

# Sustainable Science Management BAS Program UH Maui College

Tim Botkin, SSM Program Coordinator



UNIVERSITY of HAWAII®  
**MAUI**  
COMMUNITY COLLEGE



## 2020

## ANNUAL REVIEW OF PROGRAM DATA

## 1. Program or Unit Description

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Current catalog description: *The Sustainable Science Management (SSM) program, leading to a baccalaureate degree, provides a variety of options to students seeking employment in the rapidly expanding field of sustainability. Coursework covers important contemporary topics including but not limited to energy, ecology, business and management, water and wastewater, agriculture, waste-management, economics, policy, the built environment, natural and social science; all in the context of case studies in the larger interdisciplinary field of sustainability. Students develop systems thinking and analytical skills, which will enable graduates to apply learned principles to the changing and complex issues of the future. The program is designed to equip students with the fundamental skills necessary to bridge disciplines and to facilitate sustainable solutions and operations for any organization or community. (For SSM PLOs see 3.A below).*

Target population: SSM has seen students from all ages, ethnicities and academic experience engage in our sustainability courses. If there is a most consistent group it would be returning students, some of whom have previously received degrees but are returning to school in search of a 'more meaningful career' opportunity. Sustainability science relies on a broad foundation of knowledge which therefore naturally attracts a diverse student body whose members share a commitment which supersedes differences and inequities at a variety of levels. In truth, the concept of sustainability science/education remains nuanced enough that most young (high school age) students are not aware of it as a valid and growing career opportunity. However, once students have taken SSM 101, many who originally thought it a novelty become tuned into the challenges and opportunities in sustainability overall. As well, SSM is considered a rigorous academic program and requires a commitment to do the work, so this ultimately identifies who will pursue and complete the degree.

## 2. Analysis of the Program/Unit

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The ARPD indicators for the SSM program have remained the same from 2019 for the Demand (Healthy) and Efficiency (Cautionary) indicators. For the 2020 report the Effectiveness indicator has slipped back to Cautionary.

a) Indicator Analysis:

Demand: Demand has remained clearer since a revision in this indicator broadened the criteria in 2019.

Efficiency: Efficiency is unchanged from prior years. The number of majors is down slightly, but average class sizes, number of low-enrolled classes and fill rates are improved from 2018 to 2019.

Effectiveness: This indicator shows a decline in successful completions in 2020, as well as loss of persistence in the fall to fall particularly. Transfers to 4-yr UH programs are less than 2018, but in the case of SSM this could be good. Perhaps there should be a change in the indicator to reflect that students remain at UHMC to complete this 4-year BAS degree (see below).

See the complete SSM ARPD report at the end of this document.

b) Program Analysis:

There is a singular, clear reason for the two lower-categorized indicators, that being a reduction in student numbers, largely frustrating all student enrollments in higher education. Additionally, by the end of the 2019-20 academic year, it became obvious that the pandemic/online-only environment was imparting a strong impact on our students. While this current trend must be addressed, the demand for sustainability in organizational planning and as a community priority indicate there exists an as-yet untapped potential for increased SSM enrollments, which is also the best way to cure indicator deficiencies.

The uniqueness of the SSM curriculum further extends the discrepancy of potential to actual enrollments, particularly in the developing phases of community sustainability successes. Prospective students and most citizens are not aware that sustainability science is a sharp area of expertise in itself, but capable of addressing almost any field or discipline. [This is also evidenced by the fact that the UH APRD data system did not recognize a demand for sustainability jobs until 2019.] This state is deepened by a running succession of mildly successful community sustainability efforts routinely undertaken without a strong sustainability basis. These commonly start and end largely in promotional impact rather than providing actual change, as noted in the Hawai'i 2050 audit completed this year. Contrastingly, once SSM students are exposed to the principles of sustainability science

they quickly comprehend its higher sophistication and capacities over typical non-professional plan development. Somewhat paradoxically, when looking to enter the working world SSM graduates are often frustrated by the lack of jobs offering the opportunity to demonstrate their sustainability skills outright; at the same time they have been highly successful in gaining jobs once they get to an interview. That is because the skills SSM students reveal are based in logic, fact-finding, the ability to deal with complex circumstances and change, and tools to project outcomes in the future; all highly sought after by employers even if 'sustainability' is not listed in job requirements.

Reaching back to the question of enrollments, the same lack of understanding is a barrier to gaining the attention of potential majors. Most recruitment mechanisms readily available through the college and system leave it to the prospect to decide which programs to consider, so they consider those they know (which often does not include SSM). On those occasions during which all students are exposed to SSM we generally see a higher response and follow-up. On the other hand, we continually receive inquiries nationally and internationally from students interested in our program. Addressing this marketing/enrollment gap has become our highest program priority.

Demographically, SSM has a strong component of Maui resident students but it is understood there may be a limit to those if we expand our enrollment goals. SSM was established as, and remains the only degree (two-, four-year or graduate) program in the UH System which provides a meaningful cadre of sustainability-specific courses, now numbering 17 overall. Thus, it could be reasoned that SSM at UHMC should be a focal reference for sustainability students across the state, but this has never been the case. Our ability to recruit in-state is hampered by the continued competition with other UH programs promoted as equivalent, but a quick glance shows that SSM alone offers sustainability science and associated skills via faculty and curriculum specifically created for that purpose. Input from students in other islands in the UH system has informed us they wish they had known that SSM was an option. This even though the uniquely focused sustainability curriculum in SSM matches up well with other undergraduate sustainability program across the country, or even internationally. Yet SSM is rarely mentioned in sustainability education publications. This would be addressed by the requested marketing plan.

The lingering question is whether SSM can best serve the state by focusing almost exclusively on Maui residents, or is it better to leverage its reputation by attracting students from a broader scope? SSM has never secured a professional marketing plan, but a strong opportunity exists to bring in more students outside of Maui as evidenced by a consistent receipt of inquiries from students on the mainland and internationally. The SSM Action Plan provides a diverse set of strategies for tackling this gap in the near term.

Given the full view of; 1) the general demand for sustainability across communities, 2) the compelling opportunity to study sustainability on Maui, an attractive island community in its maturing phase, 3) the upsides offered by SSM, and 4) the likely benefits to Hawai'i, both from the advancement of critical knowledge and from potential revenues from outside sources; the focus on increasing enrollments via more effective marketing seems reasonable. Other less-ambitious steps may also help bring more students. The projected outcomes of success would be transdisciplinary, a contemporary description of an activity which enriches its community across the board. Mechanism to pursue this are discussed in the Action Plan below.

Overall, the values leading to indicator result are not drastically changed and may indicate stress from the tumult of 2020 spring semester. While there is little expectation that SSM, nor any other program, will immediately return to a growth pattern above numbers from 2019, there is strong reason to believe that efforts such as those delineated in the Action Plan can lead to higher enrollments by 2022.

c) Pathways and articulation:

A few high school students have taken SSM 101 and generally shown interest in the program. However, in our experience most of these Early Admit/Running Start students are intent on travelling off-island for their college experience. While assisting in the development of high school coursework may help draw in more enrollment from local schools, this is not a current priority in our Action Plan.

Without exception, the preferred undergraduate pathway is the achievement of the SSM BAS degree. Over the past years several of our graduates (4) have continued to graduate

school in related fields. From the standpoint of sustainability in Hawai'i, it should be a priority that UH Manoa create a graduate degree program to capture these and other students, both as students and as future local leaders

d) Value of the SSM BAS degree:

As the SSM program is unique in the UH system regarding the availability of upper division sustainability coursework, the degree is equally critical for those interested in community leadership or in pursuing graduate school. While not quite as clear, it must be noted that most of the 'heavy lifting' for sustainability science comes during the student's upper division work, while lower division is necessary foundational experience. In other words, it would be extremely difficult to incorporate all the requisite courses into a certificate program and expect to retain the quality now provided.

e) Graduate Placements:

*"Over the course of 10 years, students [in sustainability] have achieved a job placement rate of 82 percent within three months of graduation, on par with some of the most recognizable standard MBA programs in the country.*

*As sustainability becomes an increasingly prevalent part of the business world, it stands to reason that the value of sustainability degree programs will continue to grow. "We've never heard anyone say that having a sustainability related degree hurt them," said Ray Berardinelli, marketing director for ISSP. "As more and more sustainability programs are created inside organizations, it can only help to have such credentials."*

<https://www.greenbiz.com/article/sustainability-degree-worth-it-heres-crash-course#:~:text=The%20value%20of%20a%20sustainability%20degree,-So%20how%20much&text=Over%20the%20course%20of%2010,MBA%20programs%20in%20the%20country.>

SSM grads have been similarly successful finding work, and a surprising number do so in their field of interest. A few have built a new enterprise for their work, and many are active in the Maui community. The most recent example is the hire of a spring 2021 soon-to-be graduate as the Administrative Officer for the County of Maui Department of Water Supply. A fuller summary follows:

**Current Employment Data for Sustainable Science Management (SSM) Graduates**

93% of SSM graduates are known to be employed. As illustrated in Table 1 (below), over two-thirds (20/28, 71%) of SSM graduates are working in sustainability related careers. According to the ASU School of Sustainability, this is three times higher than the national average (27%) of students finding work in degree-related careers within five years of graduation.

**Table 1: SSM Graduates Employed in Sustainability Related Careers**

<b>Sustainability/Other Field</b>	<b>Graduates' Employment (up to 2020)</b>	<b>Grads in Sustainability Related Fields</b>
Education	3	3
Educational Film & Media	1	1
Entrepreneur	3	2
Graduate School	4	4
Natural Resource Management	2	2
Renewable Energy	1	1
Sustainable Business Strategies	2	2
Sustainability Consulting	2	2
Sustainable Tourism	1	1
Other Employment/ Unknown	7/2	2
Total Employed	26/28 (93%)	
Total Employed Sustainability Careers		20/28 (71%)

**Sustainable Science Management (SSM) Employment Sources and Trends**

f) New Program Initiatives:

In process with the UHMC Curriculum Committee is a program modification which provides for a Concentration to be stated on the SSM diploma. This will allow students to accumulate elective courses in a field of interest and complete an additional credential. The first concentration to be established is Marine Studies, a field of consistent interest for SSM students and compatible with the teaching expertise of existing faculty. In the near term it is intended that additional concentrations will be established in Natural Resources, Policy, Native Hawaiian Studies and Energy. SSM students were polled about this step and expressed strong enthusiasm for it. Pending final approval from the Curriculum Committee and Academic Senate, this option will appear in the Fall 2021-22 UHMC catalog.

### 3. Program Student Learning Outcomes or Unit/Service Outcomes

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a) List of the Program Student Learning Outcomes or Unit/Service Outcomes

In 2018 and 2019, SSM Program Learning Outcomes were reviewed and ultimately adopted in 2019. These were reported in the previous Program Review.

SSM PLOs

1. Describe the functions, inter-relationships, and limitations of human-developed and naturally occurring systems.
2. Utilize systems and sustainability science tools to solve complex problems and design durable responses.
3. Understand contemporary legal, technological, economic, cultural, and ethical infrastructure as it impacts sustainability.
4. Utilize conventional and emerging methods to measure sustainability aspects of behaviors.
5. Integrate transdisciplinary knowledge; across cultural, social and educational realms; to identify and implement sustainable practices.

b) In 2019-20, PLOs #1 and #2 were evaluated in the context of SSM 422, a terminal level course entitled Sustainable Systems Thinking. This was done in concert with a CASLO evaluation of the course.

c) Assessment Results.

Method: Assessment was based upon two samples (one exemplary level and one passing level) of the SSM 422 Final Exam. The exam included short answer questions largely technical in nature and two larger essay style queries. The review focused mostly on the final question which required students to 'show their work' in the early development of a systems model for one of three important sustainability issues.

Participants: In two meetings participants included a non-SSM faculty member, the UHMC CASLO coordinator, two different members of the SSM Advisory Committee and the SSM Program Coordinator.

Findings: Participants were given a basic understanding of systems development, then examined the student work from their own perspective. They expressed a great deal of interest in the process. The group readily



accepted the importance of students displaying a commitment to building the full system parameter (section a of the exam question), which is an applied use of PLO #1, necessary to fulfill the sustainability promise of PLO #2. As predicted, the lower graded student failed to spend as much effort exploring the system boundaries and demonstrated an interest in 'solving' the problem with abbreviated scoping. The exemplary student filled the page with notes, arrows and thoughts, making that student's progress evident. In the second part of the question the requirement was to distill the original data and begin the process of finding inter-relationships and ramifications. The lower achieving student accomplished this reasonably well, but the quality of the product was diminished by the limited scope. The exemplary student created the start of a very thorough exploration of a fairly complex system.

d) Changes that have been made as a result of the assessment results.

In teaching this course it is easy for both student and Instructor to overlook the importance of seeing the big picture first to make effective use of the tools referenced in PLO #2. As there was evidence that at least some students had not incorporated that into their methodology, when taught the next time, two more practice sessions were added which were intended to reinforce the understanding and commitment to the critical initial step. As the course is currently underway, indications of improvement are not final, but it appears students are universally doing so.

## 4. Action Plan

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### I. Status of Prior Year Action Plan Items

- i. Action was taken to improve the linkage between PLOs, course competencies and assessment, as described above. This work is ongoing.
- ii. We return with continued requests for marketing assistance. A new program brochure was developed in the past year but is just a start. We still hope to tap a much broader audience, including both those within the UH

system area and beyond, which will require revisions to our web site and potential target activities via social media. See below.

iii. SSM now includes a 400 level Topics course emphasizing Native Hawaiian practices and values. We have preliminarily worked with a current Lecturer for development of the second as in our prior plan.

iv. There was significant activity on the Sustainability Collaborative over the summer. It remains in our action goals below.

v. Little movement in more access to conferences has manifested so far, particularly in a very tight budget environment. Faculty continue to seek opportunities using personal and/or available funds.

## II. 2020-21 Action Plan

Most of the following are focused on the need to increase student enrollments in the SSM program from a variety of methods. Both from the expansion of APRD criteria and in our program experience, it is evident that the skills possessed by SSM grads are in high demand and are likely to result in advancement of sustainability principles. All proposals include the goal of more effectively spreading a higher-level understanding of sustainability across the community and state.

- i. Online Cohort. While an obvious potential mechanism for increasing student enrollment has been the increase in online offerings, two elements have held this back to date. For one, students and faculty alike have stated a strong preference for face-to-face classes and the subject matter in SSM courses relies heavily on discussion, group and field work and collaboration generally. This has only been underscored during the recent period of all online classes at UHMC. At the same time both technology and teaching practices have improved with practice to the belief that hybrid options can provide the benefits of an expanded audience with at least mitigated loss of quality.

A second concern has been the requirement for a full commitment to offer a degree path for online participants which does not reduce the value of studying sustainability on Maui for locally attending remaining students. We have therefore developed a design to hybridize the location/delivery system for a specified cohort annually. We plan to start with the designation of six openings for remote students per year who will be guaranteed online access to all SSM courses needed to graduate with a degree. This will make use of facilities already at UHMC and may expand into STEM/SSM facilities as well.

1. Enhanced Remote Learning Tools. Field work comprises an important element of several SSM courses. To date online participants are limited to viewing recorded versions without the benefit of spontaneous questioning or observations. We understand there is technology to address this gap which we would like to pursue.

Est. price \$1500

*Specific Benchmark:* Addition of six out of state SSM majors/year committed to the SSM degree beginning fall 2021.

- ii. Elevate SSM as a Transfer Destination. Ironically, the ARPD data still lists 'four year transfer' as a good outcome for SSM students. In fact, the much better result is retention of students to graduation with the SSM degree. While we have made some effort to increase awareness of this for students in other community colleges around the state, we hope to increase this to ensure student know SSM at UHMC is a valid option for transfer. This will require some adjustment to SSM entry requirements and will not lead to a net increase in students for the UH system, but will increase the opportunity for students to join the SSM program if they seek a truer sustainability curriculum.

*Specific Benchmark:* The recruitment of 2-4 UH system transfer students into the SSM program for fall 2021.

- iii. Comprehensive Marketing. The SSM program has for several years sought assistance with a targeted marketing plan for student recruitment, but it has not panned out as a budget allocation, even though the price is quite modest. SSM is unique in that the courses and experiences it offers, as well as the opportunity to pursue them on Maui, are a rare find for dedicated sustainability students. This means that it represents a draw to students living elsewhere to attend school on Maui. The prospect of this might run contrary to the historic mandate of community colleges to serve local students only, but SSM is a 4 year program and limiting it to local registrants misses an opportunity to increase student enrollments and revenues for the UH system overall. Another outcome of this is the enhancement to Hawai'i's reputation as a serious sustainability innovator, which should lend itself to spin-off green economic development.

*Specific Benchmark:* An additional 2-4 non-resident SSM majors on the UHMC campus by Fall 2021.

- iv. SSM faculty have worked for several years on the development of a regional center for sustainability science housed on the UHMC campus, integrating practices undertaken within the college and also serving businesses and organization across the island. It has taken on the name Maui Sustainability Collaborative (MSC).

Over the past year, these efforts were enhanced first by additional research and design which has been ongoing, then taken to a new level when a major donor approached the UH Foundation at UHMC last summer, seeking to catalyze sustainability n Maui. That person determined that the opportunity offered through the UH Foundation was not of his choosing, but the prospect itself stimulated a surge in work to articulate functions and structure of the center, specifically as a systems-based function to help shape, test and facilitate

sustainability projects and progress. This would be unique not only to Hawai'i, but likely in the US.

Direct benefits to UHMC and the system would include a broad opportunity for student internships and research positions, tighter connections between the college and surrounding community, a greater emphasis on UHMC leadership on Maui, and a focal point for UHMC to rally around for its efficiency and improvement in years to come. This also comes with a strong prospect for green business development spin-off, much as we have seen from SSM grads in the community (see 2.d above)

*Specific Benchmark* This goal extends far beyond the academic parameters of the SSM program, though SSM provides the unique core. While the concept exceeds UH capacity for funding or defined expectation, it is also much broader in benefit, extending to the inherent values, economies and communities of the State of Hawaii.

- v. Student Housing: While this action would truly evidence a change in policy for and about UHMC, the expansion of SSM and other four-year degree programs at UHMC would benefit from the availability of affordable housing opportunities for non-resident students. This could include a referral system for rooms or family sponsors undertaken by Student Life, the availability of first priority for students at existing multi-family complexes or of course the development of school-owned facilities. We have seen first-hand that locating private housing is a deterrent for new students, and particularly if they are young and seeking their first college experience.

*Specific Benchmark:* If funded, the expectation would be a return on investment including additional enrollments at UHM which provide new, external revenues to the UH system.

- vi. Potential Program Mergers: With the prospect of a required cut-back in program offerings, SSM stands well-suited to accept coursework in

other fields by relatively minor adjustments to them which establish an SSM-level 'sustainability focus' for case study type applications.

Students would take some SSM core coursework and remain committed to their technical field of interest. Interest could come from various social and natural science fields.

Given the existing economic and health conditions of the State, it is intended that the specific goals of this Action Plan will provide the priorities for the Sustainable Science Management program for the next several years. Though these goals are largely targeting student population and economic issues, it may be expected that academic improvements will also be ongoing, consistent with the Plan.

## 5. Resource Implications

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i. Ideally, SSM would realize improvements to STEM/SSM facilities to serve a proposed six student cohort for classroom work. The facilities would be shared with other programs.

Est. price \$7,000

SSM will endeavor to make best use of existing facilities, if they can be adequate in size and capacity to meet our needs and retain the quality of our instruction for off-island/non-resident students. As well, it can be expected that any required improvements will benefit other programs and shared funding. These offsets may reduce the need for additional funding specified as SSM requests.

ii. Most of the transfer initiative would be included in the broader marketing plan. We have developed a presentation for this purpose and would need additional materials. If/when face to face is appropriate there would be a place for travel to attend transfer fairs across the state.

Est. price \$500

iii. Done correctly, the marketing plan will include updates to the SSM website, new materials for events and the implementation of creative strategies for reaching prospects through social media. This will require some consultation as well as system modifications.

Estimated price: \$10,000

A concurrent update to the UHMC web presence, along with peripheral sites such as SSM's site may reduce the resource need for this element of the request.

iv. The MSC initiative continues to seek external funding and would seek to minimize impacts to academic area budgets.

v. Student housing would be a campus project and capital resources likely a subject of Legislative determination.

vi. There would be no anticipated negative resource implications for the program merger activity described but could result in overall savings in the longer term as courses are consolidated and teaching faculty demands reduced.

☐ I am NOT requesting additional resources for my program/unit.