2016
SUSTAINABILITY SCIENCE AND EDUCATION IN HAITI

A WORKSHOP REPORT TO
The American Association for the Advancement of Science and
The Haitian Association for the Advancement of Science and Technology

Dr. Gary Machlis
Clemson University

Dr. Naomi Krogman
University of Alberta
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Disclaimer
The interpretations and conclusions contained in this report are those of the authors and workshop participants, and do not represent the views of the AAAS Board of Directors, its Council, and membership.
INTRODUCTION

Haiti, as it has so often in its history, is at a crossroads. Rebuilding from the devastating 2010 earthquake, the people and institutions of Haiti are working to find new strategies for economic and social development, new solutions for old problems such as inadequate infrastructure, and new opportunities for creating a sustainable and prosperous Haiti. In these efforts, higher education institutions can play a crucial role in advancing needed science and technology, and educating a new generation of Haitian citizens. In particular, higher education institutions can help promote sustainability as a core strategy for progress. Sustainability can be defined as,


The emergence of sustainability as a subject of university education and research is not unique to Haiti; higher education institutions around the world are engaged in a wide range of sustainability initiatives. However, there is a significant lack of guidance on how such institutions can effectively plan for and implement these initiatives in ways that are distinctive to national cultures and higher education institutions, affordable within financial constraints, and forward looking over the mid-term (2015-2025). In Haiti, the role of universities as solutions providers for sustainable development has been mostly ignored by the public and private sectors, as well as international stakeholders. In addition, the capacity of Haitian universities to provide complex, value-added solutions has remained limited.

To address this issue, the American Association for the Advancement of Science (AAAS) has joined with Clemson University (USA) and the University of Alberta (Canada) to conduct a series of workshops to provide stakeholder-driven guidance on future directions of sustainability initiatives at higher education institutions in North America and the Caribbean. The newly formed Haitian Association for the Advancement of Science and Technology (HAAST) co-sponsored a workshop held in Pétion-Ville, Haiti on 10 September 2015. This report describes the background and objectives of the workshop, how it was conducted, and the results of the workshop discussions. The report also includes several specific recommendations regarding advancing sustainability science and education in Haiti.
BACKGROUND AND OBJECTIVES

The Haiti workshop is part of the larger Sustainability Sciences and Education Project sponsored by the AAAS, Clemson University, and the University of Alberta. Other workshops have been held in the United States, Puerto Rico, and Canada. A final workshop will be conducted in Banff, Canada in September, 2016.

In this project, “sustainability sciences” include the biophysical, socio-cultural, and interdisciplinary sciences, and “sustainability education” includes both formal and informal learning at the higher education level, as well as experiential and service learning related to sustainability. There are currently many universities with interdisciplinary sustainability academic programs at the undergraduate and graduate level; examples include the University of Alberta (Canada), the University of Arizona (United States), and Stockholm University (Sweden).

The Haiti workshop was co-sponsored by HAAST, and HAAST leadership collaborated with the project directors (Dr. G. Machlis of Clemson University and Dr. N. Krogman of the University of Alberta) in planning the agenda, inviting participants, and organizing the venue. The workshop had three main objectives: 1) provide stakeholder-driven guidance on future directions of sustainability initiatives at Haitian higher education institutions, 2) foster communication and collaboration amongst institutions with similar sustainability goals within Haiti, and 3) help build capacity for sustainability leadership in Haiti.

THE WORKSHOP

The workshop was conducted on 10 September 2015 at the Hotel Montana, Pétion-Ville, Haiti. Approximately 35 individuals attended all or part of the workshop. Participants included academic leaders, university faculty, secondary school teachers, representatives of non-profit organizations, university and high school students, and others. A partial list of participants is in Appendix 1; additional participants joined for selected workshop discussions.

Drs. Machlis and Krogman facilitated the discussions. The workshop was conducted in French and English, with simultaneous translation, and recorded on video. One facilitator took notes summarizing participant’s comments while the other led a discussion.
After introductions and an overview of sustainability science and education, the discussions (each lasting approximately 90 minutes) were organized into three sessions linked to three key questions:

1. What should be the goals of the sustainability sciences in Haiti?
2. What should be the goals of sustainability education in Haiti?
3. What are the strategies and tactics in Haiti to achieve these goals?

The workshop concluded with a brief summary of the discussions and a description of next steps.

After the workshop was completed, all comments by participants were reviewed and placed with the responses to one or more of the three questions. In some cases, a response made during a particular discussion session was more appropriate to a different question session, and was placed in that session for analysis.

The workshop results have several limitations. First, only 90 minutes were available to discuss each question, and this limited the breadth and depth of the discussion. Second, the results are dependent upon the individuals and mix of institutions represented in the workshop; a different set of participants might provide different results. Third, the concepts of sustainability science and sustainability education were relatively new to some participants, limiting their opportunity to provide comment. Given the small percentage of students who enter higher education in Haiti, significant concern and interest was expressed about sustainability education at primary and secondary levels. The results do represent the guidance of a broad set of stakeholders in higher education and research within Haiti, and can provide useful insights into advancing sustainability science and education in Haiti.

**WORKSHOP RESULTS**

1. **What should be the goals of the sustainability sciences in Haiti?**

There are three general overarching themes that emerged from the participants’ statements at the workshop. First, the sustainability sciences in Haiti should focus on the protection and sustainable use of the fundamental natural resources of the country. Among these are water, land (especially arable and forested land), and marine resources. A suggestion was made to create a national inventory of the land of Haiti that identifies land that cannot be cultivated due to drought or deforestation, and lands that hold the potential for successful reforestation. Enthusiasm was demonstrated around science that informs farming that is less labor intensive and more ecologically sustainable, due to the health issues associated with manual farm implements, and the soil erosion and nutrient depletion currently reducing agricultural productivity. Similarly, many participants were interested in sustainability science that could inform incentives and community
collaborative approaches that arrest deforestation and improve the longer-term outcomes of reforestation. Interest was also expressed in enhanced marine science that identifies medicinal and edible plant and food harvest possibilities.

A second expressed goal for the sustainability sciences is to create higher education opportunities to directly address Haiti-specific sustainable development. Participants spoke of the unique history, geography, and demographic trends (e.g. majority of population is young or of child bearing age) in Haiti that call for sustainable development initiatives informed by distinct Haitian needs. In particular, participants called for greater science and scholarship in risk management, disaster preparedness, and enhancing resiliency for Haiti. Country-specific research could be conducted on:

- alternative energy development (solar, biogas, waste product energy),
- pollution abatement and waste management, particularly in regards to recycling science and practice (e.g., reuse of plastics, using waste to make other products, potentially involving robotics),
- building termite-resistant homes,
- efficient and affordable transportation for people across Haiti,
- communication technologies that would foster these sustainable development initiatives above, and
- most importantly, identify places of high risk, in terms of potential disaster and climate change impacts, and the ability for communities to prepare, adapt, and make improvements in these high-risk areas.

Participants felt that the sustainable development needs of Haiti should emerge from communities across Haiti, and to specifically engage and integrate community members in needs assessments, experimental and demonstration projects, test-applications, and partnerships to implement and evaluate interventions. They also felt the accumulated knowledge should be made public and easily accessible.

Participants felt that the third goal of sustainability science in Haiti should be to create a partnership between higher education, scientific research, and public policy. Essential to this task, some participants held, is the need to re-establish a reliable Haitian Census. Participants expressed concern about the absence of a current and longitudinal analysis of the demographics and conditions of the Haitian population, rendering many development efforts in Haiti poorly informed about their target populations. Participants also suggested the development of research centers to more effectively build collaborations between higher education institutions, and among Haitian researchers and the global academy of scientists who work in Haiti, the government, non-governmental organizations, the private sector, and communities.
2. What should be the goals of sustainability education in Haiti?

There were two theme areas for responses to goals of sustainability education in Haiti. First, educational content should increase in the areas of risk management, disaster-preparedness, and approaches and designs for recovery and resilience. This training was seen as part of education that places risks, disasters, and resiliency as pedagogy on systems and systemic thinking about linkages among multiple elements, such as the stages of preparation, disaster event, and recovery over time. Participants suggested interdisciplinary systems training could help explain the interacting factors of shelter, water, farming, food, technology, transportation, and support for governance, human health, communication, education, and employment. Such systems curriculums would also address agriculture-environmental connections, climate change, energy, reforestation, tourism, public policy, governance, and cultural barriers to sustainable development.

Secondly, participants felt that the goal of sustainability education should be to connect higher education institutions to communities as well as international research programs working on similar issues, through the research centers described above and study centers in communities. For example, such study centers could be a place for secondary students to participate in learning experiences (e.g., “Reforestation Days”) or a research project initiated by a Haitian university. The study centers could also be a place for community teachers to attend workshops (for example, on the basics of the scientific method or on models for sustainable development) led by a Haitian higher educational institution. Participants suggested the scientific training of teachers in Haiti is weak, and continuing education in this area is needed. They also felt that continuing education of teachers is needed to nurture student curiosity, enthusiasm, and awareness of the role of science in civic well-being, and to better prepare students for careers in science that require higher education.

In general, greater cooperation and exchange between higher educational institutions and communities could potentially foster transdisciplinary, cross-sector, experimental, experiential, and proactive learning. Participants felt that secondary and post-secondary students need this kind of learning to understand the importance and application of knowledge and skills and to contribute to Haiti’s development. Students and faculty in higher educational institutions can be far more effective, several suggested, if they have direct experience working with communities to learn about in situ priorities (e.g., improving farmer livelihoods) for sustainable development and the skills of developing specific solutions for Haitian communities.

Consistent emphasis throughout the workshop was placed by participants on the high proportion of Haitian students who will not attend a higher educational institution, and the importance of learning opportunities for primary and secondary teachers and their students, and more broadly community members. Students need to understand their own potential to combine a variety of skills in the trades, and the related opportunities for entrepreneurship, to help build and improve
Haiti’s infrastructure, and develop small-scale businesses. Issues addressed in Haiti exist in many developing countries, and locally developed solutions can and should be exportable and usable elsewhere. Many participants held that entrepreneurial opportunities exist in waste recycling, energy/electricity development, and reforestation.

One participant expressed concern about the barrier of language for students capable of pursuing a higher education but who only speak Creole, given that French is the primary language for which higher education is delivered. Greater creativity in teaching sustainability education in Creole and teaching French in rural areas may be required to effectively reach the broader Haitian population.

3. What are the strategies and tactics in Haiti to achieve these goals?

Several themes emerged from the discussion of strategy and tactics. Many participants (including the student representatives) reported that developing significant opportunities for life-long learning was the foundation for long-term sustainability in Haiti. Participants stated that sustainability can and should be integrated into the curriculum early, “even in primary school” and definitely in secondary and higher education. Importantly, the values of empathy, solidarity, and collaboration were seen as essential elements to impart on young persons, to help create motivation and interest in subjects (from science to civics) relevant to Haitian sustainability. Building student interest, skill, and confidence in solving local problems had strong support amongst participants. Teaching “how to learn” and training students “to keep them learning” were seen as important strategies.

In addition to this expanded view of sustainability education, there were several institutional strategies proposed. One was to ensure that the “systems perspective” is part of the curriculum, so that students can better understand the key linkages between environment, economy, society, and culture. This necessarily requires interdisciplinary coursework and teachers skilled in systems thinking. While participants felt that the systems perspective could and should be integrated into sustainability education and research at all levels, there was specific interest in developing a sustainability certificate for higher education students, modeled after the certificate program at the University of Alberta. Participants felt that AAAS and HAAST could provide valuable assistance in implementing such a program.

A third theme was the importance of higher education investing in applied research at the local level, to help Haitians solve problems and advance sustainability. Participants recommended that university students, even at the beginning of their training, could and should be engaged in problem-solving research. Further, advanced students (particularly those preparing for the Ph.D.) should conduct research that is relevant to Haitian needs, applied to Haitian problems, and communicated to Haitian decision makers. Reducing current course loads to create opportunities for hands-on research was seen as an important strategy.
For faculty, this emphasis on systems-level science and applied research suggested several important strategies and tactics. With the heavy teaching loads carried by Haitian faculty, creating opportunities for student and faculty research may benefit from informal collaboration and formal partnerships focused on sustainability science with universities outside Haiti, external scientists and international students. Participants noted that AAAS and HAAST could help facilitate such exchanges.

RECOMMENDATIONS

The project directors (who served as facilitators for the workshop) reviewed the workshop comments, and from the above discussion developed a set of recommendations for: 1) higher education and research institutions in Haiti, 2) the Haitian Association for the Advancement of Science and Technology, and 3) the American Association for the Advancement of Science. These recommendations are presented below.

General Recommendations

1. Haitian sustainability policy and practice can be informed by policies and practices in other countries (such as the US, Canada, and developing countries confronting similar problems) but should be distinctively Haitian and derived from local community engagement.

2. Sustainability science in Haiti should be fully integrated into sustainability education; i.e., learning about sustainability should include research experiences at all levels of Haitian education.

3. Sustainability sciences and education in Haiti should include applied biophysical science, socioeconomic science, and interdisciplinary science, and focus on systems-level understanding and the protection and sustainable use of Haitian natural resources.

4. Haitian higher education institutions should consider partnering with universities outside Haiti to develop a primary-secondary-undergraduate curriculum proposal to promote sustainability education in Haiti.

5. In collaboration with select universities in the US and Canada, a certificate program in sustainability should be developed appropriate to Haiti, including distance learning where most effective.

Recommendations for HAAST

1. HAAST should consider making sustainability a key theme and focus of its programmatic activities, and share that theme prominently through outreach and social media.

2. HAAST should consider creating a sustainability research needs assessment and strategic plan (including key research topics and delivery systems such as research centers), derived from
existing reports (such as *Science for Haiti*, 2012), HAAST members’ expertise, and input from public decision makers and other stakeholders. This needs assessment and strategic plan should be widely distributed to the scientific community within and outside of Haiti.

3. HAAST should consider the development of an awards program to recognize faculty and students conducting significant applied research of value to Haiti’s sustainable development.

4. HAAST should partner with the AAAS, North American universities, and other scientific societies to conduct a series of teacher workshops on sustainability, in order to increase teacher awareness, expertise, and interest in teaching sustainability in Haitian primary and secondary schools.

**Recommendations for AAAS**

1. AAAS should create an informal Haiti Research Group, bringing together AAAS members with mutual interests in conducting and supporting research (including sustainability science) in Haiti. This group should meet annually during the AAAS annual meeting, and be provided modest administrative support services, web presence, and rostering support.

2. AAAS should formally recognize HAAST as a partner scientific organization, and provide technical advice and support as feasible and appropriate, in order to speed the development and growth of HAAST and build capacity among Haitian scientists, corporate leaders, and educators to promote the role of science to Haitian decision makers.

3. AAAS should broadly disseminate this report to key US institutions (such as universities, federal research agencies, and the State Department) to increase awareness of the needs and opportunities for sustainability science and education in Haiti.

**CONCLUSION**

The near term future of Haiti, like many countries in the Caribbean, is a future of population growth, resource shortages, challenging economic development, climate change, sea level rise, and potential seismic activity. Sustainability as a strategic policy goal and a series of practices will be essential in creating a secure and prosperous future for the Haitian people. Sustainability science and education can play a valuable role in Haiti’s future, and the results of this workshop may prove useful in that effort.
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APPENDIX 1.
PARTIAL LIST OF PARTICIPANTS

Bogenston Andre
Dean, Université d’État d’Haïti

Giovanna Blanc
Master's in technology from Ecole Supérieure d'Infotronique d'Haïti (ESIH)

Jhon Picard Byron
Université d’État d’Haïti

RoseLuce Cadot
Disaster Risk Management Specialist, USAID/UFDA/DPC

Alain Charbonneau
Director of Francophone, University Agency (AUF in French)

Wendjel Charles
Teacher at Collège Catts Pressoir

Yvens Chery
Université d’Haïti, expertise in Analytical Chemistry, Biochemistry, Chemical Biology

Richardson Ciguene
Master's in technology from Ecole Supérieure d'Infotronique d'Haïti (ESIH)

Jean Odile Etienne
Université d’État d'Haïti /LADMA/ENS

Jean Fenel Felix
Teacher at Université d’État d’Haïti

Lyse Ladouceur
Junior at Ecole Supérieure d'Infotronique d'Haïti (ESIH)

Vellie Laguerre
Junior at Ecole Supérieure d'Infotronique d'Haïti (ESIH)
APPENDIX 1. CONTINUED

Geraldine LeCarret
Director of communications department at Ecole Supérieure d'Infotronique d'Haïti (ESIH)

Mirlande Leroy
Consultant in Project Management and Capacity at CREFI

Detmich Michel
Student at Collège Catts Pressoir

Dr. Kenny Philippe-Auguste
Fiber optic teacher at Ecole Supérieure d'Infotronique d'Haïti (ESIH)

Wilma May Pierre
Student at Collège Catts Pressoir

Emmanuel Rathon
Student at Collège Catts Pressoir

Marilise Rouzier
UEH Université d'État d'Haïti

Marlene Sam
Director, International Affairs at Ecole Supérieure d'Infotronique d'Haïti (ESIH)

Carole Sassine
FASCH-UEH Université d'État d'Haïti

Mario Silney
Graduate from Ecole Supérieure d'Infotronique d'Haïti (ESIH), Master MONE

Gianmichele Toglia
Directeur, MakerLab and Mobile Developement at Ecole Supérieure d'Infotronique d'Haïti (ESIH)