

Environmental Studies Assessment Report, June 2011
Carlos Davidson, Program Director

The Environmental Studies program has been using the same assessment strategy since the Spring 2007 semester. We developed a quantitative and simple assessment strategy that focuses on courses taught directly by program faculty. We give our assessment instrument to students in ENVS 300 (Introduction to Environmental Studies) to assess students coming into the program and to students in ENVS 690 (Senior Seminar) to assess and compare students completing our program. Our updated as of November 2009 assessment instrument is attached as Appendix A. Combined assessment results from Fall 2008 through Spring 2010 are in Appendix B and our assessment matrix is in Appendix C.

Developing the assessment instrument and having our assessment results has been very helpful in evaluating the current ENVS curriculum. On both the multiple choice and essay questions students in ENVS 690 did substantially better than those in ENVS 300. For the years 2008 through 2010 ENVS 690 students correctly answered 68.1 percent of the multiple choice questions compared to 55.7 percent for ENVS 300 students. For the essay question on environmental justice issues, 690 students got a median score of 8.0 compared to 6.8 for ENVS 300 students (on a 10 point scale). On 13 of 21 questions ENVS 690 students had greater than 5 percentage points more correct answers and on six questions they had greater than 20 percentage points more correct answers than ENVS 300 students.

In our 2007 assessment report we reported that one of our main findings from assessment was that Environmental Studies majors did poorly on the quantitative reasoning questions. In response we have developed a new quantitative and field methods course for our majors: ENVS 224 Research Methods in Environmental Studies which was first taught fall 2009 semester by Professor Barbara Holzman. To date we have not been able to offer the course as frequently as we would like. We recently applied for and received an Instructional Equipment grant to purchase equipment needed for the course. Professor Carlos Davidson will be teaching the course Fall 2012. Currently we are working on a curriculum reform of the major core and major electives in which we hope to make ENVS 224 a required course for all our majors.

In our 2007 assessment report we found that students also did poorly on two questions about the structure of U.S. government institutions related to the environment. For one of these questions we have seen a clear improvement since we made ENV5 450 (Law and Policy) a required course for all majors. On question 17 on executive branch powers this semester 63 percent of ENV5 690 students chose the correct answer compared to 31 and 46 percent in fall and spring 2007.

Developing the assessment instrument encouraged ENV5 faculty to think more systematically and specifically about learning goals for our program. We continue to use assessment as we work on reshaping our curriculum. This year we also realized the need to upgrade our assessment instrument. For a number of questions a very percentage of students gave correct answers in both ENV5 300 and ENV5 690. It appears that while these questions indicate that students come into the major with knowledge about common environmental issues, the questions are not helping us assess what students are learning in the program. We intend to add additional and more difficult questions in these areas to better assess student learning in the major.

Appendix A

ENVIRONMENTAL STUDIES PROGRAM Assessment Exam. V5 Nov 2009

Read each question carefully. The first part is multiple choice questions – enter your answers on the scantron form. The second part is a single short answer question – write your answer on a separate sheet of paper. Be sure to put your name on both this sheet AND on the scantron form.

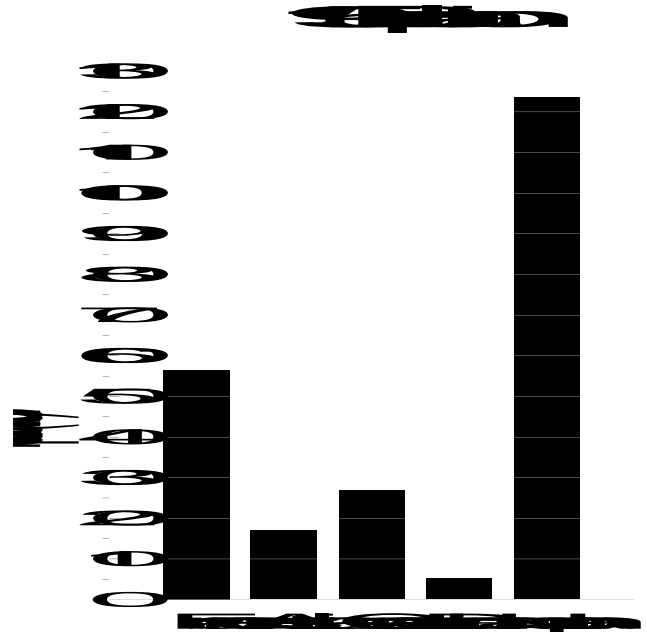
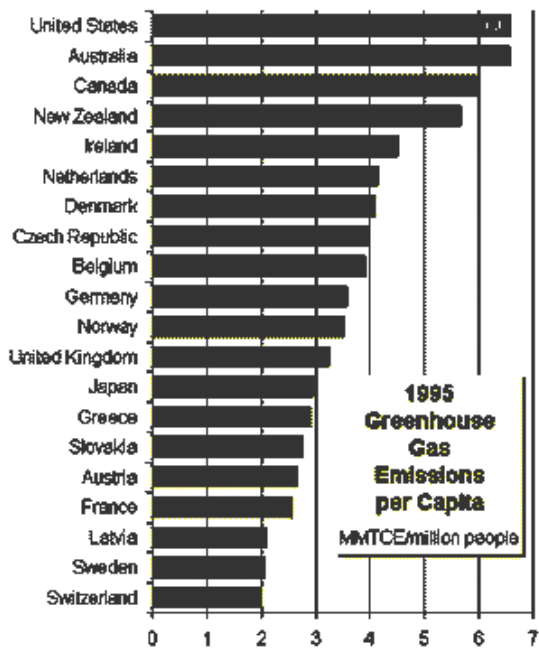
PART ONE – Multiple Choice.

1. You are a toxicologist studying the possible effects of the pesticide malathion on red-legged frogs. For simplicity let's say either the pesticide "effects" the frogs (negatively) or it has "no effect". In order to ban a pesticide the burden of proof is on those that want to show harm from the pesticide. That being the case, the null hypothesis in your study is that malathion has no effect on red-legged frogs. State in words, for this case, what is a Type I error (false positive).

- a. You think that malathion does not effect frogs, but in reality it does.
- b. You think that malathion does effect frogs, but in reality it does not.
- c. You reject the null hypothesis of malathion not effecting frogs, but in reality it does effect frogs
- d. You think that malathion does effect frogs, and in reality it does.
- e. none of the above

2. What would you conclude regarding malathion and red-legged frogs if you made a type two error (false negative)?

- a. You think that malathion does not effect frogs, but in reality it does.
- b. You think that malathion does effect frogs, but in reality it does not.
- c. You reject the null hypothesis of malathion not effecting frogs, but in reality it does not effect frogs
- d. Your study concludes that malathion does not harm frogs
- e. none of the above



3. Based on the figures above, in 1995 how did **per capita** greenhouse gas emissions in Japan compare with those in Canada (put your answer in the form Japan's per capita emissions were X percent of Canada's)? You may roughly estimate the numbers from the graphs and round off to make calculations easier. Note: MMTCE stands for million metric tons of coal equivalent. The units on the graph on the left are MMTCE/Million people.

- a. 200%
- b. 50%
- c. 2%
- d. 75%
- e. none of the above

4. How did **total** greenhouse gas emissions in Japan compare with those in Canada? Again, give a quantitative answer. Put your answer in the form Japan's total emissions were X percent of Canada's.

- a. 250%
- b. 50%
- c. 20%
- d. 500%
- e. none of the above

5. What are characteristics of a species that could make it vulnerable to extinction or becoming endangered?

- a. Small geographic range
- b. Small number of offspring
- c. Small body size
- d. A,B and C
- e. A and B

6. The Kyoto protocol on climate change requires developed countries to reduce emissions and initially does not ask the developing countries to do the same. Supporters of the protocol argue that this is fair because:

- a. Developing countries only emit a very small amount of greenhouse gases.
- b. Per capita emissions in the developing countries are much lower than in the developed countries therefore it is not fair to ask the developing countries to cut back.
- c. Up until now the developed countries have emitted most of the greenhouse gases that are causing global warming and therefore they have to go first in cleaning up.
- d. Developing countries have the technical expertise to be able to cut emissions.
- e. B and C

7. Why is reducing consumption a difficult environmental issue?

- a. Governments recognize population growth as a problem but not consumption growth.
- b. Businesses and governments encourage people to consume more and more
- c. People associate high consumption with success
- d. People in developing countries desire to have the same lifestyle as in the developed countries..
- e. All of the above.

8. Ecosystem Services include

- a. Erosion control by natural forests
- b. Production of soil by microbes and earthworms
- c. Decomposition of human produced waste by soil organism.
- d. All of the above
- e. A and C

9. Currently the world's human population is

- a. Growing at an exponentially increasing rate
- b. Declining sharply
- c. Still growing but the rate of growth has declined sharply
- d. Stable – not growing, but not increasing.
- e. None of the above

10. Biodiversity is

- a. the diversity of species
- b. genetic differences within species
- c. different types of ecosystems
- d. all of the above
- e. none of the above

11. The biodiversity crisis refers to

- a. lack of funding to study species
- b. worldwide high rates of species extinction
- c. unprecedented hybridization of species
- d. a crisis in human understanding of natural diversity
- e. none of the above

12. A pollutant is released to the environment by dumping it onto the ground. Which combination of factors would favor mobility of the pollutant in the environment? Assume there is ample water to provide the mobile phase.

- a. A polar organic pollutant released in soil with low organic content.
- b. A non-polar organic pollutant released in soil with high organic content.
- c. A heavy metal pollutant released in an acidic soil environment.
- d. A heavy metal pollutant released in a basic soil environment.
- e. Both a and d would favor mobility.

13. A pollutant reaches a drinking water supply. The impact of the pollutant on a person depends on

- a. The concentration of the pollutant in the water supply.
- b. The individual's health and/or age.
- c. The ability of the pollutant to bioaccumulate in the body.
- d. How toxic the chemical is to species other than humans.
- e. a, b, and c only.

14. The structure of a pollutant is an important factor in which of the following properties?

- a. How quickly the pollutant breaks down over time
- b. The ability of the pollutant to move through the environment.
- c. The types of reactions that the pollutant undergoes in the environment.
- d. Both b and c.
- e. a, b and c.

15. What are possible adverse effects to humans and the environment due to continued global warming?

- a. northward spread of tropical diseases
- b. increased ultraviolet radiation and skin cancer
- c. flooding of coastal cities
- d. all of the above
- e. A and C

16. What are the main human activities **broadly defined** that most contribute to global warming?

- a. burning of fossil fuels and habitat destruction
- b. burning of fossil fuels and release of ozone destroying chemicals
- c. release of ozone destroying chemicals and habitat destruction
- d. burning of fossil fuels and deforestation
- e. deforestation and release of ozone destroying chemicals

17. Two federal-level Executive Branch agencies other than the EPA that have responsibility for environmental matters include

- a. Department of Commerce and the Treasury Department
- b. Department of Interior and Department of Lands
- c. Resources Department and Department of Interior
- d. Department of Commerce and Department of Interior
- e. None of the above

18. "Mainstream" U.S. environmental advocacy organizations have historically shown most concern for and interest in:

- a. environmental justice issues
- b. preservation of species and wilderness
- c. ecosystem preservation

- d. resource conservation
 - e. None of the above
19. Executive Branch agencies of the U.S. government do which of the following?
- a. enforce environmental legislation
 - b. write regulations that follow the intent of legislation passed by Congress
 - c. A and B
 - d. write legislation for the consideration of Congress
 - e. A and C
20. The U.S. is responsible for approximately what percentage of global CO2 emissions?
- a. 50%
 - b. 5%
 - c. 25%
 - d. 60%
 - e. 10%
21. An "environmental externality" is
- a. an environmental problem that is located outside the region or country under consideration
 - b. an environmental cost of production that is not included in the price of a product or service
 - c. a factor outside of an ecosystem that affects the ecosystem
 - d. The economic costs of pollution
 - e. None of the above.

PART TWO – Short Answer

Write your answer on a separate sheet of paper. Be sure to put your name on the paper and please write clearly.

22. Robert Bullard has written "Social inequality and imbalances of social power are at the heart of environment degradation, resource depletion, pollution and even overpopulation. The environmental crisis simply can not be solved effectively without social justice" Pick an environmental issue and discuss how social injustice contributes to the problem or how social injustice affects solving the problem. Note: social injustice means large inequalities of wealth, income, and or political power. The classic example (which you cannot use for your answer to this question) is inequalities in income and political power leading to the disproportionate location of hazardous waste facilities in poor and people of color neighborhoods.

Appendix B – Complete assessment instrument results for Fall 08 – Spring 2010

ENVS Assessment Data 2008-10			Ave390	Ave690
NOTE: 2010 not yet added to all years summary stats			ENVS300	ENVS690
Q#	Question	Q type	% right	% right
1	Type I error	Quant	24.1	55.3
2	Type II error	Quant	24.8	43.4
3	Graph: per capita greenhouse gas emissions	Quant	71.8	68.9
4	Graph: total greenhouse gas	Quant	21.1	26.2
5	Species vulnerable to extinction	Biodiv	79.4	79.5
6	Kyoto protocol	EJ	72.6	72.5
7	Reducing consumption	Cons	97.0	94.1
8	Ecosystem services	Econ	85.0	90.5
9	Human population trend	Pop	34.8	19.2
10	Biodiversity is...	Biodiv	63.7	59.2
11	Biodiversity crisis	Biodiv	89.0	92.8
12	Pollutant released to environment	Tox	62.0	65.2
13	Pollutant reaches drinking water	Tox	90.2	98.8
14	Structure of a pollutant	Tox	87.5	95.2
15	Adverse affects of global warming	Climate	19.1	45.7
16	Human activities contributing to global warming	Climate	51.0	78.3
17	Executive branch agencies other than EPA	Policy	15.1	62.9
18	US environmental advocacy organizations	EJ	57.9	82.1
19	Executive branch agencies do...	Policy	13.5	30.0
20	US percentage of global CO2	Climate	63.4	74.8
21	Environmental externality	Econ	47.6	96.3
22	Short Essay (median -scored on 1 to 10 scale)	EJ	6.7	8.0

**Appendix C. San Francisco State University
Inventory of Program Assessment Activities,**

Program: Environmental Studies **College:** BSS **Date:** 11/xx/09

Program Mission: The program will produce exceptional graduates who are grounded in the study of contemporary environmental problems and solutions that transcend the existing academic disciplines and programs at San Francisco State University. The program will provide students with the knowledge and skills required for understanding relationships between humans and the physical world. It will examine how the environment is being used, abused, and perceived, and what individuals and organizations are doing and can do to protect it for themselves, future generations, and other living beings and ecosystems.

Measurable learning objectives	Place in curriculum where objective is addressed	Academic year objective was/will be assessed	Assessment/procedures Methods/strategies	Summary of findings about student learning	Use of findings for program improvement
Demonstrate understanding of the broad themes within the field of Environmental Studies	ENVS 300, 600, and 690	2006-09	ENVS quantitative assessment instrument.	Students do fairly well with some clear gaps	Contribute to major curriculum review
Demonstrate understanding of chemical and biological processes related to environmental problems	ENVS 380, BIO 230 or BIO 313	2006-09	ENVS quantitative assessment instrument	Students did fairly well	
<i>Demonstrate ability to integrate natural science and social, political, ethical values in analyzing environmental issue.</i>	ENVS 690	2007-08	TBA		
<i>Demonstrate understanding of the</i>	ENVS 300, 600, Social	2006-09	Evaluation of essay question in assessment instrument		

relationships between social justice and environmental issues.

Demonstrate ability to persuasively argue orally and in writing multiple sides of an environmental issue.

Demonstrate basic computer competence with word processing, spreadsheets, and online research.

Demonstrate ability to critically evaluate descriptive statistics commonly used in environmental literature.

Demonstrate research skills relevant to their area of concentration in environmental studies.

Justice Area of courses					
ENVS 300, 690	2006-07		Evaluation of essay question in assessment instrument	Students did fairly well	
Yet to be determined	TBA		TBA		
BIO 458 (NMRC) or MATH 324 (ESS). Yet to be determined for BA	2006-07		ENVS quantitative assessment instrument	Students did medium to poor	Offered new quantitative methods course ENVS 224 Fall 09
ENVS 224	TBA		TBA		