APES Potential FRQs for 2015

**Potential APES FRQ Topics for May 2015**

* **Gulf Oil Spill**
* Impacts of oil spills
* Remediation of oil spills
* Chemical dispersants (Corexit) issues
* Bioremediation (bacteria)
* Eutrophication link
* Aerobic bacterial decomposition of oil occurs naturally, lowering DO
* And this occurring in a body of water already dealing with a dead zone
* **Prescription drugs in our surface water**
* Gets in there from what humans pee out
* Occurs because sewage treatment plants are not designed to handle them
* Water treatment plants are not designed to remove them
* Impact on wildlife? Hormones?
* **Algae blooms**
* eutrophication / also known as “cultural eutrophication” and “nutrient loading”
* Primary sources are human sewage and animal waste (manure)
* **Industrial Smog**
* China as a model for industrial smog
* Rising “affluence” leading to more and more pollution
* Possibly links to demographic transition model (going through industrialization)
* **Fracking**
* Fracking is done for natural gas and shale oil
* Key issues to keep in mind: groundwater contamination, surface water contamination from production fluids that come out of well, yet another fossil fuel to add more CO2 to the atmosphere, air pollution issues was gases are “scrubbed” clean emitting VOCs into the air, and fracking requires a lot of water (typically a million gallons of fresh water or so per well)
* **Tar sands**
* Also called oil sands
* Surface oil deposits mixed with soil and rock
* Must be cooked with natural gas to extract it, raising the C footprint of this
* The resulting product is “bitumen” which must be diluted with natural gas because it is so thick
* Putting in through pipes is challenging because it requires hit temps and pressure, possibly leading to pipe failures.
* One solution has been to put it on trains cars. Significant accidents have occurred from this as its highly flammable. Lac Megantic, Quebec is a town that had its town center incinerated by a runaway “oil train”.
* The Keystone XL pipeline that has received a lot of attention over the years is a good example of the controversy here. Putting it over environmentally sensitive habitats or protected habitats could be a bad idea because the pipes are possibly more prone to bursting.
* “Dilbit” is the name for “diluted bitumen”, the tar sands product. Another key feature here is that its actually denser than water, unlike traditional petroleum. this means it sinks which makes cleanup really challenging when spills occur over water like rivers and lakes.
* **Human Population**
* When the this test was written the world population was hitting 7 billion for the first time, so I am thinking a world population question may have been on their minds.
* One of the issues with this is that yes, the population growth rate is coming down. Meaning the annual growth rate. But remember, 1.2% growth rate at 5 billion is very different from 1.2% growth rate at 7 billion. Its millions of extra people.
* Also at this time is the other big concern of the rise in affluence. For many people there is more economic opportunity and more and more people are able to demand more economic goods. More meat, a car, a house, air conditioning, a cell phone, TVs, computers. this rise in affluence is very challenging, even if the world population stabilizes if more and more people become increasingly affluent its almost like putting more people on the planet. This connects to Ehrlich’s I=PAT formula.
* Another relevant connection here is agriculture and the environmental implications therein like salinization, eutrophication, soil degradation, desertification. And potential solutions like conservation tillage, IPM, biocontrol, hydroponics, GM crops and drip irrigation.
* **Mercury Deposition**
* Most of the mercury emitted into the environment comes from the combustion of coal, most of which is burned for electrical power generation
* the majority of this mercury ends up depositing in the oceans where it has been proven to both bioaccumulate and biomagnify
* Mercury is a known neurotoxin
* Little has been known, however, about the impact of its deposition on land
* Recent studies have suggested that Hg deposition on land also bioaccumulates and biomagnifies through terrestrial food chains.
* In particular, some species of birds have been shown to have reduced reproductive success and toxicity due to ingestion of mercury. Breeding songs may be incorrect in some way or behavior may be altered in some way. regardless, the mercury is having an impact.
* The million dollar question at this point is what other impacts is it having upon other organisms. Mice, raptors, fox, coyote, humans, etc.
* **eWaste**
* eWaste is the generic term for waste consumer electronics.
* This includes old TV sets, computers, laptops and cell phones
* The problem with eWaste is that its difficult to recycle
* It does, however, have valuable metals like Fe, Al, Ni, Au and Ag in it.
* At the same time it also has lead, mercury, cadmium and selenium -- all toxic heavy metals
* the recycling process often occurs over seas where it is heated and the metals are then extracted, exposing recyclers to the poisonous metals
* **Bees / Colony Collapse Disorder (CCD) / neonicitinoid pesticides / endocrine disruptors**
* Bees pollinate ⅓ of all produce, a service worth billions of dollars annually
* Several years ago bee colonies began dying off without warning for no apparent reason
* The syndrome became called CCD for colony collapse disorder
* Although there may be multiple causes, one of the merging causes seems to be widespread use of a new type of pesticide called neonicotinoids. They are a variant of nicotine.
* These pesticides appear to have a degree of persistence in the wild and may operate as endocrine disrupters in bees. Essentially interfering with their overall health and their ability to navigate successfully. In essence, they lose track of home.
* No absolute definitive link has been established yet, but the suggested link is strong.
* **White Nose Syndrome**
* An introduced fungal infection in bats that causes them to develop a white powdery nose as a symptom
* This infection, among other things, reduces their ability to hibernate successfully. They emerge out of hibernation hungry and  early at a time when no insects may be present for them to eat.
* Overall the mortality from this invasive infection have been massive and extinction of some species could occur. Some mortality rate in some species have approached 90%. Imagine the human population being hit by 90% in a few years, our population would be reduced to 710 million, roughly half the population size of China.
* **Biofuels**
* Corn
* Cellulosic -- from forest and crop residues in which “cellulose” is converted into ethanol.
* Palm oil -- from palm nuts in tropical region. Large areas of forest have been cleared for palm plantations.
* **Plastic Pollution in oceans**
* Plastic is frequently washed into the ocean or blown into the ocean. Sometimes dumped.
* In the ocean it accumulates fat soluble pollutants like DDT, dioxin, PCBs, and PBDEs.
* It breaks down into smaller fragments over time and can be ingested by ocean organisms.
* That ingestion can then lead to bioaccumulation and biomagnification of the pollutants.
* **Overfishing**
* Aquaculture to meet rising demands for protein
* Bycatch issues, net designs
* Relevant laws (thinking Magnuson fisheries act) and CITES failed attempt to regulate bluefin tuna catch
* **Thawing permafrost**
* As the earth’s temps rise the permafrost is beginning to thaw.
* As the permafrost thaws the frozen organic material in it is beginning to decompose for the first time in tens of thousands of years.
* As that organic material decomposes both CO2 and methane (CH4) are released.
* Those gases migrate to the surface and drift into the air, adding yet more climate change gases to the atmosphere.
* The thawing of the permafrost, therefore, can lead to yet even more thawing and warmer temperatures in a positive feedback loop.
* This process is already beginning and may in fact be accelerating.
* Methane seeps through the iced areas of the arctic are a worrying symptom of this.
* **Declining ice shields**
* As the arctic, antarctic and greenland ice sheets have begun thawing less solar radiation is being reflected back into space.
* In essence, the polar regions are becoming less white.
* As this occurs a larger amount of incoming solar radiation could be absorbed.
* That solar radiation warms the surface and the air above it. Further, as the energy is released back into the atmosphere greenhouse gases can absorb it and reemit it back into the atmosphere as heat yet again. This is the greenhouse effect. The darker the polar regions the greater the amount of energy the atmosphere will absorb and heat.

Published by [Google Drive](https://docs.google.com/a/schscougars.org/)–[Report Abuse](https://docs.google.com/a/schscougars.org/abuse?id=1Bw--WgTvuyv2DH165iz2lUw1eklbgUw6vjjPoOgTL2U)–Updated automatically every 5 minutes