

Environmental Quiz – Answers

Population numbers and environmental trends are linked. So, before asking questions about the environment, we ask a few questions about population dynamics.

1. The population of the world in 1950 was about 2.6 billion. The world population is now about:
 - a. 3.4 billion
 - b. 7.4 billion
 - c. 9.3 billion
 - d. 11.5 billion

As of mid-October 2016 the world population was estimated to be 7.36 billion (b).

2. The population of the world in 2016 was increasing at a rate of about 9,000 people per _____.
 - a. month
 - b. week
 - c. day
 - d. hour

As reported by the U.S. Census Bureau, International Programs Division, the world population in mid-October 2016 was increasing at an estimated 8,889 per hour (d).

3. The world population in the year 2050 is projected to be about:
 - a. 3.4 billion
 - b. 6.8 billion
 - c. 9.7 billion
 - d. 11.5 billion

The medium projection of world population for the year 2050 by the International Programs Center of the U.S. Census Bureau is 9.7 billion (c). The Population Reference Bureau estimate for the year 2050 is 9.9 billion.

4. The population of the United States in 1960 (56 years ago) was 181 million. In October, 2016 the U.S. population was estimated to be _____.
 - a. 220 million
 - b. 325 million
 - c. 420 million
 - d. 511 million

The population of the United States on October 31, 2016 was about 324.8 million (b).

5. The medium (most likely) estimate of the U.S. population in the year 2060 is:
 - a. 220 million
 - b. 319 million
 - c. 417 million
 - d. 511 million

The projected population of the U.S. in 2060 is 417 million (c), an increase of just over 93 million from mid-year 2016. The mid-year 2016 combined populations of California, Texas, New York, and Florida totaled about 96 million.

6. China's mid-year 2016 population was estimated at 1.37 billion. That's more than 4 times the U.S. population. Assuming a continuation of the 2016 U.S. population growth rate (0.82% annually), how many years would it take for the U.S. population to become equal to the 2016 population of China?
- 50
 - 90
 - 175
 - 400
 - 900

If the U.S. population were to continue growing at a rate of 0.82% annually the U.S. population would surpass China's current population level in 175 years (c), or by 2191. At that point the U.S. population would be 4.2 times larger than it is today.

If the U.S. population were to continue its current rate of growth (a rate of growth that many people would say is negligible) for the next 400 years, the population would increase to over 8.5 billion (the current world population is 7.4 billion). If the current rate of growth were to continue for the next 900 years, this seemingly negligible growth rate would result in a U.S. population of over 506 billion (68x the current *world* population)!

China's population is also growing, estimated at an annual rate of 0.5% annually in 2016. If this rate of growth were to continue, China's population in the year 2100 would approximate 2.1 billion (as compared to 1.37 billion in 2016).

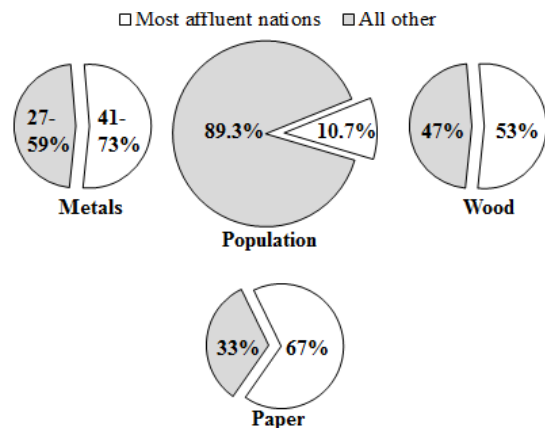
- ___ 7. True (T) or False (F). Consumption of mineral resources globally has increased sharply over the past 30 years.

True. Rapidly rising consumption in China and other developing countries has sharply increased demand for mineral, timber, and fuel resources, with consumption of minerals rising globally more rapidly than the rate of population growth.

- ___ 8. True (T) or False (F). The world's most economically developed countries consume a far larger share of the world's industrial raw materials than their collective share of world population.

True. As an example of this, a 2016 analysis found that the world's most economically developed nations – which together accounted for 10.7% of the world population, consumed 41-73% of the world's metals (with the exact percentage depending upon the particular metal), 53% of industrial wood, and 67% of paper. Similar disparity exists with respect to virtually all other materials. Moreover, consumption is even more lopsided than indicated by these numbers since considerable volumes of resources flow on a net basis to the most developed nations in the form of finished goods.

Recently, the world's second most populous country – China – until recently classed as economically underdeveloped, has begun to consume vast quantities of raw materials. Addition of China to the list above would yield truly stunning consumption numbers.



Source: Bowyer, J. 2016. *The Irresponsible Pursuit of Paradise*. Levins Press.

___ 9. True (T) or False (F). The United States is a net exporter of most raw materials used by industry.

False. The U.S. is a net importer of most categories of industrial raw materials, including metals, Portland and masonry cement, petroleum (the basis for plastics), and wood and wood products.

The 2015 U.S. import situation is outlined below:

Net U.S. Imports of Selected Materials as a Percent
of Apparent Consumption—2015, and by Major Foreign Sources^{a/b/c/d/}

Material	% Imported	Principal Foreign Sources (2011-2014)
Niobium (Columbium)	100	Brazil, Canada
Manganese	100	South Africa, Gabon, Australia, Georgia
Graphite	100	China, Mexico, Canada, Brazil
Strontium (Celestite)	100	Mexico, Germany, China
Arsenic (trioxide)	100	Morocco, China, Belgium
Bauxite/Alumina	100	Jamaica, Guinea, Brazil, Guyana
Fluorspar	100	Mexico, China, S. Africa, Mongolia
Indium	100	China, Canada, Belgium, S. Korea
Thallium	100	Germany, Russia
Thorium	100	India, France
Asbestos	100	Brazil, Canada
Quartz crystal (industrial)	100	China, Japan, Romania, UK
Rare earth metals	100	China, France, Estonia, Japan
Rubidium	100	Canada
Cesium	100	Canada
Tantalum	100	China, Germany, Indonesia, Kazakhstan
Mica sheet (natural)	100	India, Brazil, China, Belgium
Scandium	100	China
Vanadium	100	Czech Rep., Canada, S. Korea, Austria
Gallium	100	Germany, China, UK, Ukraine
Iodine	100	Chile, Japan
Gemstones	99	Israel, India, Belgium, S. Africa
Bismuth	95	China, Belgium, Peru, UK
Titanium mineral concentrates	91	South Africa, Australia, Canada, Mozambique
Platinum	90	South Africa, Germany, UK, Canada
Garnet (industrial)	88	Australia, India, China
Germanium	85	China, Belgium, Russia, Canada
Antimony	84	China, Bolivia, Belgium, Thailand
Diamond (dust, grit, powder)	84	China, Ireland, Romania, S. Korea
Potash	84	Canada, Russia, Israel, Chile
Stone (dimension)	83	China, Brazil, Italy, Turkey
Zinc	82	Canada, Mexico, Peru, Australia
Lithium	80+	Argentina, Chile, China
Rhenium	79	Chile, Poland, Germany

Material	% Imported	Principal Foreign Sources (2011-2014)
Silicon carbide (crude)	77	China, S. Africa, Netherlands, Romania
Rare earth metals	76	China, Estonia, France, Japan
Cobalt	75	China, Norway, Finland, Russia
Tin	75	Peru, Indonesia, Bolivia, Malaysia
Silver	72	Mexico, Canada, Poland, Peru
Barium (Barite)	70	China, India, Morocco, Mexico
Peat	69	Canada
Titanium (sponge)	68	Japan, Kazakhstan, China
Chromium	66	South Africa, Kazakhstan, Russia, Mexico
Palladium	58	Russia, S. Africa, UK, Switzerland
Tungsten	49	China, Bolivia, Canada, Germany
Magnesium compounds	43	China, Brazil, Canada, Australia
Aluminum	40	Canada, Russia, United Arab Emirates
Mica, scrap/flake (natural)	39	Canada, China, Finland, Mexico
Silicon	38	Russia, Brazil, China, Canada
Nickel	48	Canada, Russia, Australia, Norway
Copper	36	Chile, Canada, Mexico
Salt	32	Canada, Chile, Mexico, The Bahamas
Lead	31	Canada, Mexico, Peru, Australia, Kazakhstan
Nitrogen (fixed), Ammonia	29	Trinidad/Tobago, Canada, Russia, Ukraine
Petroleum (crude & refined)	27	Canada, Saudi Arabia, Mexico, Venezuela, Iraq
Magnesium metal	26	Israel, Canada, China, Mexico
Iron and Steel	25	Canada, S. Korea, Brazil, Russia
Softwood lumber	25	Canada
Perlite	21	Greece, Turkey
Pumice	21	Greece, Iceland, Mexico
Vermiculite	20	S. Africa, Brazil, China
Sulfur	16	Canada, Mexico, Venezuela
Gypsum	14	Canada, Mexico, Spain
Talc	13	Pakistan, Canada, China, Japan
Feldspar	12	Turkey, Mexico, Germany, India
Beryllium	11	Kazakhstan, China, Nigeria, UK
Iron and steel slag	11	Canada, Japan, Spain, Italy
Portland and masonry cement	10	Canada, S. Korea, China, Greece

^{a/} Principal foreign sources arranged by most important supplier to the left, next most important supplier to the right of that, and so on.

^{b/} Minerals data from U.S. Geological Survey. 2016. Mineral Commodity Summaries – 2016.

^{c/} Petroleum data from U.S. Department of Energy, Energy Information Administration, 2016 (October).

^{d/} Data for wood, wood products, and wood pulp products are from RISI, Random Lengths, 2015, 2016.

10. Considering U.S. annual consumption of the following materials, which is consumed in the greatest quantity? (Note: Cement is a binder, making up 8-15% of concrete).
- steel
 - aluminum
 - wood
 - plastic
 - cement

The answer is wood (c). More wood is consumed annually in the United States than any of these materials. In fact, on both a volume and weight basis, more wood is consumed each year in the U.S. than all metals and all types of plastics combined.

- ___ 11. True (T) or False (F). Energy consumption per capita (per person) in the United States is twice that of the European Union.

This statement is True. Per capita consumption of energy is also significantly higher than in several nations often listed as offering a higher or comparable quality of life as in the United States.

Per Capita Energy Consumption in the U.S.
and the E.U. Countries - 2008

Country	Per Capita Energy Consumption (kilograms of oil equivalent per person)
United States	7885.9
Finland	6555.0
Belgium	5891.7
Sweden	5780.3
Netherlands	5048.8
Czech Republic	4418.6
France	4396.8
Germany	4187.0
Austria	4134.7
UK	3894.6
Estonia	3786.0
Ireland	3656.0
Slovenia	3655.0
Denmark	3634.3
Slovakia	3502.8
Cypruss	3367.0
Spain	3339.6
Italy	3169.1
Greece	2794.0
Hungary	2757.4
Bulgaria	2592.0
Portugal	2574.1
Lithuania	2515.0
Poland	2429.0
Malta	2349.0
Latvia	2050.0
Romania	1772.0
Weighted E.U. Average	3773.4

* Values are not provided for Cypress, Malta, or Luxembourg as data for these countries was not included in source documents.

Source: Ewing et al. 2008. The Ecological Footprint Atlas 2008.

12. China's emissions of carbon dioxide in 2014 were greater than those of any other nation, and twice those of the United States. In that same year, China's per capita emissions of carbon dioxide were:
- a. 35% greater than the U.S.
 - b. 15% greater than the U.S.
 - c. About the same as in the U.S.
 - d. Less than one-half those of the U.S.
 - e. Less than one-third those of the U.S.

Carbon dioxide emissions in 2014 for China, the European Union, and the United States were estimated at 10.6, 3.4, and 5.3 billion metric tons, respectively. China's per capita CO₂ emissions in that same year were 7.6 metric tons, while emissions for the E.U. were 6.7 metric tons and those of the U.S. 16.5 metric tons. Consequently, China's per capita CO₂ emissions were less than one-half of those of the U.S. in 2014 (d).

13. Water covers approximately 70% of the Earth's surface. About _____% of this is available for human use.
- a. 1
 - b. 5
 - c. 10
 - d. 15

As reported by the U.S. Environmental Protection Agency only 1% of the world's water is available for human use (a), including agricultural, domestic, commercial, industrial, and environmental needs. Globally, water consumption has tripled in the last 50 years. Managing the supply and availability of water is one of the most critical natural resource issues facing the United States and the world.

- ___ 14. True (T) or False (F). Globally, the area of forests is declining, mostly due to human activity.

True. About 8.2 million acres of forest were converted to non-forest uses annually during the period 2010-2015, primarily in the tropical regions where population growth was greatest. While bad news, there is good news in that the annual rate of forest loss is less than half of what it was just 15 years earlier. In some areas of the world, such as the United States and in Europe, forest cover is increasing.

In all parts of the world, and even where forest cover is increasing, the area of forest per capita is declining due to ongoing population growth, continuing a trend that has existed for millennia. In the tropics, where population growth is rapid and forest loss continues, the area of forest per capita is about half of what it was only 25 years ago.

15. The number one cause of tropical deforestation worldwide is:
- a. commercial logging
 - b. wildfire
 - c. clearing of lands for agricultural use
 - d. gathering of firewood
 - e. building of roads and cities

Clearing of lands for agricultural use (c) is by far the leading cause of tropical deforestation worldwide.

16. The area covered by forests in the United States in 2012 was approximately _____ of the forested area that existed in 1600.
- 73 percent
 - 50 percent
 - 33 percent
 - 17 percent

There were 766 million acres of forests in the U.S. in 2012, about 73% of the 1.044 billion acres of forests estimated to have covered what is now the United States in the year 1600 (a).

- ___ 17. True (T) or False (F). The geographic area that encompasses the United States today has greater forest coverage than the same geographic area did in 1920.

True. In 1920 there were an estimated 732 million acres of forest covering the area that now comprises the United States. As of 2012 there were 766 million acres of forest in the U.S., with forest area continuing to increase. The 2012 forested area was greater and within one percent of the forest area of approximately 755 to 760 million acres that existed in 1907.

18. Which of the following statements most accurately describes United States forests:
- forest harvest exceeds net growth by 20 percent
 - forest harvest exceeds net growth by 5 percent
 - forest harvest roughly equals net growth
 - net forest growth exceeds harvest by 29 percent
 - net forest growth exceeds harvest by more than 100 percent

Net growth of forests in the United States substantially exceeds harvest. In the most recent assessment of U.S. forest land (USDA-Forest Service, 2014, RPA Assessment - 2012) net growth was estimated to exceed removals by 105% (e) – i.e. net growth is more than double net removals. These figures do not include growth within areas designated as parks, reserves, or wilderness areas. If growing on all lands were counted the net growth figure would likely be higher than that indicated above.

- ___ 19. True (T) or False (F). Growing trees capture carbon dioxide from the air and release oxygen.

True. In the process of photosynthesis, which is driven by sunlight, water from the ground is combined in the leaves with carbon dioxide from the air to form glucose and other sugars, and oxygen that is released to the atmosphere. The sugars are used to form wood which stores carbon for as long as it exists. On a dry weight basis, carbon makes up almost exactly half the weight of wood.

- ___ 20. True (T) or False (F). As originally established, it was never intended that the National Forests of the United States would be periodically harvested to obtain timber that would be used in meeting the nation's need for wood.

False. One of the specifically stated reasons for establishment of the National Forests was to ensure a continuous supply of wood for U.S. citizens.

- ___ 21. True (T) or False (F). At current rates of deforestation, 40 percent of current forests in the United States will be lost by 2050.

False. Forests actually increased in area coverage in the United States between 1985 and 2012. However, a 2012 assessment of U.S. forests predicted that 4-5% of the current area of forest land in the U.S. may be converted to non-forest uses by 2060, with increased urbanization the primary driver of forest loss.

___22. True (T) or False (F). When properly managed, forests can provide products and services indefinitely.

True. Forests are renewable. When managed with care, forests can provide watershed services, wildlife habitat, recreation, and a flow of wood and wood fiber forever.

___23. True (T) or False (F). In the U.S., more species of plants and animals have been driven to extinction by logging activity than any other activity of mankind.

False. There is no documented evidence of even one plant or animal species having been driven to extinction by logging activity in the United States.

___24. True (T) or False (F). Under current United States law, forest harvesting is allowed within federally designated wilderness areas.

False. Forest harvesting is not allowed in federally designated wilderness areas.

___25. True (T) or False (F). Considering the total annual harvest of forests in the United States and the total consumption of wood and wood fiber products within our country, the U.S. is a net importer of wood and wood products.

True. The United States is a net importer of about a quarter of the softwood lumber consumed annually within the country. When all products are considered, including exports of logs, and chips, the U.S. is a net importer of about 9% of the total wood and wood fiber consumed within its borders. Prior to the 2007-2009 economic recession, U.S. net imports of wood were 15-20% of domestic consumption. The United States has been a net importer of wood for about 50 years.

26. As a percentage of all the paper consumed in the United States in 2015, _____ was recovered for reuse.

- a. 15 percent
- b. 38 percent
- c. 67 percent
- d. 81 percent

In 2015, a record 66.8 percent (c) of all paper used in the United States was collected for reuse.

27. Recovered paper provided _____ of the fiber used in manufacturing paper in the United States in 2015.

- a. 15 percent
- b. 40 percent
- c. 60 percent
- d. 80 percent

Recovered paper provided about 40 percent of the U.S. paper industry's fiber in 2015 (b). The difference between the wastepaper collection rate (67 percent) and the recovered paper use rate (40 percent) is largely traceable to the fact that the United States is the world's largest exporter of waste paper. Virtually all exported wastepaper is also used in making paper and paperboard.

___28. True (T) or False (F). Paper can be recycled indefinitely so that no more trees need to be cut.

False. Wood fiber deteriorates with each reuse, and can be reused no more than 4-9 times before disintegrating. Consequently, a continued supply of virgin fiber is needed in papermaking. This means that when paper is produced with 100% recycled fiber, other types of paper must contain a higher percentage of virgin fiber than if the proportion of recovered fiber were distributed uniformly throughout various paper grades.

___29. True (T) or False (F). Reduced paper consumption is likely to result in a greater extent of forest cover in the United States.

This statement is very likely False. The vast majority of wood used for papermaking in the United States comes from privately-owned forest land, two-thirds of which is in the Southeastern part of the country. Should consumption of paper, and thus pulpwood, decline markedly many forest owners are likely to sell their land to urban developers or to convert their forested lands to agriculture or some other non-forest use.

___30. True (T) or False (F). The manufacture of wood construction materials generally results in far lower environmental impacts than when similar construction materials are manufactured from steel, aluminum, plastic, or concrete.

True. Well-documented environmental life cycle inventories of various raw materials production processes conducted by research organizations around the world show that wood products can be manufactured with relatively little environmental impact compared to potential alternatives. Even when wood products are compared to cement-based and recycled metal products, energy consumption and associated environmental impacts associated with wood-based materials manufacture are generally substantially lower.

Question for Thought:

When someone says “In the United States, we have less than 4% of our original forests left,” what are they really saying?

For more information on these and other topics go to:

Dovetail Partners (www.dovetailinc.org)

U.S. Census Bureau, Population Division (<http://www.census.gov/popclock/>)

Population Reference Bureau. 2016. World Population Data Sheet.
(<http://www.prb.org/Publications/Datasheets/2016/2016-world-population-data-sheet.aspx>)

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Metafore –The Paper Life Cycle (<http://thepaperlifecycle.org/>)

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