

Some Thoughts on Keeping Field Stations and Marine Labs Afloat in Turbulent Times

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Field stations and marine labs have long been important components of the nation's and the world's research infrastructure, and many believe that their importance will increase in the future. But many are struggling financially. A number have been closed, and others are threatened with closure.

Last year, the National Research Council completed a study at the request of the National Science Foundation to assess and make recommendations for field stations and marine labs if they are to survive and thrive in the twenty-first century. I chaired the committee that produced the report entitled *Enhancing the Value and Sustainability of Field Stations and Marine Laboratories in the 21st Century* (NRC 2014). Preparation of the report was a collaborative effort of 12 scientists with extensive field station experience.

The report (NRC 2014) was released in September 2014. In it, we pointed out that 75 percent of *field stations* (the term used here, as in the report, includes marine laboratories) with US addresses are affiliated with universities. Although being part of a university often is important, it is not a guarantee of fiscal viability. Many universities are facing their own financial challenges. Mergers of independent laboratories with universities bring with them the well-known challenges of integrating two distinctly different cultures. Most field stations have less formal organizational structures and bureaucracies than do large universities. Some field stations whose university affiliations date back many years have dealt with the clash of cultures by escaping from the campus both physically and intellectually. This separation

can come at a cost, particularly when campuses are struggling: The field stations are out of sight, so they're out of mind. The directors of field stations need to stay in close communication with their parent institutions, especially with those campus leaders who set institutional priorities and who are responsible for funding allocations and infrastructure priorities.

In a statement written for the report, E. O. Wilson observed that "in the not too distant future a much larger share of biological research, from biochemistry to ecology, will be conducted at biological field stations that consist of nature preserves and have ready access to laboratories equipped to analyze and monitor processes at every level of biological organization, including the molecular." He went on to state, "Field stations will also serve as key centers of education at all levels."

These facilities will take on added importance in the years to come as the extent and rate of environmental change grow more rapidly. Many field stations are located in areas relatively undisturbed by humans, a smaller number are located in heavily populated urban areas, and still others are located along these population and environmental gradients. Together, they have the capacity to document the progressive intrusion of humans into nature and the increasing modification of it that results in the loss of habitat, biodiversity, and ecosystem services. We can use these facilities to help figure out how to slow the rate of environmental change and to contain and then compress human activities to leave more of the Earth undisturbed in larger, unfragmented chunks. The data, information, and knowledge developed through studies

at these facilities could be translated into action to increase the capacity of humans to adapt to environmental surprises such as extreme weather events (e.g., Hurricane Sandy) and to elevate the public's awareness of the insidious creep of climate change, which occurs at a rate that is too easy for decision- and policymakers to ignore.

Field stations perform another important function. There is a growing recognition of the importance of integrating the various disciplines, something that recently has been given the name *convergence*. Field stations have been doing this for decades and some for centuries. But they can do much more. Field stations are ideal places to bring scholars and students from different disciplines together not just for a seminar or a lecture but for a weekend, a week, or even an entire field season to live and work together, to share ideas, and to benefit from the creative abrasion that results from the collision of ideas—particularly ideas from different disciplines. They can start by increasing the number of social scientists—both professionals and students—and representatives of the arts and humanities who participate in field station programs to address major environmental and societal issues. And through connectivity with other field stations, they can benefit from dialogue with communities in quite different environments, where the same issues have quite different expressions in both degree and in kind. Networking of field stations and marine labs in clusters around natural biogeophysical areas is essential if they are to demonstrate their true value in an interactive community.

Field stations should be hotbeds for the exploration of ideas and pathways

to move us from the present trajectory toward an unsustainable future to a new one that leads to a better future for both nature and humans.

Collaborations of biological field stations with some of the nation's more than 50 agricultural experiment stations (each state has at least one) might open entirely new approaches. The two human activities that take the greatest toll on nature and nature's services are the ways in which we grow and harvest our food, including seafood, and the kinds and amounts of energy we use. The United Nations' Food and Agricultural Organization predicts that we will need to produce 70 percent more food by 2050 to feed an additional 2.5 billion people.

Today, we use about 50 percent of the ice-free land surface and 70 percent of the available freshwater to grow our crops and livestock. Clearly, an extension of current practices is not sustainable. We need to grow more food on less land, using less water, less fertilizer, fewer pesticides, and fewer herbicides. Cross-fertilization of these two station cultures might facilitate the application of advances in genetically modified crops that could benefit both humans and nature. Partnerships with the Electric Power Research Institute and university energy institutes might also lead to new practices and policies to reduce greenhouse gas emissions and fragmentation of nature.

Field stations need to demonstrate in more compelling ways the value that they bring as a community to the

nation and to the scientific enterprise. This will require the development of a core set of quantitative metrics that can be used by all field stations and that can be supplemented with other metrics suitable and scalable to particular missions and the large range of sizes of field stations. We live in a world that demands and rewards accountability and that punishes the lack of it. The parent organizations of these institutions—the Organization of Biological Field Stations and the National Association of Marine Laboratories—should convene a workshop to develop and endorse these metrics and should insist that their members record and report them. The National Science Foundation should support such a workshop.

In selecting the leaders of many of our field stations, we often look for the best scholars, apparently thinking that anyone with outstanding scholarly credentials should be able to lead and manage. However, experience tells us otherwise. Too many scholars fail to recognize that effective leadership requires different and demanding skill sets and an entrepreneurial thirst that can be quenched only by the success of the organization one leads—not by the number of publications and accolades one adds to one's own résumé.

Too often, we use the lack of funding as an excuse for not taking action. One of the strong recommendations made in the report is that field stations should monetize their assets, develop business plans as sound as

their scientific plans, charge appropriately for the services and experiences they provide, and diversify their funding portfolios to be more robust in the face of the fiscal volatility that is part of the “new normal.” This requires entrepreneurial leadership.

Realizing the full potential of field stations is an exciting challenge and opportunity. Although some will agree with the comic character Pogo that “some opportunities are so large they are insurmountable,” I am not among them. I am more in John W. Gardner's camp when he said, “We are all faced with a series of great opportunities brilliantly disguised as insoluble problems.” Field stations fall into this category.

It is up to the directors of field stations to articulate that vision, to create the infrastructure and the environment within which scholarship can flourish, to connect them with other field stations, and to orchestrate making the case for their value not only to their host institutions but also to other potential supporters.

Reference cited

- [NRC] National Research Council. 2014. Enhancing the Value and Sustainability of Field Stations and Marine Laboratories in the 21st Century. National Academies Press.

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