

2. Discussion/Essay Questions

- 1) Bauer says “some scientists thus do a lot of speculating [theorizing], whereas others do virtually none ...” What is the principle reason for this difference? In which category does global warming fall? Explain and defend your stance.
- 2) In what ways is the enhancement of the atmosphere effect (global warming) (i) a scientific question (of a type described by Kneller, for example), and (ii) a political problem? What aspects of the science make the politics more difficult?
- 3) Compare the views of science held by Bauer and Kneller, based on the assigned course readings. How do you think each of these two scientists would view the science of global warming?
- 4) Economic disruption in Russia and Ukraine has reduced by over 30% CO₂ emissions there since 1990 (the Kyoto baseline year). Should these countries be permitted to engage in “emissions trading” as allowed between more developed countries under the Kyoto agreement? Clearly defend your answer.
- 5) Suppose that the United States set a goal of CO₂ emission reductions of 40% from the current 5 tons per capita annually and that China wished to increase its GNP to 20% that of the United States. China’s current emissions per capita are 0.4 tons per year at most and it relies mostly on coal as an energy source. What would the net effect on world CO₂ emissions be?
- 6) (a) Analyze and explain the probable consequences of the impact between Earth and a 1-km asteroid for the following two cases. (i) The impact site was the Gulf of Mexico. (ii) The impact site was NY City.
(b) “The US should unilaterally mount a program to defend the planet from an impact by an asteroid or comet of size at least 0.5 km by the year 2025.” Take a stand for or against this statement, making a cogent argument that includes analysis of (i) damages, (ii) risk, (iii) costs, and (iv) other factors.
- 7) What factors are critical for gaining international support to remedy problems viewed as global? Show how these operated in the politics of ozone, and then analyze and assess the likelihood of international cooperation (at least among major powers) to provide for planetary defense.
- 8) Why has international action to ban CFC production been so swift, whereas action on greenhouse gasses has been more difficult to agree upon? (In your answer be sure to contrast the science and the nature of the “experiment,” as well as other factors that have been important).
- 9) What are the characteristics of a good vaccine? How are vaccines developed? Why is the development of a vaccine against HIV such a difficult task? In your answer discuss the roles of B cells and T helper cells in immunity.
- 10) An Ebola outbreak in 1995 was contained and stopped much more quickly than an Ebola outbreak in 1976. What are some possible explanations for this?
- 11) From the varied diseases covered in “plagues,” identify and briefly explain one instance for each of the following:
 - ◆ An instance in which political leaders seriously handicapped efforts to diagnose or prevent its occurrence.
 - ◆ An instance in which governments and/or political leaders cooperated fully with scientists to diagnose/prevent the disease.
 - ◆ An instance in which conflict among scientists handicapped efforts to understand the disease.
 - ◆ An instance in which scientists found ways to circumvent “the establishment” to diagnose or prevent the disease.
 - ◆ An instance in which scientists from the First World acted in such a way as to make studies in Africa more difficult.
 - ◆ An instance in which “science as a way of knowing” made correction and redirection possible.

12) Compare the policies which have been adopted in China, India, and Peru to limit population growth, and classify these in terms of what governments can do (i.e., do nothing, offer authority/guidance, develop incentives, provide structured options, regulate).

13) (a) List and briefly explain at least 4 reasons why NASA should be given prime authority to direct and develop a planetary defense program. (b) List and briefly explain at least 4 reasons why the US Department of Defense should be authorized to direct and develop a planetary defense program.

14) Compare and contrast the population control policies of three countries in terms of
(a) components of the policy;
(b) effectiveness in reducing population growth;
(c) balance between incentives (carrots) and compulsion (sticks).

15) Some science is supported by the state while some is supported by industry. Comment on how sometimes divergent interests drive and influence the science done and the role played by the scientists involved. Base your comments on the Mertonian norms, which are supposed to describe the behavior of scientists, and the fact that the different aspects of science involve influences from many different disciplines. Use examples based on this course, wherever possible.

16) How can the reluctance to acknowledge new findings that point to potentially catastrophic problems and to act aggressively on them be explained? Illustrate your points with examples from the course.

17) Consider the following two statements.

- (a) "Scientists continuously make moral choices in the course of their research based on the Mertonian (or other similar) norms. But they generally do this out of respect for truth, which in science is not a moral value but an intellectual one. Therefore, science can be considered as morally neutral."
- (b) "Science has become a powerful force in our society. Scientific knowledge is technologically applicable and thus capable of good use and misuse. The advances in nuclear physics and genetics are good examples for possible misuse. This suggests that society has the right to not only question the way its monetary support is being used but maybe even regulate the way science is done and the topics researched."

Taking into account that the Mertonian norms call for disinterestedness (and the pursuit of truth for its own sake), the needs that society may have, the possible misuses in both a regulated and unregulated research program, discuss the above statements, clearly explaining your reasoning in defending or disagreeing with them, using examples we discussed in class.

18) How does the "politics of science" differ among global warming, plagues, and asteroid collisions, in terms of:

- (a) interest groups
- (b) popular understanding and support
- (c) ease of getting on agenda of governments in US and abroad
- (d) implementation after a decision is reached

19) Your government is sufficiently concerned about the AN10 pass in 2039 to devote funding to an anti-mitigation strategy, but can only fund one thing. Which of the ECO mitigation alternatives would you choose as the best choice in terms of (a) science and (b) popular and political support for continued funding? Are the two the same? Why or why not?