Quiz 6 **Name: Thomas Byrne**

Chapters 11 & 12 **Due Date: 4/13/13 Mid-Night**
45 Points Possible

Chapter 11

1. About what percent of the world's water is liquid, fresh, surface water that supports most terrestrial life? (1 Point)

About 0.2% of the world's water is available to us and other organisms that rely on fresh water.

2. What is an *aquifer?* How does water get into an aquifer? Explain the idea of an *artesian well* and a *cone of depression*. (4 Points)

An *aquifer* is a geologic layer that contains water. Surface water seeps down into an aquifer through a recharge zone, an area that is not made up of impermeable material.
An *artesian well* is a well or spring that flows freely at the surface and is fed or pushed by the water pressure in an aquifer.
A *cone of depression* is an area where previously water was available, but due to pumping or other circumstances, the water table is lowered, and water is no longer available at previous depths.

3. What is the difference between water *withdrawal* and *consumption?* Which sector of water use consumes most globally? Overall, has water use increased in the past century? Has efficiency increased or decreased in the three main use sectors? (4 points)

Withdrawal refers to the total amount water removed from a body (such as a lake). The majority of this water will be recycled or put back into the environment in some form.

Consumption refers to the amount of water that is lost or cannot be reused due to transformation or other reasons.

Agriculture uses the largest portion of our fresh water globally - about 70%.

Water use has increased in the last century. It has grown about twice as fast as the population has.

Water efficiency has increased in the three main use sectors.

4. Explain the difference between *point* and *nonpoint pollution*. Which is harder to control? Why? (3 Points)

Nonpoint pollution is pollution that does not have a specific location or point where they discharge into our water system. Water runoff from fields or roads are examples of nonpoint pollution.

Point Pollution is pollution that discharges from a specific location, such as a drain pipe or sewer outfall.

Nonpoint pollution is much harder to control, as there is no one specific point where pollution can be trapped or treated. Pollution that enters the environment in multiple places, such as car exhaust or

pesticides have to be regulated and stopped before they are spread, as they can't be stopped before they're emitted into the environment.

5. Why are nutrients considered pollution? Explain the ideas of *eutrophication* and an *oxygen sag*. (3 Points)
Nutrients can be considered pollution because when they are dumped in excessive levels, they can cause uncontrolled growth of microbes and algae that harm the water.

Eutrophication is the increase of nutrient levels and biologic productivity. Cultural Eutrophication is eutrophication caused by human activities, and is often marked by accelerated eutrophication that is harmful.

Oxygen Sag is the decreased oxygen levels downstream of a point source. As the environment absorbs waste materials, the available oxygen in the area falls. Further downstream, as decomposers metabolize the waste material, oxygen levels slowly return to normal.

6. What are some sources of groundwater contamination? Why is groundwater pollution such a difficult problem? (4 Points)

Sources of groundwater contamination include air pollutants, fertilizer, cattle manure and pets.

This is a difficult problem for multiple reasons. Groundwater is contaminated from many sources - some of which are very distant from the place where they are found, such as air pollutants from plants traveling many hundreds of miles before falling to earth. In addition, there are many unregulated activities that currently affect groundwater, such as dense animal farming. Laws to make changes have been proven to be effective, but these laws need to be created and enforced at the federal level to have any effect. Lastly, even the current studies and treatments only look for a small percentage of items, and can easily miss newer pollutants.

Chapter 12

1. How does tectonic plate movement create ocean basins, mid-ocean ridges, and volcanoes? (2 Points)

Tectonic plates are huge blocks that move based on the currents in the earth's mantle. These plates slide extremely slowly across the earth's surface. Where these plates pull apart, they create *ocean basins*. Where these plates crack, if magma is forced up through them, they become *mid-ocean ridges* if under water.
Volcanoes can form when plates pass over a 'hot spot', or where plates converge and cause melting.

2. What is the "*ring of fire*"? (1 Point)

The *ring of fire* is a ring around the pacific ocean rim, from Indonesia to Japan, up to Alaska and down the coast of the Americas where oceanic plates are being subducted (pushed under) the continental plates. This is characterized by lots of volcanic activity and earthquakes.

Alternately, if you are a Johnny Cash fan, the *ring of fire* could refer to falling in love:
"Love is a burning thing,
And it makes a fiery ring.
Bound by wild desire,
I fell into a ring of fire." (Cash, Johnny. *Ring Of Fire,* Columbia Records, 1963. Record.)

3. What is the difference between metals and nonmetal mineral resources? (2 Points)
Metals are characterized by their composition. They are relatively light, stong, malleable, and can be (relatively) easily reshaped for multiple purposes. They are so important that we have named major "ages" in human development after them, ie: "Stone" Age (pre-metalworking), "Bronze" age, and "Iron" age. Non-metal minerals lack in one or more of these qualities. Important non-metal minerals include gemstones, salt, limestone and silica.

4. What is a *mineral* and a *rock*? Why are pure metals not minerals? (3 Points)

A *mineral* is an inorganic solid, characterized by a specific internal crystalline structure and a specific chemical composition, which occurs naturally.

A *rock* is a solid aggregate of one or more minerals.

Pure metals are not considered minerals because although their ore may have been a mineral, the refining and purifying process destroys the internal crystalline structure, and are therefore no longer minerals.

5. Which countries are the single greatest producers of our major metals? (3 points)

The countries that are the largest producers of major metals are Canada, the US, Russia and China.

6. Compare the different mining methods of *underground*, *open-pit, strip,* and *placer mining*, as well as *mountaintop removal.* (6 Points)

Placer Mining is an ancient method of mining gold, where gold nuggets and flakes are washed out of stream sediments. This type of mining can cause excessive sediment to choke streams.

Underground Mining involves digging tunnels underground and directly removing the ores. This type of mining can cause toxic groundwater seepage, explosions (due to natural gas pockets) as well as physical danger, in the case of tunnels collapsing.

Open Pit Mining refers to simply digging a huge pit on the surface, near large ore deposits, and mining all the ore that is found. This can lead to toxic groundwater accumulation.

Strip Mining is similar to open pit mining, but the ground is dug away in large strips, coinciding with the large horizontal strips that coal is found in. Strip mining causes increased erosion and the land is difficult to restore once the mine is no longer viable.

Mountaintop Removal involves removing or moving all the layers of sedimentary rock on top of, and between the horizontal layers of coal on the top of a mountain. This is done with large earth moving equipment and explosives. MTR mining causes water pollution and destroys the surface, including clear-cutting the forests and causing damage to streams and land downhill of the mining area.

7. What is *mass wasting?* Give three examples and explain why they are a problem. (4 Points)

Mass Wasting is a general term for the downhill sliding of earth.
Examples:
a) Landslides - these are sudden collapses of a hillside. If the structure of a hill is compromised by erosion, storm saturation or human factors(logging or road construction, for example), the entire hillside can collapse, taking houses and other structures with it.
b) Soil Creep - is the constant, slow movement of material downhill. This can be so slow as to be imperceptible.

c) Falls/Rockfalls - this type of mass wasting is characterized by large sections of rocks breaking off of a face (usually due to vertical cracks), and cascading down a slope. These can cause tremendous damage to anything below that the rocks come in contact with.

8. What is a *floodplain*? Why is building on floodplains controversial? (2 Points)

A *floodplain* is a large, level area adjacent to a river that can be inundated with water during a flood.

Building on a floodplain is controversial, as these areas are statistically likely to be flooded, at some point. Anti-flood measures such as drainage and levees only defer the problem, causing increased damage or flooding downriver.

9. The Mesozoic period begins and ends with the appearance and disappearance of dinosaurs. What fossils mark the other geologic eras? (3 Points)

a) The *Precambrian* era is marked by the earliest single-celled fossils. This is the longest era, lasting from the beginning of the earth's history until 545 Million years ago.
b) The *Paleozoic* era is marked by the first abundant fossils, as well as the first fish and reptile fossils.
c) The *Cenozoic* era is marked by the first important mammals and later humans. This era began about 65 million years ago.