

Implementing the Mission and Vision
for the
W. K. Kellogg Biological Station
Michigan State University

A report to

Dean Jeff Armstrong, CANR
Dean George Leroi, CNS
Director Ian Gray, MAES
Director Maggie Bethel, MSUE

Submitted by

Katherine L. Gross, Acting Director, KBS
on behalf of the KBS faculty, staff and community

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Summary

At the request of Provost Simon, Deans Armstrong and Leroi, and Directors Gray and Bethel a retreat was held “to review the mission and vision for the Kellogg Biological Station and propose an implementation plan that is compatible with the current fiscal situation.” To meet this goal, a group of 30 faculty and staff¹ from the Kellogg Biological Station (KBS) and affiliated departments and programs from main campus met in a facilitated retreat (“Implementing the Mission and Vision for KBS”) 8-9 March 2004 at Brook Lodge, Augusta MI.

This report describes the outcomes of the discussions that occurred at, and following, the retreat from which we have developed an initial plan for implementing the Vision for KBS. We have included here both immediate (next 1-2 years) and short-term (3-5 year) needs that must be addressed for KBS both to continue to function as a highly regarded center for research and education in ecology and evolutionary biology and to achieve its potential to extend its impact to more applied areas of research and fully integrate outreach and extension into these activities.

We see this document as an important ‘next step’ in the development of a long-term, comprehensive research, education, and outreach plan for KBS that can be used to guide the recruitment and selection of a permanent Director. The new Director will have the responsibility to develop long-term goals that will build on the tradition of excellence and historical strengths of KBS, to enhance the research, educational and outreach programs of MSU, and to serve local and regional communities.

The focus of the retreat was to develop programs in research, education and outreach in three focal areas that are broadly integrative and driven by the Mission of KBS²:

- (1) Ecology and Evolution,
- (2) Sustainable Practices on Agricultural Landscapes, and
- (3) Species Conservation and Habitat Restoration.

The rationale for these focal areas, how they complement each other and lead to implementation of the KBS Mission, and immediate and short term goals that are necessary for this integration are described in the accompanying report. The immediate needs and goals (next 1-2 yrs; by Fall 2005) are: to clarify the administrative structure of KBS and hire a Director; hire new faculty in Cropping System Ecology and Field Microbial Ecology; to develop reciprocal links between KBS and campus departments for research, education and outreach programs; to develop plans to establish ecologically-based programs in Habitat Restoration and Species Conservation and Sustainable Practices in Agricultural Landscapes. The transition to the new Director will be an opportunity to fulfill the short-term goals described in this report and develop a longer term, comprehensive plan to implement the Mission of KBS.

¹ See participant list and agenda in Supplementary Material

² See Section A: Overview in Supplementary Material

Introduction

The Kellogg Biological Station (KBS) has been a part of Michigan State University for over 50 years and during this time its mission, goals and role within the university have evolved. To determine if the current mission of KBS remains appropriate, in spring 2003 a group of MSU faculty led by Mike Klug, then Director of KBS, reviewed the 1994 KBS Mission statement and determined that the Mission Statement³ is, in fact, still appropriate as a guide for development and implementation of programs at KBS in the foreseeable future.

In January 2004, Provost L.A.K. Simon, Deans J. Armstrong and G. Leroi, and Directors I. Gray and M. Bethel requested that Interim Director Kay Gross develop a process “to review the mission and vision for the Kellogg Biological Station and propose an implementation plan that is compatible with the current fiscal situation.” In March 2004, a group of over 30 faculty and staff associated with KBS and affiliated departments and stakeholder groups participated in a retreat, “Implementing the Vision of KBS” at the Brook Lodge, Augusta, MI. The specific goals for this retreat were to develop recommendations for implementation of the Mission of KBS by development or enhancement of research, education and outreach programs in three focal areas that were broadly integrative and built on historical strengths of the Station. These focal areas were: Ecology and Evolutionary Biology, Sustainable Practices in Agricultural Landscapes, and Conservation and Restoration Ecology.

For each of these areas, the group considered how existing programs could be enhanced and the types of new programs needed to achieve specific goals in, and greater integration of activities in, research, education and outreach. As part of these discussions we identified institutional assets and opportunities, constraints, and priorities. Our recommendations here include both immediate (next 1-2 years) and short-term (3-5 years) activities that are needed to realize these goals. An important secondary objective was to provide a focus for the recruitment and selection of a permanent KBS Director who will implement the short-term goals defined here and use this document as a framework for developing longer term goals for KBS that build on these programs and enhance their breadth and impact. We include in this report specific recommendations regarding the skills, experience and vision that the new KBS Director should have and what we see should be the Director’s initial responsibilities and priorities.

Mission and Vision for the Kellogg Biological Station

The Mission

In November 2002, KBS Director Mike Klug was asked by Deans Armstrong and Leroi and Director Gray to review the relevancy of the current mission and vision for KBS in the 21st Century. The mission for the KBS has been reviewed by a number of ‘green ribbon committees’ over the years and was last reviewed and reaffirmed in 1994. The consensus of the 2003 committee was that, except for minor edits, the current KBS Mission statement remains appropriate for a research-intensive educational unit of MSU:

³ See Section A and following page

The reaffirmed Mission⁴ of the Kellogg Biological Station is:

Development of programs in research, education and outreach directed toward a comprehensive understanding of natural and managed terrestrial and aquatic systems, and the interdependence of these systems in regards to the conservation of natural resources.

We feel that this statement remains relevant today as it captures both our historical and emerging strengths and will allow us to build on these. The KBS land base includes over 3,600 acres that encompass a diversity of natural and managed, aquatic, and terrestrial habitats that reflect the mosaic of landscapes and land uses that are typical of SW Michigan. These lands, together with other MSU properties in the area (e.g. Kellogg and Russ Forest, Brook Lodge) provides students, faculty and visitors with a unique opportunity for research, education and outreach programs focused on natural and managed landscapes.

Our vision for KBS is that we continue to be a university and national resource that provides the infrastructure to support high-quality research and educational programs for both resident and non-resident faculty and students and to communicate the knowledge from those programs to the public. To realize this vision we choose to focus on the development and support of programs and activities in three focal areas:

- 1) Ecology and Evolution Biology from Genes to Landscapes
- 2) Sustainable Practices in Agricultural Landscapes
- 3) Conservation and Restoration Ecology

Ecology and evolutionary biology provides the foundational knowledge required to address many of the most important and recalcitrant environmental challenges of today. Two of these challenges – the development of sustainable practices for agriculture and the development of conservation and restoration strategies for natural habitats – seem particularly well-suited for KBS. Both directly tie to Mr. Kellogg’s vision for his original gift of KBS lands to MSU, and both build on the international reputation of KBS in basic sciences of ecology and evolutionary biology. From an institutional standpoint, they also enhance opportunities for research and educational collaborations with faculty in main campus departments such as Fisheries and Wildlife, Forestry, Crop and Soil Sciences, and Horticulture.

Strengths of KBS

The tradition of excellence for research and education in ecology and evolutionary biology at KBS began in 1964 when Dr. George Lauff was appointed KBS Director and began hiring a resident research faculty. Since then the KBS faculty has grown in number and disciplinary breadth, and currently includes seven resident faculty members with

⁴The 1994 Mission Statement is given in the Section A: Overview & Resources section of the Supplemental material.

joint or adjunct appoints in four campus-based departments⁵. Currently, this faculty group is down from a peak of 10 in the early 1990's, at which time KBS could document faculty expertise at all levels of ecological organization, from genes to landscapes. This broad expertise allowed KBS to secure two major NSF graduate training grants in the 1990's (RTG) totaling over \$2.0 million.

The current resident KBS faculty⁵ have active and well-funded research programs of national and international stature. KBS research publications are highly cited; two of our current faculty members were recently recognized by ISI as among the 250 most highly cited researchers in ecology and the environment. In February 2004, the KBS library assigned its 1000th contribution number to a KBS publication. A recent ISI analysis showed that KBS journal publications have been cited over 30,000 times, with 46% cited 10 or more times and 80+ articles cited over 100 times. This is an impressive measure of the impact of research conducted at KBS.

KBS is also known for producing outstanding graduates. Former KBS students have taken faculty positions at UC Berkeley, University of Chicago, Dartmouth College, and many other top-notch institutions and agencies. These graduates extend the impact and reputation of MSU through their own productive careers, their teaching, and the students they produce. Statistics from our recently completed RTG grant (1996-2003) show that 32 Ph.D. students were enrolled in our RTG program: 19 students completed their degrees during this period and 11 continue. Among these students, we had seven University Distinguished Fellows, three NSF pre-doctoral Fellows, two C.S. Mott Fellows, one EPA STAR fellow, and one Ford Foundation Minority Fellow. KBS RTG students have published more than 50 peer-reviewed papers. In addition, this program supported 25 non-KBS students (15 from MSU, 10 from other universities), allowing them to conduct research or take classes at KBS.

Undergraduate education has been a traditional strength of KBS achieved via intensive field-based courses in the summer, providing direct hands-on experience in the study of natural and managed ecosystems that are not possible in traditional classroom instruction. In addition, a large number of undergraduates have experienced field research with KBS faculty and graduate students funded through NSF REU awards and other sources of funding. These students have been drawn from across the country, and they have often been coauthors on published papers and have used this research as a basis for honors theses at their home institutions. Increasingly, students from nearby colleges and universities (primarily MSU, Western Michigan University, and Kalamazoo College) as well as high school students have been involved in research during the academic year in KBS faculty laboratories.

The KBS Bird Sanctuary and Farm have also provided undergraduates opportunities for educational and training internships. The Kellogg Farm educational internship program began in 1987 and primarily has attracted students from the 2-yr Agricultural Technology programs at MSU, though recent participants have included students from Earth University in Puerto Rico and Kalamazoo College. The internship program at the Bird

⁵ See Supplemental Material Section B: Kellogg Biological Laboratories

Sanctuary provides opportunities for students to gain experience in both Wildlife Techniques and Education and Outreach. Most recent participants are from the CANR Professional Internship program, though historically students from Hope College, Western Michigan University and Olivet College were attracted to this program. Although highly regarded by the participants, lack of funding has typically limited participation in these programs to 1-2 student a year and in the past 3 years has declined.

More recently the KBS faculty have extended their involvement in ecological and environmental education to K-12 teachers in the region through the development of Science Literacy Partnerships in collaboration with faculty in the Department of Science Education. In 2001 we received funding from the NSF-HER Teacher Retention and Renewal Program (\$1.3M for 3 years) to expand a program that had begun in 1998 funded by supplements to the LTER. The partnership now provides 80 science teachers from 14 districts around KBS with training in ecological science content, pedagogy, and educational leadership. This program also provides KBS graduate students with support; they serve as both workshop developers and year-round assistants working with teachers at workshops and in their school buildings.

The KBS faculty and MSU's Extension Land and Water Program staff have a long tradition of capitalizing on the unique facilities and outdoor environments offered by KBS to provide outreach locally, regionally, and statewide. These activities involve both mission-oriented projects directed towards local environmental concerns, facilitation of local community activism to develop a greater appreciation for natural resources, and on-site workshops to help landowners and professionals build capacity to address agriculture and natural resources issues. This role dates back to the 1960's and 70's when KBS faculty, working in collaboration with MSU faculty, helped Gull Lake residents document lake quality degradation, leading to a sewer expansion and substantially improved lake water quality. More current examples include providing technical and logistical support for the Four Township Water Resources Council and Augusta Creek Watershed Association. The Four Township Council recently produced a "Citizen's Guide to the Conservation of the Four Townships"⁶ that they plan to distribute in conjunction with public educational programs. The KBS Land and Water group has also supported research, education and outreach programs in sustainable agriculture programs in collaboration with Living Field Laboratory (Harwood), LTER (Robertson) and local farmers. The Kalamazoo River TMDL project is a regional effort in which Land and Water Program staff provides resources to support watershed wide efforts to reduce phosphorus inputs to the river.

Unlike most other research units, KBS has an informal environmental educational program focused on youth and family education. One example of this is the YES (Youth Exploring Science) program of the KBS Bird Sanctuary⁷. This is a year-round program that targets public, private and home-schooled students during the academic year and a 6-week summer day camp program. The program involves collaboration with KBS faculty and graduate students in the summer and provides K-12 students the opportunity to be in

⁶ Section C: KBS Outreach and Extension

⁷ Section D: Bird Sanctuary, Farm and Forest

the field with graduate students and others. There are also a variety of self-guided and facilitated tours of the KBS Bird Sanctuary, Farm, Manor House, Brook Lodge and Kellogg Forest that are coordinated and facilitated by an active KBS Volunteer Program (over 300 active members). Contributions by the KBS volunteers allow us to offer a variety of educational and outreach activities, as they plan and provide necessary support for a variety of special events and workshops, including Red Cross Blood Drives 5-6 times a year. Volunteers also assist with research activities, and provide clerical assistance and help maintain our physical facilities and grounds, including the Manor House gardens.

Implementing the Mission –Statement of the Vision

To implement the vision of KBS in the first decade of the 21st Century, we will focus our efforts on the three focal areas noted above, Ecology and Evolution, Sustainable Agricultural Practices, and Conservation and Restoration Ecology. This approach allows us to develop a more intentional linkage between our current research and educational expertise in ecology and evolutionary biology and outreach programs in agriculture and natural resource management. It also allows us to more directly link our activities to issues that clearly were part of Mr. Kellogg's vision when he first donated the lands that have become the Kellogg Biological Station: sustainable practices in agriculture and conservation of natural resources. These issues are as relevant today as they were 75 yrs ago when KBS began.

Our approach in developing this plan has been strategic in that we recognize that the University currently has limited resources to invest in new programs. To be successful we need to better integrate research, educational, and outreach programs at KBS, foster more partnerships with campus-based units, and develop a framework for improving community involvement and support for KBS activities. However, for KBS to continue to excel requires a commitment of resources from the University both for replacing faculty positions in Ecology and Evolutionary Biology that have been lost, creating new positions to lead the new focal areas in Sustainable Agriculture and Conservation Biology, continued commitment to graduate training, and investment in new opportunities for residential undergraduate education and research experiences at KBS. It is also critical to maintain our outreach and education program delivery capacity so that the local community and region may continue to benefit from KBS knowledge and research.

For these programs to be successful there needs to be a clear administrative structure at KBS that will allow the Director to provide leadership, develop funding opportunities, and assure that KBS programs are fully integrated into those of the main campus. This will require that there be a single Director at KBS with responsibility for all of the activities of all units and appropriate support staff.

Focal Areas

1. Ecology and Evolution: Our global environment is undergoing unprecedented change and basic ecological research must provide the knowledge to guide the management of ecosystems and the conservation of biodiversity in this changing world. A sustainable

view of ecosystems also must consider the impacts of a changing environment on natural selection and the evolution of populations. Basic ecological and evolutionary research at the KBS is directed at understanding organisms in natural and managed habitats, from genetic changes underlying adaptive evolution, through species interactions in communities, to the structure and functioning of ecosystems. This unifying theme of integrative studies of ecological and evolutionary processes is a KBS hallmark.

KBS is the only unit at Michigan State University whose core conceptual focus is synthesis across the breadth of ecology and evolutionary biology. All KBS faculty participate in MSU's Ecology, Evolutionary Biology and Behavior Program (EEBB), and a number of KBS faculty participate in MSU's Environmental Sciences and Public Policy Program (ESPP). KBS faculty members are the lead instructors for most of EEBB's key graduate courses. As a microcosm of the ecological and evolutionary disciplines, KBS fosters a rich variety of intellectual interaction and collaboration among faculty and students, as evidenced by NSF research training awards for graduate and undergraduate students, the LTER project, and other collaborative NSF awards and publications. Integration across the spectrum of ecology, from genes to landscapes, also characterizes the training of KBS graduate students and contributes to their success in securing faculty positions at colleges and university across the nation.

Maintaining balance and complementary strength in faculty expertise is crucial to the continued success of KBS. However, due to past losses and recent retirements, KBS is at risk of falling below the critical mass needed to maintain a level of interaction and synergy necessary to drive the research environment that has built KBS's national and international standing. A continued breadth of resident research activity is also necessary to foster collaborative research with campus-based faculty and students, and to attract visiting researchers from other institutions⁸. Efforts are also needed to sustain undergraduate and graduate training activities in integrative ecology and evolution at the KBS. The rising cost of graduate education is a concern for all units at MSU but is especially problematic for KBS, which competes nationally for the best students, yet has few resources (e.g., TA) to support them in residence.

2. Sustainable Agricultural Practices. The movement towards a more sustainable agriculture has a strong history at MSU dating from the late 1970's. KBS played an early supporting role in this effort as a field site for some of the first IPM studies, and with the 1987 establishment of the LTER site became established as a major site for basic research in agricultural ecology. The rationale for NSF's awarding KBS LTER status was clear: few if any places in the U.S. had as strong a potential for merging the agronomic and ecological sciences via outstanding faculty in each discipline enthusiastic about working in the same set of agronomic systems. Today KBS in general and the LTER site in particular is internationally recognized as a leading center for basic ecological research in agricultural ecosystems. Over 45 faculty members from 14 departments and 4 colleges participate as co-investigators in the project, about to enter its fourth round of NSF funding under the direction of KBS PI Phil Robertson. Over 180 peer-reviewed publications and 40 PhD dissertations have been produced by the project over its first 15

⁸ Section B: Kellogg Biological Laboratory

years. During this period the project has grown from a plot-based focus on specific ecological processes in different agronomic systems to a focus that includes the larger geographic and socioeconomic landscape. The main goal of the KBS LTER program is to provide an ecological understanding of the row-crop ecosystem sufficient to allow its management to shift from a chemical to a biological basis, and to thereby improve the profitability and environmental integrity of row crop production.

Associated with the LTER program has been extension research directed towards applying research knowledge from the LTER project. Central to this effort has been the KBS Living Field Lab (LFL), established by LTER co-PI and Mott Chair of Sustainable Agriculture Dick Harwood in 1992. The LFL has provided an extensive set of field plots within which basic research findings from the LTER site can be tested prior to on-farm experimentation. Additionally, the KBS Land and Water Extension Program has initiated a set of organic field plots and cover crop trials that are tied to on-farm experiments via strong farmer involvement.

Extension research in sustainable agriculture at KBS has substantially lagged since Harwood's retirement in 2001. While the organic field and cover crop program has continued, LFL research has stopped and the plots have been placed in a temporary holding pattern. LTER extension efforts have suffered correspondingly. This situation should reverse, however, with the hiring of the Cropping Systems Ecology position in 2005. This CSS/KBS faculty position, to be based at KBS and associated with the LTER project, will provide extension leadership for the LTER and for the cropping systems now managed by the KBS Farm. A resident faculty with principal interests in the application of sustainable agricultural practices will have a major impact on the development and implementation of sustainable practices both locally and regionally.

Still unresolved is the role of KBS in the development and promotion of sustainable agricultural practices for the animal industry. At present the KBS Dairy is largely a subsidiary service facility for animal science research on campus; it has no clear identity or role in sustainable agriculture apart from a small rotational grazing program (led by a KBS adjunct faculty, Rich Leep). It is thus entirely underutilized from the standpoint of sustainable agricultural practices, yet its potential is significant: with a herd capacity close to that of median-sized Michigan farms, appropriate resident leadership could provide the same benefits and visibility for sustainable animal production at KBS as we have had (and are again expecting) for sustainable crop production. Extension research and leadership are key aspects to the success of this program as well.

Overall, KBS could play a highly effective and visible role in the development and adoption of sustainable agricultural practices in the coming years. There is an urgent need for the development of management models that lead to the long-term sustainability of food systems including the promotion of ways to maintain a viable rural economy in Michigan. A research and education program that focuses on mid-sized farms (50-500 acres), that involves both crop and animal agriculture, and that is integrated with existing strengths in Ecology and Evolutionary Biology, and the new focal area of Conservation and Restoration Ecology, at KBS could be a huge success for the University.

3. Conservation and Restoration Ecology: The landscapes of southwest Michigan have changed dramatically since the first European settlers arrived and continue to change today. Forests and grasslands first gave way to agriculture, and over the past half-century agricultural land has increasingly been lost to development or abandoned due to the economic uncertainties of farming. Plant community succession on these abandoned lands has produced a patchwork of habitats of different ages, each bearing the signature of human disturbance. Just as the character of the land base has changed, so have the assemblages of organisms that occupies these ecosystems. Native species such as the Passenger pigeon were lost, while countless exotic species have invaded. Some native species, such as the Whitetail deer, were at first suppressed by these changes but later experienced explosive population growth due to the extinction of large predators and to the food subsidies provided by the remaining farms.

The Kellogg Bird Sanctuary was an early leader in conservation efforts. In the 1940's it played a central role in restoring viable populations of the nearly extinct Canada Goose and more recently has played a major role in the reestablishment of Trumpeter Swans in the Great Lakes region. There are new challenges to the biodiversity of our region that deserve similar effort. The patchwork of secondary forest and abandoned agricultural lands is seriously degraded due to years of human activities and to the adverse effects of harmful invasive species and exploitation by deer. These habitats once supported far greater biodiversity than they do now. To restore such degraded habitats will require new research efforts to first estimate the impacts of harmful species and then use this information to design effective and practical management guidelines.

As agricultural lands increasingly give way to residential development in southern Michigan, the landscape is transforming into a patchwork of innumerable private land interspersed among agricultural and state lands - a phenomenon referred to as exurbanization or suburban sprawl. This transformation is particularly apparent in the vicinity of KBS. Many of these new landowners are interested in maintaining and enhancing the environmental quality and ecological values on their own and surrounding land. They express concern about wildlife habitat loss, economic consequences of exotic species invasion, and maintaining forest health. Local leaders seek research-based information to guide policy development to address the consequences of sprawl, water quality concerns, and loss of "rural character." Thus an important new constituency has arisen that desires information and guidance on land management, but from a decidedly distinct perspective from the traditional farmer or resource manager.

KBS is well-positioned to initiate a research, education and outreach program in Conservation and Restoration Ecology that will build on these historical legacies and increase the impact of our basic research programs with this new constituency. The land base of KBS offers opportunities to develop programs in a variety of terrestrial and habitats that are representative of much of the current land base of our region. For example, experimental and demonstration projects could be established to determine what processes and management techniques are most effective in restoring native under-story plants in forests and woodlots heavily impacted by deer and invasive species, or

how alternative woodlot management can affect the diversity and abundance of native birds. The KBS land base includes a wide variety of successional fields, some of which have undergone natural succession to woodlots, but landowners often want to know how to restore native prairie savannah species (plants and animals, especially birds) on these sites. Establishing a range of replicated treatments and coordinating these efforts with local resource managers, land-owners, land use planners, and conservation organizations will allow them to gain restoration experience, and potentially provide opportunities for the development of certification programs for conservationists.

The Conservation and Restoration Ecology focus will establish KBS as a place where landowners, can observe research-validated demonstration and learn concepts and techniques for sustainable natural resource stewardship and habitat/species restoration. These new efforts build on the rich history of the Kellogg Bird Sanctuary and Kellogg Experimental Forest, where natural resources conservation and species and habitat restoration research have benefited Michigan residents for decades.

Implementing the Vision

To implement the vision of KBS, we have identified issues and priorities that require action in the short term (next 1-2 yrs; Immediate Needs) and others that demand attention in the short-term (3-5 yrs). We have intentionally avoided defining specific longer-term goals here, leaving this activity to the new Director. We expect that a new Director will be hired by fall 2005 and it is critical that these immediate and short-term needs be addressed before (and independent of) the hiring of a new KBS Director. This will sustain the viability of KBS and set the groundwork for future growth and development led by the new Director.

Goal 1. Clarify the Administrative Structure of KBS and Hire a New Director

[Immediate Need; by Fall 2005]: Essential to the implementation of the vision for KBS is the establishment of an administrative structure with a single Director responsible for all programs and activities at KBS. This will clarify that all units at KBS are responsible to and ultimately report to the Director and also make the reporting structure clear to MSU departments and units.

A single Director at KBS is needed to assure programmatic consistency, particularly in the development of new programs in the areas of Sustainable Agricultural Practices and Conservation and Restoration Ecology. It will also ensure that the facilities and resources of KBS, and particularly the land base, are well managed and appropriately used and allocated to support programs in all three focal areas. There is also a need to have a more centralized budget to facilitate the integration of unit-based programs that is required for the implementation of the KBS vision.

As discussed in a meeting with KBS faculty last fall and articulated in a memo from the KBS faculty to the Deans and Directors (23 September 2003), and further affirmed in

discussions among a larger constituency at the March 2004 retreat, the ideal candidate for KBS Director will possess strong research credentials in ecology or evolutionary biology, be experienced in an academic setting, and have the vision, administrative skills and breadth to build on the existing strengths of KBS and develop new directions.

The programs and ideas we have proposed and articulated in this report as ways to implement the vision of KBS in the first decades of the 21st century should be used to help identify potential candidates for the KBS Directorship and to recruit them to this position. Clearly these are ambitious goals and their success will be dependent upon both the type of person who is hired as KBS Director and the administrative structure and support staff that are provided for this position.

Goal 2. Hire new faculty: The size of the current resident KBL faculty (7 after the retirement of Klug) is not sufficient to maintain traditional strengths in ecology and evolutionary biology and certainly cannot successfully initiate or sustain the new programs we have outlined above. It is critical that to hire faculty to maintain our historical strength and initiate programs in the two focal areas we have identified. Funding of new faculty positions is critical to address both immediate and short term needs of the KBS. We have a commitment from CANR/MAES for one position (**Cropping System Ecologist**) to be filled by Fall 2005. Additional resident faculty positions are needed at KBS if we are to sustain our current expertise and develop these two new programs.

a. Field Microbial Ecologist (Immediate Need; by Fall 2005) - We currently have pending a request to the CNS position management committee for a new faculty position in Field Microbial Ecology to be hired in 2004-05 to replace the expertise that Mike Klug has provided in this area for over 30 yrs. Having a resident microbial ecologist is critical both to the maintenance of our research and graduate education in ecology and evolutionary biology which emphasizes linkages across genes, populations and processes and for fostering research and graduate training collaborations with faculty in MMG, CSS, GEO, ENT and ZOL. The development of MSU as a nationally and internationally recognized center of expertise in microbial ecology (e.g. the CME) was in part fostered by research collaborations between KBS and campus-based labs. Moreover, this position could provide important linkages between the three focal areas we have identified for KBS. ***Investment in a resident faculty position in Microbial Ecology is crucial to maintain the tradition of excellence in ecology and evolutionary biology at KBS.***

b. Conservation and Restoration Ecology (Short-term need, by 2006) - Mr. Kellogg's original vision for KBS included the development of research, education and programs in natural resource management, a theme we plan to develop into a full complement of programs in Conservation and Restoration Ecology. There are faculty members in campus-based departments (e.g., FW, FOR, PLB, ZOL, CAARRS) who would be interested in partnering with us in the development of research, education and outreach programs in this focal area. However, without a resident KBS faculty member with an explicit interest in this area, these initiatives are likely to flounder and fail. KBS has the facilities and land base to develop an outstanding program in this area; we also have the

additional advantage of having in place expertise in Education and Outreach that can support and extend the impact of research programs in these areas (e.g., Solomon and Herbert - KBS Land & Water: Johnson, Charleston, Stage -Bird Sanctuary; Kowaleski - Kellogg Forest). ***Hiring a new faculty member in this area would allow us to develop an important, relevant and emerging area of research and develop complementary and integrated education and outreach program that would effectively utilize the diversity of KBS resources.***

c. Animal Production Ecology (Decision on this position needed by 2006) - Despite numerous attempts over the past 10-20 years, the research and educational programs at the Kellogg Farm have not been successfully integrated with those of the KBL academic faculty nor effectively promoted by the KBS Land and Water unit. This may be due in large part to the absence of a resident faculty member to develop and support these programs. Attempts over the past decade to attract campus-based faculty to develop research programs at KBS have been largely unsuccessful. As a consequence, the Kellogg Farm and Dairy have increasingly functioned as an underutilized service facility for campus-based faculty whose research is not related to the KBS Mission.

Recent and ongoing discussions on the need (and potential) to develop sustainable agricultural programs at MSU have stressed the value of KBS for the development of sustainable agriculture programs that integrate crop (potentially including fruit and vegetable) production with animals on the landscape. Our discussions at the retreat and subsequently have further identified ways that KBS could provide a unique opportunity to develop a research, education and outreach program in Sustainable Practices on Agricultural Landscapes. The assets that KBS brings to the development of this program include not just the land base, facilities and agronomic staff, but the potential to develop real linkages to the well-established research in ecology and evolutionary biology that are the traditional strengths of the KBL faculty.

The identification of Sustainable Practices on Agricultural Landscapes as one of the three focal areas discussed at the retreat for implementing the KBS Vision reflects the enthusiasm among the KBL faculty, staff and campus partners for developing KBS-based programs in this area. However, how best to implement this program in a way that is ecologically relevant, environmentally and economically sustainable, and humane (i.e. considers animal health and welfare) requires further consideration and discussion. A primary concern is what type of program can be developed that will both complement and extend the traditional strengths of KBS in ecology and evolutionary biology. It is arguable that without an animal component, the agricultural research program at KBS will have limited impact- locally, regionally or nationally. However, past experience has shown that without thoughtful consideration, direct involvement of campus-based departments and potentially the hiring of a resident faculty, even the best-intentioned programs fail. ***We therefore see the immediate need for the development of a plan as to how – or even if it is feasible - to develop an Animal Production Ecology program at KBS. Without such a program, there would be little/no justification to maintain the Kellogg Dairy and associated Farm operations.***

Goal 3. Strengthen reciprocal links between campus and KBS

Clearly, the ultimate success of KBS in fulfilling its vision is contingent upon the continuation and augmentation of reciprocal relationships with campus-based departments and units that share our mission. The KBS faculty currently plays an important role in the campus-based EEBB graduate program, and some are becoming involved in the ESPP program. Opportunities exist for us to further these relationships through the development of graduate training programs (e.g., IGERTs) and collaborative research programs with campus-based faculty. There is also an emerging opportunity for KBS to support more undergraduate research and education. We have traditionally met this need by offering intensive summer field courses and research experiences for undergraduates. However, we are expanding the diversity of courses we offer in the summer program and as part of the immediate implementation of our vision, plan to develop more opportunities for residential undergraduate education at KBS.

The KBS summer course offerings have provided students (primarily undergraduates) the opportunity to take intensive field courses that both meet their curriculum requirements and provide relevant electives for various majors. Unpredictable and declining enrollments have necessitated revision and alternative scheduling of these courses that has made it difficult for students to plan a course of study that will include a summer at KBS. In some cases, we can identify the cause of variable enrollments (e.g. the offering of ZOL/PLB 355/355L additional terms, including summer on campus competes directly with our summer offering of this course). In other cases the cause of this variation is not clear. Experience has taught us that promotion of courses by instructors, financial support (scholarships and job opportunities), and the availability of research opportunities are important factors in the recruitment of students to KBS in the summer.

a. Develop more opportunities for undergraduates at KBS - Our goal is to increase the number of summer resident undergraduate students at KBS and we plan to address this in the immediate and short term by:

1. developing a coordinated recruitment and promotion program for the KBS summer courses on campus and in nearby colleges and universities (e.g., WMU, Kalamazoo and Hope Colleges);
2. working with campus departments to identify students who would be attracted to the opportunities at KBS;
3. offering courses that meet multiple needs of students; and
4. providing more opportunities for scholarships and fellowships to attend classes at KBS.

This year (2004) we are introducing a new summer science institute “Enhancing Linkages between Mathematics and Ecology, ELME”. ELME addresses the latter two points above and will offer us opportunities to expand the base of students coming to KBS. ELME (funded by a grant from the Mellon Foundation) offers students the opportunity to enhance their training in mathematics by taking a series of short courses in mathematics and then to apply these skills to research problems in ecology/evolution in a

follow-up field course. By 2006, we plan to expand this program to include recruitment of students majoring in math and statistics to these courses.

We also plan to develop opportunities for summer undergraduate research internships at KBS. The immediate potentials for this (by 2005) include increased REU Fellowships (from individual grants and submittal of a REU site proposal) and expanding the ELME program to include opportunities for summer research fellowships to undergraduate students who have participated in the program. Longer term, we hope to work with campus-based faculty to develop relevant summer internships that will give students in programs such as RISE (Residential Initiative on the Study of the Environment) and STEPPS (Science, Technology, Environment & Public Policy) practical and hands on research and/or outreach training to enhance their education. It is also possible that we could expand our K-12 teaching programs to include internships for students pursuing degrees in secondary science and math education or for current teachers.

Although KBS has the potential to provide undergraduates with a unique educational experience, for a variety of reasons few students are able to take advantage of this opportunity. To address this issue, we plan to initiate a semester at KBS in (ideally by Fall 2005) that will provide students with a unique integration of course work, practicum and research experiences. Our intent will be to develop the equivalent of a study abroad experience at KBS in regard to the off-campus experience, intensive and integrated courses, and the opportunity to interact with the local community. KBS has the classroom, laboratory, and housing facilities to support such a program and through the KBS Land and Water unit, SW Michigan Extension office, LTER, Farming Systems Center, Kellogg Dairy Farm and Sanctuary the potential to involve students in a wide-range of service learning and experiential learning activities. To assure its success, we need to develop a curriculum/ course offerings that both meet basic requirements for students interested in pursuing a major in both departmental (e.g., PLB, FOR, F&W) and interdisciplinary programs (e.g., RISE, STEPPS) and provide students with a unique educational experience. KBS clearly has the infrastructure and field resources to offer MSU undergraduate students a unique, residential learning experience. ***University financial support is needed to develop and promote a residential living-learning experience at KBS that integrates the three focal areas identified here and to allow a diversity of students to participate.***

b. Develop collaborations with campus-faculty for graduate training – Clearly the success of expanded programs at KBS will be dependent upon our developing partnerships with campus-based departments and programs and fostering a relationship that provides reciprocal benefits to KBS and campus programs. Past experience with the KBS RTG program has demonstrated the value of having funds available to support campus-based graduate students to come to KBS for a summer (or longer). This both gave those students the opportunity to take advantage of KBS resources and increased the sense of community between KBS and campus-based graduate students. While we currently have limited funds to provide graduate fellowship support for our own or campus-based students, we will pursue opportunities in the immediate and short-term to increase this capacity. This includes, increased promotion of the Lauff Scholarship and Research

Fellowships to campus-based students, use of ELME funds to support students to come to KBS (current and incoming) to participate in the ELME math courses, and involvement in campus-based IGERT and teacher-training programs that include graduate support.

The value of having ‘campus ambassadors’ who inform students about opportunities at KBS and promote participation in them has been demonstrated repeatedly. Current budget constraints limit our ability to hire a campus-based KBS program coordinator, so we need to determine alternative ways to achieve this goal. The positive energy and spirit of collaboration that was obvious at our recent retreat needs to be nurtured and sustained – an important key to this will be to maintain communications between KBS and campus by identifying individuals in campus-based departments and programs that can and will promote KBS opportunities and programs to students on campus. ***It will also be important to have an individual at KBS whose responsibilities will include development and coordination of educational programs at KBS that enhance those available on the main MSU campus.***

Summary

To ensure that the Kellogg Biological Station retains its national and international stature as a high quality research and educational institution, enhances its potential to impact and inform local communities and develops greater integration of activities in research, educational and outreach programs, the following immediate and short term goals need to be addressed:

Immediate Goals (next 1-2 yrs, by 2005)

- (1) **Clarify the administrative structure of KBS and hire a Director** with administrative and research credentials, scientific breadth, creativity and vision who will work to implement and extend the vision of KBS in the three focal areas identified here.
- (2) **Hire new faculty in Cropping Systems Ecology.** This position has been promised as a joint KBS/CSS position as part of the LTER renewal submitted in February 2004. This position is critical to the future success of the KBS LTER and also to the development of more integrated, ecologically-based agriculture practices on the larger KBS landscape.
- (3) **Hire new faculty in Field Microbial Ecology.** A request for this position is currently being considered by the CNS position management committee.
- (4) **Establish a semester at KBS** designed to provide MSU (and other) undergraduates with an integrated living and learning experience in the focal areas identified here.
- (5) **Develop more intentional integration of outreach activities and programs** with the current research in ecology and evolutionary biology and ecological agriculture at KBS.

Short -Term Goals (next 3-5 yrs, 2008)

- (1) **Develop research and educational programs in Sustainable Agricultural Practices and Restoration/Conservation Ecology.**
- (2) **Promote integration and collaborations** in research, education and outreach with campus-based faculty in these areas, including development of cross-cutting and integrative Outreach programs.
- (3) **Promote greater interactions with Social Sciences** particularly through more involvement of research and graduate student training in Environmental Sciences and Policy, and Recreation to develop appropriate programs at KBS.
- (4) **Encourage greater use of KBS by MSU Student Life and affiliated groups** to promote the idea that KBS should be a part of the MSU experience for all students and increase the involvement of diverse students groups at KBS.

KBS has a unique potential at MSU to ‘do it all’ in terms of fulfilling the land grant mission of the University. We can – and should be - a showcase for the value of integrating research, graduate and undergraduate education, and outreach to schools, community groups and managers. Our geographical location, unique mixture of landscapes and communities, facilities and resident faculty and staff can provide an access point to the land grant philosophy that personifies MSU for the people of SW Michigan.