Mg/person/year	10
Freshwater extracted	93 m^3/person/year	9
Access to sanitation facilities	27.8%	2
Percent of population with access to waste collection services	60%	4
Municipal waste collected	0.18 ton/person/year	8
Total Score		**53/80**

The country of Nigeria is located in West Africa bordered by Benin to the east, Niger to the north, Lake Chad to the northeast, Cameroon to the southeast, and the Gulf of Guinea to the south. Nigeria is the seventh most populous country in the world with over 141 million

inhabitants and is expected to grow yearly by 2.47%. Nigeria's economy is also growing rapidly and boasts the largest and most well developed one in the region due to its natural resources such as natural gas and petroleum, ore, coal, and agricultural products.[13] While this economic boom has benefitted Nigerians in some aspects through more and better jobs, particularly in urban areas, it is also beginning to cause some serious environmental and social concerns. The increasing economic development of Nigeria will pose environmental and human health threats if this growth continues without implementation of sustainable principles and methods. Urbanization is occurring at a rapid pace due to job openings in cities. However, this trend requires that more urban physical and electrical infrastructure is built up to support this growing population. Potable water distribution has greatly improved over time in urban areas but only about half of the rural supply has been upgraded.[13] Meanwhile, sanitation services have received minimal improvements in both urban and rural landscapes. Nigeria's booming economy is also causing difficulty in controlling greenhouse gas emissions. This issue is further compounded by the nation's growing demand for energy which is generated via the burning and processing of fuels that release greenhouse gases upon combustion. In return, the combustion of these fuels contributes to increasing land and water body acidification further deteriorating forest, agriculture, and water quality throughout the country. For these reasons, Nigeria must begin adopting more sustainable practices.

Russia:

Indicator	Value	Ranking of Each Indicator
Forested land	49%	7
Arable land and permanent crops	0.86 ha/person	4
Methane emissions	0.0037 kt of CO_2 equivalent/person/year	6
Carbon Dioxide emissions	12.2 Mg/person/year	7
Freshwater extracted	561 m^3/person/year	5
Access to sanitation facilities	70%	5
Percent of population with access to waste collection services	95%	9
Municipal waste collected	0.39 ton/person/year	7
Total Score		**50/80**

Russia is the ninth most populous country, but has the largest land area in the world with over 1.7 billion hectares. Forty nine percent of this land is covered in forests, and over 123 million hectares of arable land (0.86 ha/person). Russia has a large carbon dioxide emission rate of 12.2 Mg per person per year and a methane rate of 0.0037 kt of CO_2 equivalent per person each year, making it the third worst air polluter worldwide after China and the U.S. They have begun to see the effects of climate change in an increase of natural disasters.[14] Russia is extracting a total of 80784 million m^3 each year (m^3/person/year), and 70% of the population having access to sanitation facilities. Municipal waste is being collected at 0.39 tons per person per year, which is

almost equal to the total waste generated considering 95% of the country has access to waste collection services.

Japan:

Indicator	Value	Ranking of Each Indicator
Forested land	68.5%	9
Arable land and permanent crops	0.036 ha/person	9
Methane emissions	0.00032 kt of CO_2 equivalent/person/year	10
Carbon Dioxide emissions	9.2 Mg/person/year	7
Freshwater extracted	680 m^3/person/year	5
Access to sanitation facilities	100%	10
Percent of population with access to waste collection services	99.8%	10
Municipal waste collected	0.43 ton/person/year	7
Total Score		**67/80**

The island of Japan is surrounded by the Sea of Japan to the west, the East China Sea to the southwest, the Philippine Sea to the south, the Pacific Ocean to the east, and the Sea of Okhotsk to the north. Japan boasts one of the biggest and most developed economies in the world. Interestingly enough, while most developed countries are experiencing population growth, albeit lower than many other nations, Japan's is decreasing with a death rate that exceeds birth rates.[15] (Central Intelligence Agency, 2005a). Japan's economy is based off of agriculture, industry, and consumer services. These sectors greatly impact the nation's sustainability efforts via land usage, waste disposal, water treatment, and energy consumption. Sustainable methods for supplying the extensive energy needs for Japan's industries and largely urban lifestyle requires many power plants, some of which utilize less sustainable and dwindling resources of fossil fuels. Under combustion, these sources emit acidic discharges which result in acid rain and acidification of land and water bodies.[15] This acidification is having detrimental effects on wildlife and is degrading water quality, a valuable resource for potable water and industry in Japan.[15] Furthermore, agricultural goods supplied by Japan such as rice, beets, fruits, meats, eggs, and dairy products risk contamination and failure due to acidification of farmland which affects crops and domesticated animals. Japan's other industries are some of the most technologically advanced consisting of electronic equipment, automobiles, and chemical production.[15] These sectors of the economy emit large amounts of waste material and wastewater which must be managed in a safe manner for both public and environmental health.

Objective: A standard measurement of percentage or per capita per year was used for each indicator. This ensures that no country received an unfair bias when determining their score on the sustainability index. Each indicator was weighed equally on a scale from 1-10.

Land Use:

- <u>Percent Forested Land</u>: Forested land is the percentage of land under natural or planted trees at least 5 meters in height and does not include trees for agricultural production. Forested land is important to our health and planet by providing food and medicine, cleaning the air, cooling down the Earth, and reducing erosion, to preserve these ecosystems means more resources for future generations. The higher the percentage of forest the better the ranking with ten being the highest score a country can get. These percentages are all relative because they do not take into account if the soils can sustain a forest and/or if the land if mostly desert. The data for this indicator was taken in 2007.

- <u>Arable land and Permanent crops</u>: Arable land and permanent crops includes number of hectares of land under permanent crops, land under temporary crops, temporary meadows for mowing/pasture, and land under market gardens. Over 40% of arable land has been degraded due to desertification, salinization, erosion, and development. Much of this land is now unproductive, therefore the less arable land, the better. Therefore, the countries with the highest amount of arable land were given a lower ranking between 1-4. The data for this indicator was taken in 2007.[16]

Emissions:

- <u>Methane Emissions:</u> This includes methane emissions originating from human activities such as agriculture and industrial methane production. Methane is the second most prevalent greenhouse gas, and it is 21 times more potent in trapping heat than CO_2 in global warming potential. About 60% of methane emissions are human based, the other 40% are emitted by natural processes, but this indicator is only taking into account the anthropogenic sources. Countries with the largest methane emissions were given lower classification numbers since methane emissions are considered negative. The data for this indicator was taken in 2010.[17]

- <u>Carbon Dioxide Emissions:</u> Carbon dioxide emissions are those originating from the burning of fossil fuels and the production of cement (produced during consumption of solid, liquid, and gas fuels). It is the primary greenhouse gas contributing to global climate change; hence countries with higher CO_2 emissions were given lower classification numbers. The data for this indicator was taken in 2005.[18]

Water:

- <u>Freshwater Extracted:</u> Freshwater extracted refers to total freshwater extracted in a year from both groundwater and surface water sources, not including evaporation losses. These totals do include water from desalination plants, agriculture, industry, and domestic use. The less water removed the better, considering only 3% of Earth's water is freshwater. These numbers do not take into account how much access to ground and/or surface water a country has, and if only certain areas are more plentiful in water than others. Due to the limited amounts of freshwater available, countries with a lower freshwater extraction rate were given higher ranking numbers. The data for this indicator was taken from 2000.[19]

- Access to Sanitation Facilities: Access to sanitation facilities refers to the percentage of people using improved sanitation facilities (flush toilet with septic tank/sewer system, ventilated improved pit latrine, composting toilet). Inadequate sanitation is major problem in developing countries, especially since there are more than 2.4 billion people that do not have access to improved sanitation services. Countries with higher sanitation access were given higher classification numbers considering the importance of sanitation to the health of the environment and humans. The data for this indicator was taken from 2012.[20]

Waste:
- Municipal Waste Collected: Municipal waste collected in tons per person per year referring to the amount of waste collected through municipalities, meaning only household waste. These numbers are only accounting for the waste collected through the waste disposal system, meaning even more waste is being generated but not counted in this total since it is not being properly disposed of. Countries with the smallest waste collected were given higher rankings because in order to be sustainable it is critical for the populations to reduce the amount of waste that they generate. The data for this indicator is the most recent available spanning from 1990 to 2015.[20,21]

- Access to Waste Collection: This refers to the percent of the population with access to waste collection services. Waste that is not collected can lead to disease, water/air pollution, and has become a major problem in developing countries. How resources are dealt with after they reach the end of their useful life is an important factor of sustainability. Countries with the highest percentage of waste collected got the highest ranking because it is critical for waste to be properly collected in order to prevent it from polluting the environment. The data for this indicator is the most recent available spanning from 1990 to 2015.[20]

Methodology: The system flowchart was created using Microsoft Word. In the flowchart four categories were chosen and discussed. Each category consists of two important indicators. The indicators were chosen based on essential effects they have towards the categories and the main goal of the project which is aiming to accomplish sustainability in each country.

Four Categories:
Land Use: Forested land & Arable land and permanent crops
Emissions: Methane emissions & Carbon dioxide emissions
Water: Fresh water extracted & Access to sanitation facilities
Wastes: Percent of population with access to waste collection services & Municipal waste collected

To account for countries population and sizes, values on a per capita basis were calculated for the following indicators: Methane emissions, carbon dioxide emissions, arable land and permanent crops, fresh water extracted, and municipal waste collected. For forested land, access to sanitation facilities, and population with access to waste collection services, percentages were used as measurements.

In order to organize the data into maps displaying the results, the Field Calculator, Join, select by attribute, and Symbology commands were utilized. Each indicator was first joined to the world shapefile, making sure the names of each country were identical. Each indicator was then broken into 11 different classes using the symbology feature, with the last class being for the no data section. For each indicator, select by attribute was used to select only the countries falling within the certain range of each class category. Next, the Field Calculator was used to reclassify countries on the scale from 1 to 10 based on which range they fall into. Next ArcGis Join command is used to join all of the reclassified columns together into one attribute table. After this, creating the summary column and summing all the values was performed by using the field calculator command. The final values given to each country are based on the values from 1-10 from each indicator. Using the Symbology command, different color schemes and values were applied for each data category (i.e. water has a blue color scheme with different shades for each ranking from 1 to 10). The sustainability index ranking goes from "1", which is bad, to "10", which is good. In the end, the sum of all points each country has achieved will determine the sustainability index rating of the country. The result ranges from 0- very poor performance on sustainability to 80-good performance on sustainability.

Results/Discussion:

China: 57
India: 50
United States: 51
Indonesia: 62
Brazil: 58
Pakistan: 46
Bangladesh: 33
Nigeria: 53
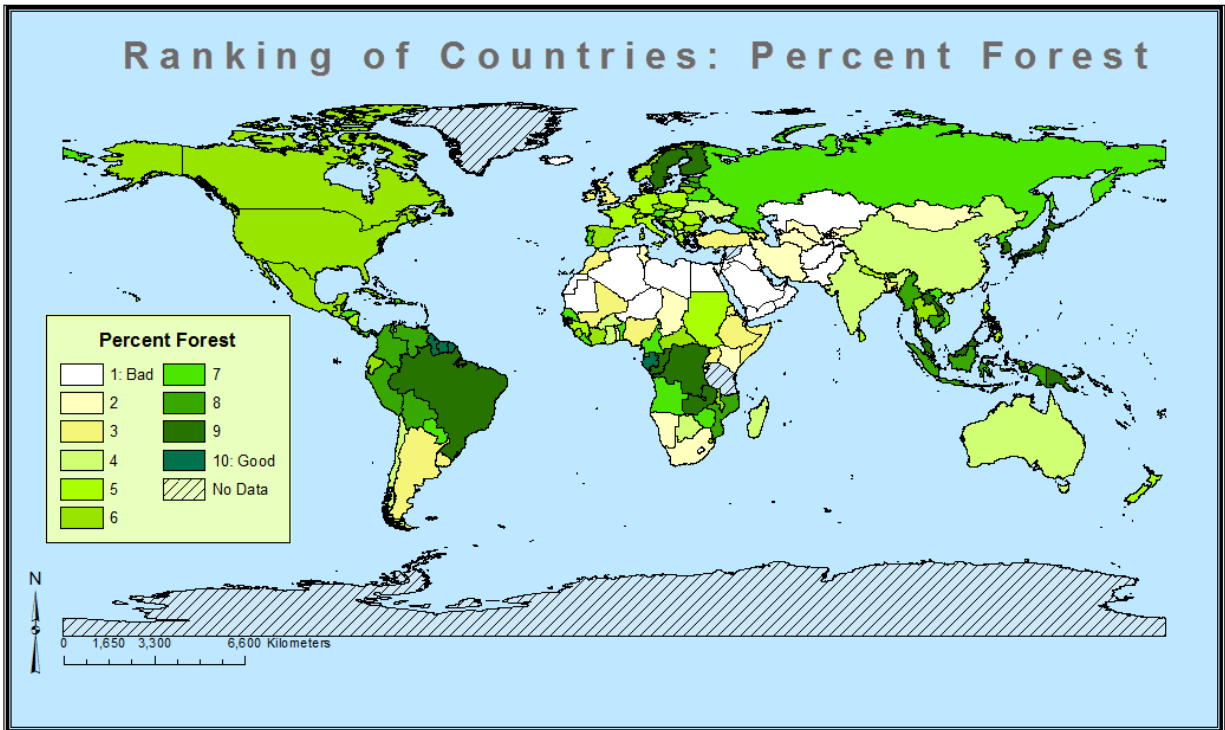Russia: 50
Japan: 67
(Out of 80)

Figure 1: This shows the amount of land covered in forest per country based on a ranking system of white (1) being the worst to dark green (10) having the most forest.
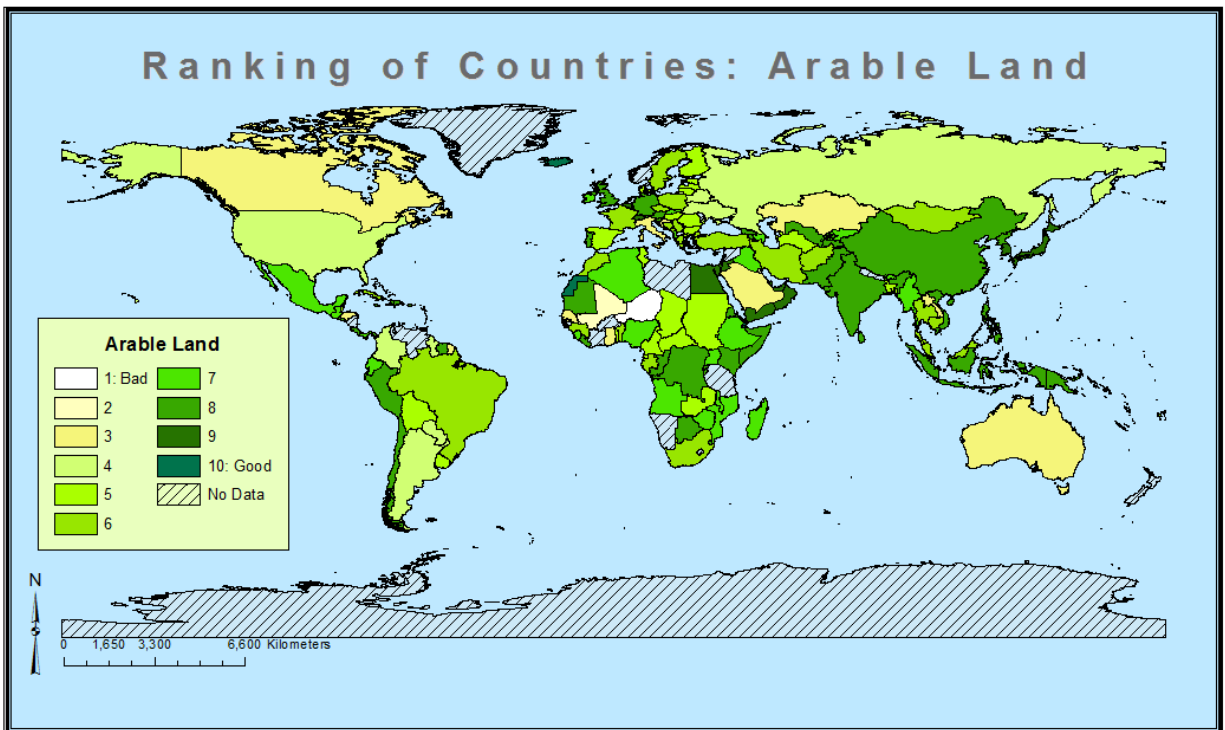

Figure 2: This is a map of the ranking of each countries amount of arable land, with white (1) having the most arable land per capita to dark green (10) having the least arable land per capita.
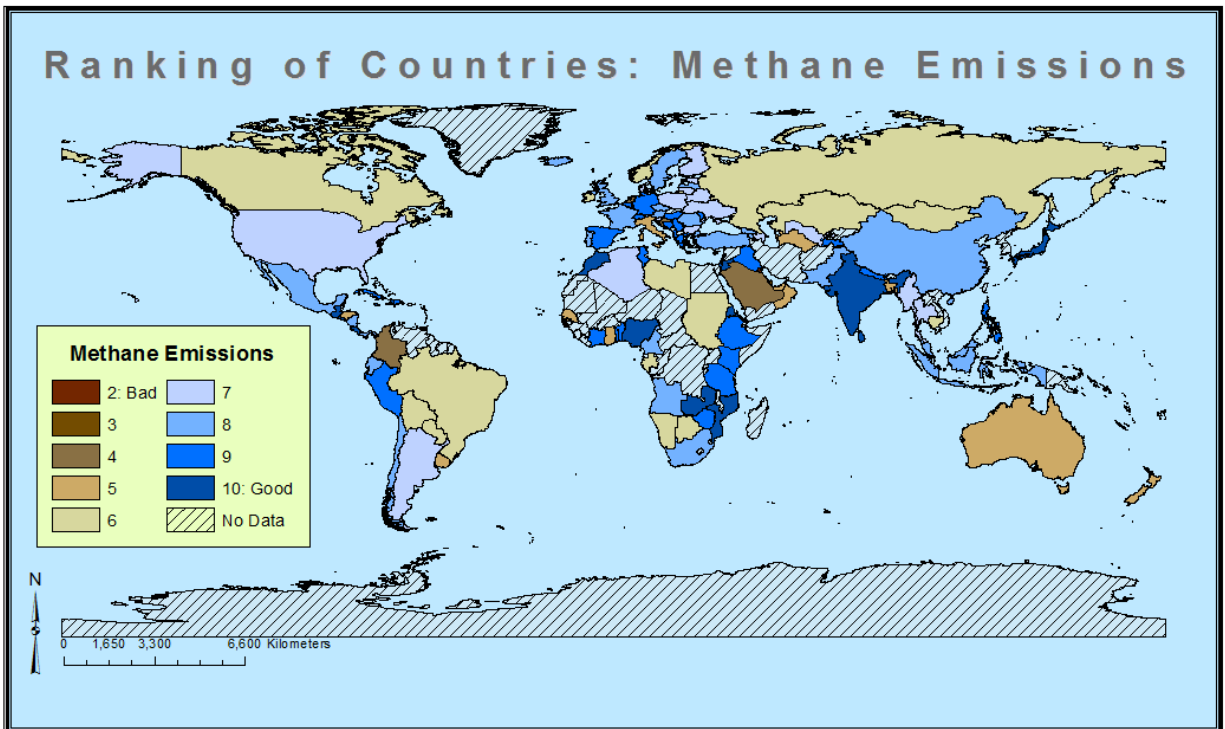
Figure 3: Displays how much each country is emitting in terms of methane on a basis of dark brown (2) being the highest emissions and dark blue (10) being the lowest emissions per capita.
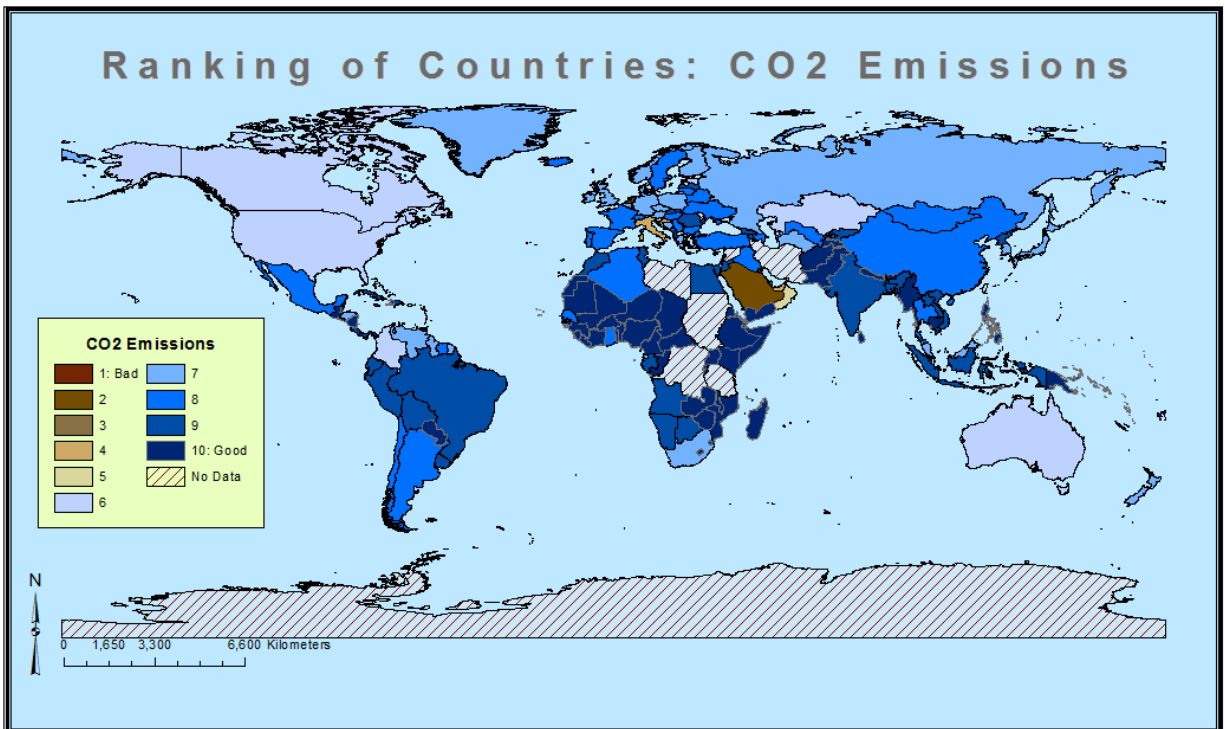
Figure 4: This is a map showing each countries CO2 emissions per capita each year with dark brown being the highest emissions to dark blue being the lowest.

Figure 5: This map displays a ranking of how much freshwater each country is extracting per year with white being the largest extractions and dark blue having the least extractions per capita.
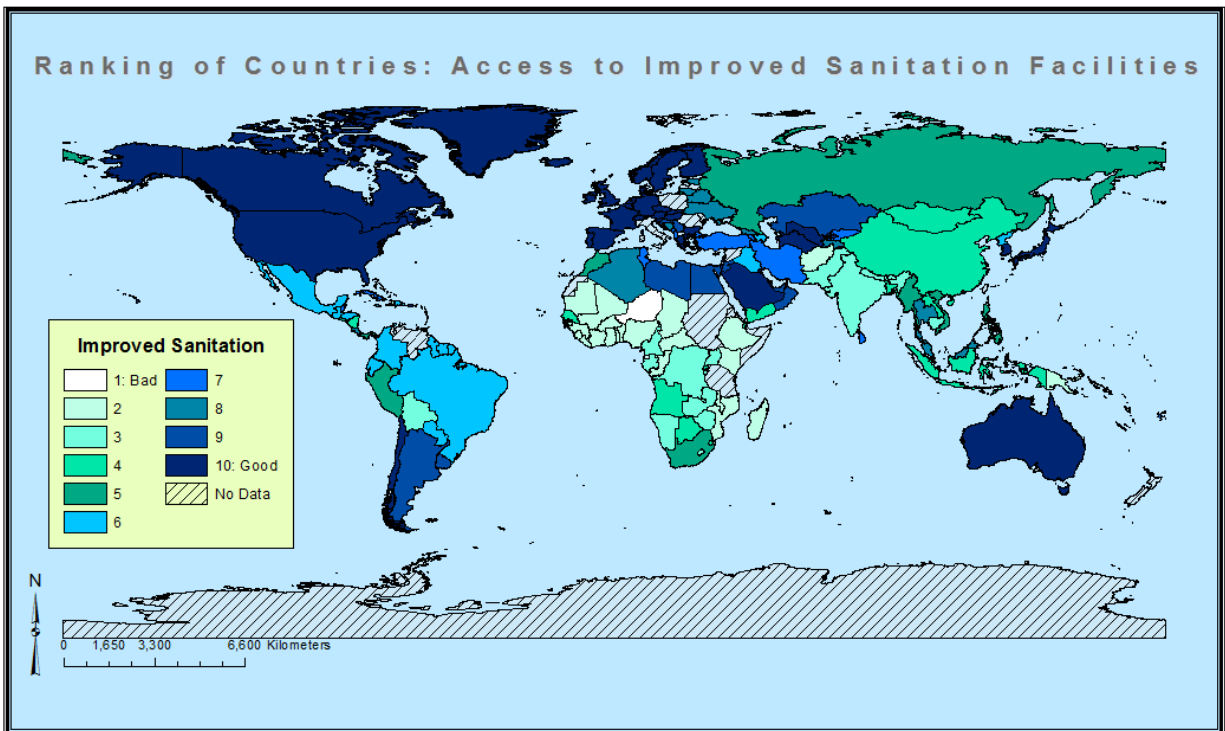
Figure 6: This is showing the percent of people with access to sanitation facilities with white having the lowest percent access to blue having the highest percent access.

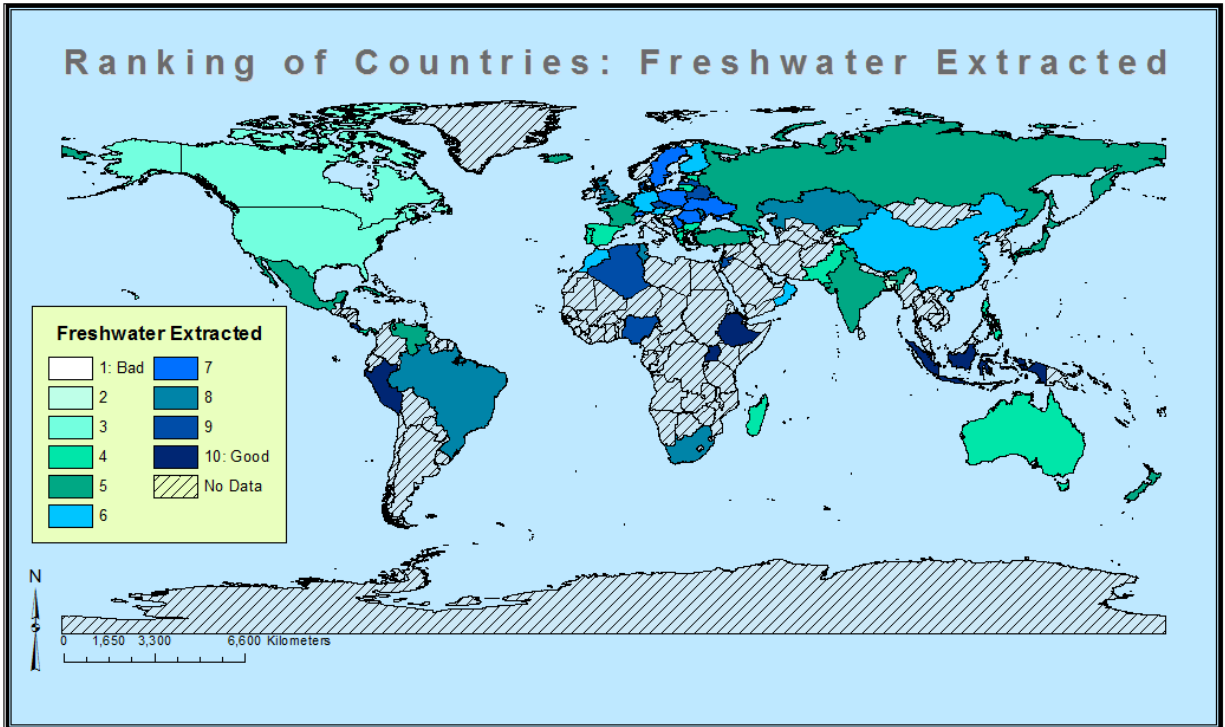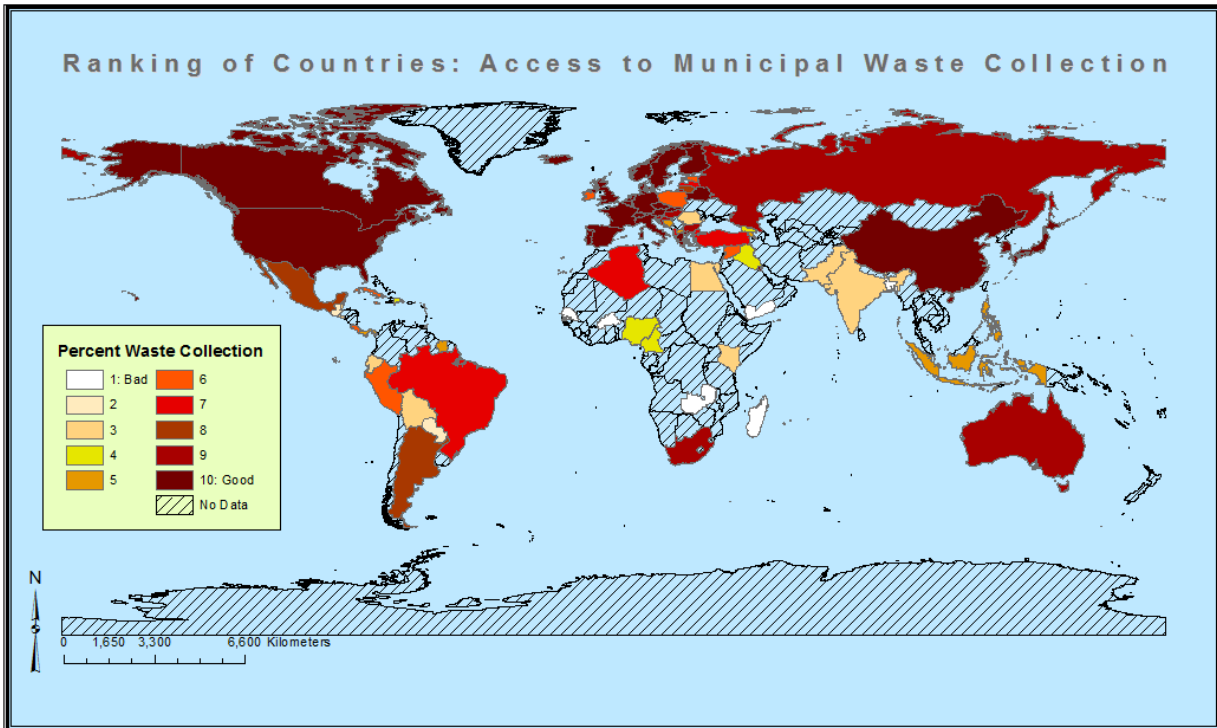Figure 7: This map shows the percentage of people that have access to municipal waste collection per country with white having the lowest access to dark red having the highest.
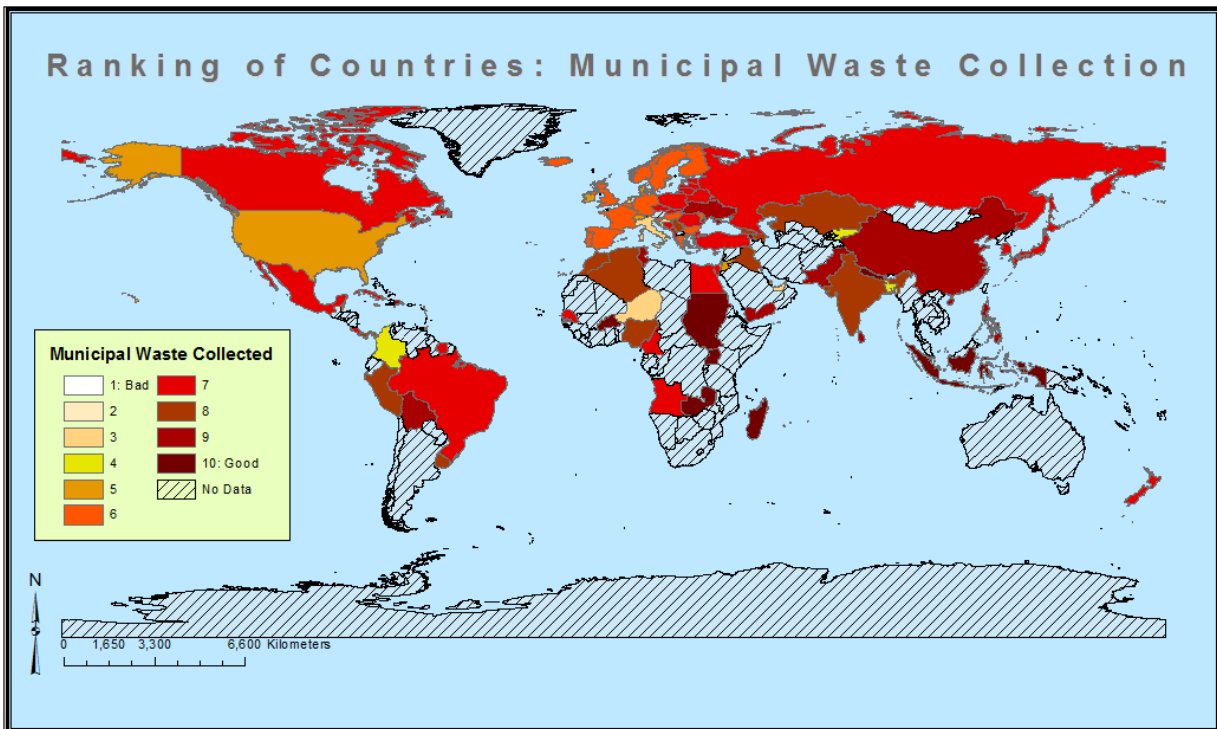

Figure 8: This map is showing how much municipal waste was collected in each country per person each year with white (bad) having the highest waste collected to dark red (good) having the least waste collected.

Conclusion:

Japan boasted the highest rating on the sustainability index of 67/80. Being a very advanced country with a powerhouse economy, Japan has also set the standard for sustainable practices. A likely reason for this characteristic is due to its large population on an comparatively small island. Hence, resource efficiency is paramount and wasting and contaminating these valuable resources, especially potable water, is unacceptable. The citizens of Japan realize that complying with sustainable principles and methods is a necessity in securing their high standard of living. However, it is important to note that Indonesia rating on the sustainability index of 62/80 falls slightly short of Japan's. What is more, Brazil ranks third out of the ten countries with a rating of 58/80. Both Indonesia and Brazil are considered to be developing countries, much unlike Japan and the United States. Interestingly enough, the United States, one of the most industrially developed and economically powerful countries in the world scored a 51/80 on the sustainability index. With this ranking, the U.S. is the sixth most sustainable country out of the selected ten and scored less than Nigeria and China with ratings of 53 and 57, respectively.

From these findings, a country's status as "developing" or "developed" (based on their economies) appears to have little weight in determining how sustainable it is based on the categories and indicators established for this study. More developed countries tend to produce much more waste, extract more water resources, and have less forested areas in lieu of arable land. Developing countries often have less consumer goods and hence generate less waste. Furthermore, water requirements are often less due to fewer industries which consume vast amounts of freshwater. Not to mention, forested land is often preserved in developing countries due to the overall lack of public and industrial infrastructure. On the other hand, developed countries typically have much better solid waste/water sanitation practices and services and have controls in place to limit their emissions of greenhouse gases. Meanwhile, many developing countries have limited solid waste collection services and water sanitation facilities. In addition, regulations are often lacking in these countries for controlling how much greenhouse gases are emitted from industry in the hopes of growing their economies as quickly as possible to compete with global competitors. Government policies on the environment can factor into a countries sustainability especially for water use, sanitation, and GHG emissions. Sustainability also may depend on a people's access to resources, since one tends to not think about conserving until they absolutely have to. Perhaps what affects a country's sustainability rating more than anything are the practices of the people who live within it and their outlooks on sustainability.

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