

# 2018-2019 Yearly Assessment Report for the Bachelor of Science in Environmental Science & Minor in Environmental Science

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*Name of Program: B.S. in Environmental Science*

*Type of Program: Major & Minor*

*College of Arts and Sciences*

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This report is an aggregate report for the BS in Environmental Science and the Minor in Environmental Science

## Mission Statement for the BS in ENVS

The mission of the Department of Environmental Science is to provide an interdisciplinary and integrated science curriculum in order to develop skills for solving environmental problems in a socially just manner. The program prepares students for careers and graduate study and to be good stewards of the environment.

This mission statement was approved by the department in a general meeting on 24 April 2015.

## Mission Statement for the Minor in ENVS

A minor in Environmental Science provides a science-based interdisciplinary introduction to the field of Environmental Science. Students will gain an understanding of environmental systems and will be able to apply this knowledge to promote sustainability and social justice.

This mission statement was approved by the department in a general meeting on 4 October 2019.

Alexandra, I know you are a strong advocate for different mission statements and so we made sure to do this and I included it in this report even though it was not approved until recently.

## Program Goals

- Provide an interdisciplinary and integrated science curriculum to develop skills for solving environmental problems.
- Prepare students for careers and graduate study in environmental fields.
- Ground our students in social justice to be good stewards of the environment for future generations.

These program goals were approved by the department in a general meeting on 24 April 2015.

## Program Learning Outcomes for BS in ENV5

Students who complete the degree requirements will be able to:

- PLO 1 – Explain the interdisciplinary nature and complexities of environmental issues.
- PLO 2 – Apply the scientific method to environmental issues.
- PLO 3 – Skillfully communicate knowledge of environmental science.
- PLO 4 – Demonstrate knowledge of environmental conditions so as to promote active participation and social justice.

These program learning outcomes were approved by the department in a general meeting on 24 April 2015.

## Program Learning Outcomes for Minor in ENV5

Students who complete the Minor in ENV5 requirements will be able to:

- PLO 1 – Demonstrate and communicate an understanding of basic concepts in Environmental Science.
- PLO 2 – Demonstrate knowledge of the interdisciplinary nature and complexities of key environmental issues.
- PLO 3 – Develop skills in applying the scientific method to environmental issues.

These program learning outcomes for the minor in ENV5 were approved by the department in a general meeting on 4 October 2019. As such, no assessment has yet occurred with these revised PLOs.

## PLO Assessed for the BS in ENV5

During the 2018-2019 academic year, the department of environmental science assessed PLO #4 - Demonstrate knowledge of environmental conditions so as to promote active participation and social justice.

## PLO Assessed for the Minor in ENV5

During the 2018-2019 academic year, no PLOs were assessed for the minor in ENV5 simply because there were only five students enrolled in the minor and three students the previous academic year. As a result of these consistently low numbers the department held a discussion to determine if we should abandon the minor or revise it to try and attract greater numbers; we chose the latter. During spring semester 2019, a subgroup of faculty started work on revisions and after several drafts and iterations, the final change was approved by a unanimous departmental vote at our general meeting on 1 November 2019. The revised mission statement and PLOs listed above are a result of that effort. The revised program for the minor will be submitted through Curriculog this current academic year. A curricular map for the minor will be developed for this submission.

## Methods

Last academic year, we focused our attention on the one PLO yet to be assessed since they were approved in 2015, PLO #4. This PLO is a bit of a challenge to assess as it relates to the relationship between knowledge of the environmental science field and active participation towards social justice. Given the subjective nature of this PLO, we chose to use the direct method of a reflection paper by students enrolled in our senior capstone course, Methods of Environmental Monitoring. As this course is a service learning course, it was a good fit for this discussion. Most students take this course in their final semester prior to graduation and at the culmination of their degree. Finally, our curricular map, Table 1, shows that it is in this courses that PLO #4 is mastered. This PLO also aligns with USF's institutional learning outcomes, ILO #1, 2, & 7 as shown in our PLO/ILO Curricular Map, Table 2.

The essays were then reviewed by two faculty members using a rubric designed and written for this purpose.

The PLO assessed was...

*Demonstrate knowledge of environmental conditions so as to promote active participation and social justice.*

The question posed to students was...

*Think of one example of how the Environmental Science degree has developed your knowledge of environmental conditions so as to promote active participation and social justice. Now reflecting on that example, take 10 minutes to...*

- *Share the specific example you are reflecting on.*
- *Explain how you actively participated with regards to your example.*
- *Explain how you will use or have used your degree to promote social justice.*

The rubric used to assess their essay is shown in Table 3.

## Curriculum Map 1

Table 1 - The curricular map below describes when and how each learning outcome is introduced, developed, or mastered as a student progresses through various courses within the B.S. in ENVS degree, approved by the department on 24 April 2015. I = Introduced, D = Developed, M = Mastered

<b>Program Learning Outcomes / Course</b>	<b>PLO 1 – Explain the interdisciplinary nature and complexities of environmental issues.</b>	<b>PLO 2 – Apply the scientific method to environmental issues.</b>	<b>PLO 3 – Skillfully communicate knowledge of environmental science.</b>	<b>PLO 4 – Demonstrate knowledge of environmental conditions so as to promote active participation and social justice.</b>
110 Introduction to Environmental Science (LAB)	I	I	I	I
210 Ecology & Human Impacts (LAB)	D	D	I	I
212 Air & Water (LAB)	D	D	I	
250 Environmental Data Analysis	I	D	I	
410 Methods of Environmental Monitoring (FIELD/LAB)	M	M	M	M
311 Environmental Chemistry	D		D	
320 Restoration Ecology (FIELD/LAB)	D	D	D	I
321 Wetland Ecology (FIELD/LAB)	D	D	D	I
325 California Ecosystems (LAB)	D	D	D	D
330 Environment & Ecosystem Health	M		M	I
335 Marine Environments (LAB)	D	D	D	
350 Energy & Environment	D	D	D	D
360 Climate Change: Science & Policy	D	D	D	D
366 Environmental Policy	M	D	D	D
370 Intro to Landscape Ecology & GIS	D	D	M	D
380 Environmental Engineering	I		D	

## Curriculum Map 2

Table 2 - The curricular map below describes when and how each program learning outcomes (PLOs) for the B.S. in ENV'S degree maps onto the Institutional Learning Outcomes (ILOs) for the University of San Francisco, approved by the department on 24 April 2015.

<b><i>Program Learning Outcomes / Institutional Learning Outcomes</i></b>	PLO 1 – Explain the interdisciplinary nature and complexities of environmental issues.	PLO 2 – Apply the scientific method to environmental issues.	PLO 3 – Skillfully communicate knowledge of environmental science.	PLO 4 – Demonstrate knowledge of environmental conditions so as to promote active participation and social justice.
ILO 1 – Students reflect on and analyze their attitudes, beliefs, values, and assumptions about diverse communities and cultures and contribute to the common good.				✓
ILO 2 – Students explain and apply disciplinary concepts, practices, and ethics of their chosen academic discipline in diverse communities.	✓	✓		✓
ILO 3 – Students construct, interpret, analyze, and evaluate information and ideas derived from a multitude of sources.	✓	✓		
ILO 4 – Students communicate effectively in written and oral forms to interact within their personal and professional communities.			✓	
ILO 5 – Students use technology to access and communicate information in their personal and professional lives.			✓	
ILO 6 – Students use multiple methods of inquiry and research processes to answer questions and solve problems.		✓		
ILO 7 – Students describe, analyze, and evaluate global interconnectedness in social, economic, environmental and political systems that shape diverse groups within the San Francisco Bay Area and the world.				✓

Table 3: Rubric to Assess PLO #4 for the Bachelor of Science in Environmental Science.

**PLO #4 of the Bachelor of Science in Environmental Science (ENVS) states:** Demonstrate knowledge of environmental conditions so as to promote active participation and social justice.

**Question used to evaluate student learning of PLO #4:** Think of one example of how the Environmental Science degree has developed your knowledge of environmental conditions so as to promote active participation and social justice. Now reflecting on that example, take 10 minutes to...

- Share the specific example you are reflecting on.
- Explain how you actively participated with regards to your example.
- Explain how you will use or have used your degree to promote social justice.

Criteria	Below Expectations (= 1)	Minimal Expectations are Met (= 2)	Meets Expectations (= 3)	Exceeds Expectations (= 4)
Student clearly lists one relevant example of how their ENVS degree has promoted active participation and social justice.	The example stated is <u>poorly explained and/or</u> has only <u>marginal relationship</u> to demonstrating understanding of PLO #4.	The example is <u>nominally stated and/or</u> demonstrates only a <u>moderate</u> relationship to understanding of PLO #4.	The example is <u>reasonably stated and/or</u> demonstrates a <u>reasonable</u> relationship to understanding of PLO #4.	The example is <u>clearly stated and patently demonstrates</u> that the student has understood PLO #4.
Student explains how their degree promoted active participation with regards to their example.	The student provides <u>little or no</u> explanation of how they actively participated in some activity with regards to their example.	The student provides a <u>minimal</u> explanation of how they actively participated in some activity with regards to their example.	The student provides an <u>appropriate</u> explanation of how they actively participated in some activity with regards to their example.	The student provides a <u>clear and convincing</u> explanation of how they actively participated in some activity with regards to their example.
Student explains how their degree has or allows them to promote social justice with regards to their example.	The student provides <u>little or no</u> explanation of how they have or will promote social justice in an activity with regards to their example.	The student provides a <u>minimal</u> explanation of how they have or will promote social justice in an activity with regards to their example.	The student provides an <u>appropriate</u> explanation of how they have or will promote social justice in an activity with regards to their example.	The student provides a <u>clear and convincing</u> explanation of how they have or will promote social justice in an activity with regards to their example.
<b>Total Score</b>	<b>/12 points</b>			

Student Evaluated: \_\_\_\_\_

Faculty Evaluator: \_\_\_\_\_

## Results

Program learning outcomes number 4 was evaluated at the completion of ENV5-410, Methods of Environmental Monitoring w/Lab, our senior capstone course. The student essays were collected and evaluated by the two instructors for the course, Calla Schmidt and Jack Lendvay using the rubric presented in Table 3.

The raw results of this direct evaluation are shown in Table 5. A 4-point scale was used to evaluate each of the three criteria, where 4 represents exceeds expectations, 3 represents meets expectations, 2 represents minimal expectations are met, and 1 below expectations. The results show that both instructors agreed that the average student met expectations when asked to clearly list one relevant example of how their ENV5 degree promoted active participation and social justice. The two evaluators were split between students meeting expectations or minimally meeting expectations when asked to how their degree promoted active participation with regards to their example. For the final criteria, Student explains how their degree has or allows them to promote social justice with regards to their example, both instructors agreed that minimal expectations were met. Moreover, only one student was evaluated by one instructor as not having met expectations for only one criterion. Therefore, I can state with confidence that our students meet minimal expectations with respect to our PLO#4.

Consider the overall results, listed in Table 4.

*Table 4: Summary Table of Assessment Results of PLO#4.*

Criterion	Percentage of Student Evaluations Meeting or Exceeding Minimal Expectations
Student clearly lists one relevant example of how their ENV5 degree has promoted active participation and social justice.	100%
Student explains how their degree promoted active participation with regards to their example.	100%
Student explains how their degree has or allows them to promote social justice with regards to their example.	97%

Table 5: Results of the Assessment PLO #4 for the Bachelor of Science in Environmental Science, May 2019.

<u>Evaluations by Jack Lendvay</u>																
Criteria/Student	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	Average
Student clearly lists one relevant example of how their ENVS degree has promoted active participation and social justice.	4	2	3	3	4	3	3	3	3	3	3	4	3	3	3	3.13
Student explains how their degree promoted active participation with regards to their example.	4	2	3	3	4	3	3	3	4	2	3	3	3	3	2	3.00
Student explains how their degree has or allows them to promote social justice with regards to their example.	4	3	3	3	4	3	2	2	2	2	2	2	2	2	2	2.53
<b>Total</b>	<b>12</b>	<b>7</b>	<b>9</b>	<b>9</b>	<b>12</b>	<b>9</b>	<b>8</b>	<b>8</b>	<b>9</b>	<b>7</b>	<b>8</b>	<b>9</b>	<b>8</b>	<b>8</b>	<b>7</b>	<b>8.67</b>

<u>Evaluations by Calla Schmidt</u>																
Criteria/Student	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	Average
Student clearly lists one relevant example of how their ENVS degree has promoted active participation and social justice.	4	3	3	3	3	3	3	3	3	3	2	3	3	3	3	3.00
Student explains how their degree promoted active participation with regards to their example.	4	2	3	2	2	2	3	3	2	3	2	3	2	3	3	2.60
Student explains how their degree has or allows them to promote social justice with regards to their example.	4	1	2	2	2	2	3	3	3	3	2	2	2	3	3	2.47
<b>Total</b>	<b>12</b>	<b>6</b>	<b>8</b>	<b>7</b>	<b>7</b>	<b>7</b>	<b>9</b>	<b>9</b>	<b>8</b>	<b>9</b>	<b>6</b>	<b>8</b>	<b>7</b>	<b>9</b>	<b>9</b>	<b>8.07</b>



## Closing the Loop

The faculty of environmental science will review the results of this assessment and further discuss a response to this assessment during the current academic year. This will be a primary agenda item for our department meeting on 6 December 2019. While the data clearly shows that we meet or exceed minimal expectations of our PLO #4, it would be wise to discuss this evaluation further and collectively think about how we might further improve our results. Of concern might be that we are trying to distinguish between what our minimum expectations are versus what reasonable expectations are, the second and third ratings used for our rubric. When writing the rubric, these ratings made sense, now, not so much. The question is truly, what is our minimum expectation? Perhaps our evaluation category of “meets minimum expectations” should be changed to “needs improvement?” If we were to change to this revised criterion, then only 69% of the evaluations indicated that students met or exceeded expectations of the PLO, we can do better.

## Response to Previous Report Suggestions/Feedback

The Department of Environmental Science did review and respond to suggestions from our previous year’s feedback from Professor Alexandra Amati. We want to thank her for her detailed and thoughtful review.

## Mission Statement & PLOs

The feedback suggested that the mission statement and PLOs should be different for the major and minor. While our “old” PLOs were different, both operated under the same mission statement. As part of our rethinking of our minor, we did agree with this feedback and have modified both the mission statement and PLOs to better reflect what students should learn from our minor program.

## Curricular Maps

Feedback was provided that perhaps our curricular map for the major in ENVS might be overpopulated. While at first glance this may appear to be the case, it is important to recognize that students only take four of our upper division electives, the ENVS 300 level classes. So, while they are all these electives are expected to develop at least one of the PLOs, no student will take all of these classes. Considering our courses in groups, the introductory course is intended to introduce each PLO, the foundation courses (ENVS 200 level courses) are expected to either introduce or start to develop the PLOs, the upper division electives (ENVS 300 level courses) are expected to further develop and in some cases master the PLOs, while the final capstone course (ENVS-410) is expected to master all of the PLOs. We hope this structure is now more clearly explained.

## Results & Major Findings

Feedback for our results and major findings centered on the effectiveness of our rubric used to evaluate PLOs 1-3. The point made is a good one in that revisions may help us to better understand how we might improve our program. Perhaps a more detailed and targeted rubric that helps evaluate the foundational issues of each PLO would provide more actionable results. As of this past

academic year, each of our four PLOs have now been assessed; so, this is a point where we should consider and improve upon our assessment process as we move forward to our second round of evaluating our PLOs. As a department, we learned that we are effectively meeting all of our PLOs, but I agree with the reviewer that it is not clear how we might further improve our program from those assessments. That will be the focus of future assessments.