Strategic Plan - Research and the Faculty

Mission and the Stockbridge Tradition

The Stockbridge School of Agriculture is an academic unit within the UMass College of Natural Sciences committed to the legacy Land Grant University tripartite mission of research, education and outreach, all with the common purpose of service to society. The Stockbridge School of Agriculture was re-organized in 2012, moving from a school focused exclusively on teaching an applied, two-year associate's curriculum to a present form involved in all levels of instruction including Associate, Bachelor, MS or Ph.D. degrees, in biological, ecological, physical and social science research ranging from the most fundamental to the most practical, and significant outreach to agricultural and horticultural businesses as well as the general public.

The Massachusetts Agricultural College and its “offspring” the Stockbridge School of Agriculture were established with the specific intent “to make agriculture its leading subject” and further to “include, also, manual training in its curriculum.” Levi Stockbridge, one of the founders of UMass Amherst, was an ardent supporter of the societal benefits of applied scientific research. He generated income from fertilizer formulas he developed, and as President of MAC, gave significant amounts earned by these “Stockbridge Formulas” to the College, as well as leading it through financial and political threats to its existence. Levi Stockbridge, was described as “no doubt the peer, if not the superior, in native wit and capacity” of the other members of the early Mass Aggie faculty, establishing a legacy in the value of practical education built upon a solid foundation of science.

The legacy of science and professional practice lives on in the laboratories, fields, and particularly the students of the recently expanded Stockbridge School of Agriculture. Students in the four B.S. degrees, the 6 A.S. degrees, as well as those working toward graduate degrees under the supervision of Stockbridge faculty remain proud of the legacy of science and practice established by the founding faculty of the University of Massachusetts Amherst.

Our current mission statement says the Stockbridge School of Agriculture will:

- Remain central to the mission of the University of Massachusetts Amherst, focusing on education, research and outreach to promote sustainable landscape and agricultural systems.
- Provide research-based information to green-industry professionals, equine professionals, farmers, the public, policy-makers, and others in agriculture to develop and promote innovative solutions to existing and emerging problems related to managed ecosystems.
- Engage students to become future leaders, decision makers, and critical thinkers and to create career opportunities in a rapidly changing world.

An Integrated Vision – Looking Forward

While it is useful to look backward at the legacy and traditions of the Stockbridge School of Agriculture, an integrated vision for the future is needed to guide decisions and frame strategic planning. Our current vision statement reads The Stockbridge School of Agriculture shall build upon a historical tradition and public commitment to support sustainable local, national, and global agriculture through research and education in economic vitality, environmental integrity, and social justice of sustainable landscape and agricultural systems.”

There is a tendency among scientists to focus on their own area of expertise. Nevertheless, if the Stockbridge School is to sustain its commitment to public service through research, teaching and outreach for another 100 years, each individual field of study must be understood as part of an integrated whole.
Stockbridge scientists are best known for doing research on applied problems in the sustainability of agricultural and managed landscapes, on soils and their interactions with plants, and on plant stress and plant health. Thompson Reuters recently listed one member of the Stockbridge faculty working in environmental and soil chemistry as one of the eight University of Massachusetts Amherst faculty members in “Highly Cited Researchers 2014”. Much Stockbridge research is at the organism, organ, cellular, and/or sub-cellular and genetic levels. Most current Stockbridge faculty have been trained to take an organism apart to understand it from the perspective of their own discipline of plant physiology, genetics, anatomy etc. This is obviously important work.

Yet in the future, it will be increasingly important for agricultural researchers to understand the interactions of these various levels of biology in the context of whole ecosystems. Agriculture inherently involves social science, as well as populations and communities of organisms, including humans, interacting in complex ecosystems. Interactions between components across different scales in a system over time create emergent properties or behaviors that may not be predictable. Systems ecology is a scientific discipline that offers a framework for understanding relationships within complex agricultural systems from the sub-cellular to the ecosystems level, and the emergent properties that often come from them. In the future, to maintain excellence in applied research serving public good, Stockbridge will need scientists who work at with larger systems as well as those working at smaller scales.

A recent U.S. News evaluation of Best Global Universities for Agricultural Science ranked UMass Amherst eighth globally. Wageningen University in The Netherlands headed the list, and it is worth noting that Wageningen has developed a Farming Systems Ecology Group, including ten faculty members focused on ecology, agricultural systems, alternative and organic farming as well as soil, animal and plant sciences. Similarly, the University of California Davis, ranked second in the U.S. News list, has established an Agricultural Sustainability Institute, with faculty working in soil chemistry and microbiology, sustainable plant disease management, animal systems management, resource and agricultural economics, pollinator ecology and entomology and human ecology. Clearly these leading agricultural universities understand the importance of systems ecology in agriculture.

Many recent studies suggest that human society faces a dilemma, on one hand needing to feed an additional 2 to 3 billion over the next 35 years, while on the other hand facing unprecedented negative impacts on the environment from food production. In a highly cited Nature article, Foley and colleagues (2011) point out that agriculture already uses most of the land suitable for it, and further expansion to areas such as tropical forests only exacerbates environmental problems such as greenhouse gases. Clearing land, growing rice, raising cattle and overusing fertilizers make agriculture the single largest contributor of greenhouse gases to the atmosphere (35%).

Farming uses nearly three-quarters of all the water that humans use for any purpose, while fertilizer and pesticide increasingly pollute water supplies. As agriculture eats up land and other resources, valuable ecosystem services provided by the natural landscape are lost. In short, to provide humanity with a future, agriculture must become more productive and much more sustainable in the next 20 years.

Based on several sources, including academic, government and industry sources, the Stockbridge faculty identified four critical issues central to

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Levels of agricultural research from the sub-cellular to ecosystems, ultimately impacting society.

The Stockbridge School of Agriculture investigates and teaches within and among all levels of complexity from the sub-cellular to the ecosystem level. It is important to note that unlike some academic units in the College of Natural Sciences this work includes the study of social systems, as people, families and communities are considered integral components of agricultural ecosystems. Research and education at each level of complexity is important for understanding the mechanism and management of agroecosystems and managed landscapes such as fields, farms, golf courses, plant nurseries, greenhouses, and individual plants and animals.
agriculture that we should address to insure long-term ecosystem health and the sustainability of societies: global food security; mitigation of and adaptation to climate change; conservation and improvement of natural resources and ecosystem services; and development of renewable energy resources. Major government funding sources for Stockbridge, including USDA and EPA, have established significant research programs listing these issues as high priorities. For example, the National Institute for Food and Agriculture lists the following priorities:

- Plant health and production and plant products;
- Animal health and production and animal products;
- Food safety, nutrition, and health;
- Bioenergy, natural resources, and environment;
- Agriculture systems and technology; and
- Agriculture economics and rural communities.

Industry initiatives, such as Syngenta’s “Good Growth Plan”, list a similar set of priorities.

Stockbridge is well positioned to tackle research in these areas, given investment in appropriate faculty and physical resources in coming years. In the diagram below, we show three areas that interact to contribute to healthy ecosystems and society: soil health, plant health and social health. Faculty presently do successful research in the first two areas. Investment in new faculty to move this research towards more whole systems research, better integrate social and economic aspects of agroecosystems and food systems with present research and bolster our ability to interact better with other departments in the college will be critical to building excellence.

We will follow Levi Stockbridge’s legacy and pursue a vision of practical scientific research serving society through sustainable, productive agriculture.


Figure 2. Diagram showing three areas of agricultural research critical to healthy, sustainable ecosystems, soil health, plant health and social health, as well as areas of intersection. Types of research and goals are listed under each area.
Stockbridge School Goals

To realize our vision, we will need to restructure our faculty, make changes in our physical infrastructure, establish new collaborative relationships both within and outside UMass, and improve existing collaborations. Stockbridge has developed a set of goals for research and graduate education related to our Vision and Mission Statements. They are reviewed here.

Goal: The Stockbridge School of Agriculture will increase its capacity in the urban setting, including its relationship to food, the landscape, and the environment.
- Address the food system and food security.
- Incorporate an understanding of environmental quality in work with urban agriculture and horticulture.

Goal: The Stockbridge School of Agriculture will increase its research, teaching, and outreach capacity in public policy related to agriculture and environmental quality.
- Develop a better understanding of how public policy interacts with agricultural systems.
- Pursue funding of research which incorporates aspects of public policy or focuses primarily on public policy.
- Develop the educational capacity in public policy.

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Goal: The Stockbridge School of Agriculture will increase its international perspective.
- Further develop the existing International Certificate Program in Agriculture.
- Establish institutional relationships in other countries.
- Create more opportunities for study abroad, including international internships.

Goal: The Stockbridge School of Agriculture will strengthen its research capacity.
- Acquire new and significant external funds.
- Develop multi-disciplinary projects which are based on significant faculty collaboration.
- Engage faculty members from other departments to enhance our ability to address specific research needs and also to increase their access to our unique capabilities.
- Enhance research capacity from the most applied through the most fundamental and in the areas of physiology, molecular biology/genetics/breeding, chemistry, and ecology of agronomic and horticultural plants, agricultural production systems, plant and animal interactions, sustainability, pest management, and the soil environment.
- Develop new capacity for applied research in equine management.
- Perform translational research to strengthen food security, enhance food safety, and improve environmental quality.

Goal: The Stockbridge School of Agriculture will acquire new space in order to consolidate faculty in staff in close proximity to facilitate interaction.
- Continue to support the Stockbridge School of Agriculture’s placement in the renovated Paige Laboratory.
- Review current space usage in Bowditch Hall and the Agricultural Engineering Building to determine if they can accommodate more or different members of the faculty.
- Work with CNS administration to maintain the front of the Stockbridge Hall basement for the Stockbridge School of Agriculture.
Goal: The Stockbridge School of Agriculture will encompass University-based, agriculturally oriented work, including research, teaching, and outreach.

- Secure the Stockbridge School of Agriculture’s position as the dominant agricultural entity at the University of Massachusetts.
- Incorporate UMass Extension’s Agriculture and Landscape Program into the Stockbridge School of Agriculture to enhance integration of research, teaching, and outreach.
- Lead all UMass agricultural teaching and research.
- Expand the Stockbridge School of Agriculture’s capacity related to animal agriculture and particularly the interaction between plant and animal production systems.

Three Areas of Future Strength

We will reach our goals by using our existing strengths and building around three research areas (Figure 2):

- Urban Health
- Environmental Horticulture and Managed Landscapes
- Integrated Food and Farming Systems

Urban Health

Rationale – economic impact, benefits, environmental importance.

The world is becoming more urbanized at a rapid pace: In 1800, 2% of the world’s population lived in cities; in 1950, 30% of the world population lived in urban areas and it is expected to reach 66% by 2060. The northeastern US is considered one of the most urbanized parts of the world with 82% of the population living in urban settings (John Hopkins Public School of Health World, 2009, Urbanization prospects, 2014, United Nations). Massachusetts is part of the Northeast Megalopolis, which runs from metro Boston to metro Washington DC, which is the most urbanized region in the United States. It has 17% of the US population in only 2% of the US land area. Massachusetts is the third most urbanized state in the US. This trend in increased urbanization means higher percentages of fresh produce from peri-urban and rural farms in the northeastern US are sold in urban settings, highlighting the importance of rural-urban connection.

As our population in the northeastern US grows and urbanizes, the amount of fresh produce imported to the US is also increasing rapidly. The US imported five billion dollars of fresh produce in 1990 and this grew to 17 billion in 2011, and this trend is expected to continue. Fresh produce from Mexico now represents 32% of the total fresh produce imported to the US; tomatoes imported from Mexico are now 52% of all tomatoes consumed in the US (The U.S. Trade Situation for Fruit and Vegetable Products, Congressional Research Service, 2011). In addition, minority/immigrant population is growing in the urban Northeast. The minority population in the US is projected to rise to 56% of the total US population in 2060, compared to 38% in 2014 (US Census). These growing immigrant groups are largely from tropical regions of the world, and desire perennial tropical crops that cannot be grown in the US (e.g. cassava, mangoes, Malanga), and these are also imported. This long-distance transport from Latin America is one reason agriculture in all of its processes is now responsible for as much as 30% of the greenhouse gases emitted into the atmosphere.

In 2012, faculty and staff in the Stockbridge School of Agriculture and the Dept. of Nutrition and UMass Extension Nutrition Education Program initiated a program entitled the UMass Urban Agriculture and Nutrition Program (https://www.facebook.com/umassurbanag). The focus of this program is to increase the fruit and vegetable consumption of urban residents and connect the local and regional farmers to these urban markets. USDA just awarded $3.4 million to a Massachusetts project, of which the UMass component led by Stockbridge (Mangan) will receive $800,000.

In 2015, we are incorporating an urban soils remediation component, “healthy soils”. In reviewing other university-based “urban agriculture” programs, there are few that integrate agriculture, nutrition and the environment.

Key Issues

- Health issues in urban areas are increasing, including higher rates of obesity, hypertension and diabetes.
• Conaminated soils are more common in urban settings compared to peri-urban and rural settings.
• Agriculture is responsible for 30% of the greenhouse gases that are emitted into the atmosphere. A large percentage is due to transportation.
• More of the fresh fruits and vegetables are being imported from outside the region and country, and even a larger percentage of meats.
• Many different disciplines are working in “silos” on urban health.
• There is growing concern in food safety due to multiple sources of contamination.

Specific Goals

Five years
• Greater integration and synergism of Urban Health Program based in the Stockbridge School of Agriculture.
• Establishment of Center of Excellence for Urban Health based in SSA
• Hire two faculty positions
  o Soil ecologist/agroecologist working in the area of soil-crop-microbe to reduce contaminant uptake and ensure food safety & security for urban people
  o Food policy

Ten years
• The place in northeast to attract graduate students to do research in Urban Health
• Hire two faculty positions
  o Waste management
  o Food distribution and modeling analysis

Twenty years
• The best center for training graduate students, and conducting research and outreach in Urban Health

Key Collaborations

Existing collaborations as of 2015
• UMass Dept. of Nutrition
• UMass Amherst Extension Nutrition program

Future collaborations
• College of Natural Sciences
  o Veterinary and Animal Sciences
  o Biochemistry and Molecular Biology
  o Environmental Conservation
  o Food Science
• College of Nursing
• College of Social and Behavioral Sciences
  o Resource Economics
  o Landscape Architecture and Regional Planning

Funding Opportunities

The Stockbridge Urban Health initiative goals match well with those of NIFA, USDA and EPA, in areas of urban agriculture, soil health and remediation, and improving food security in urban areas and nationally. Congressman James McGovern, a member of the House Agriculture Committee, has a strong commitment to nutrition, and urban improvement. The Massachusetts Dept. of Agriculture has created an Urban Agriculture program, which distributed $400,000 to projects in FY 14.
Environmental Horticulture and Managed Landscapes

Rationale – economic impact, benefits, environmental importance.

Increased pressure of population in urban areas will result in a greater need for accessible greenspaces and recreational areas. The overall mission of this initiative is to promote environmental stewardship while improving human health, quality of life and economic well-being. As such, research efforts are aimed at the science underlying sustainable production and maintenance of turfgrass, nursery, greenhouse, and floriculture crops (collectively referred to as “the green industries”) to provide a venue for a wider range of outdoor activities, promoting biological diversity in cultivated landscapes, and environmental conservation. Overall, this will promote managed landscapes that contribute to ecosystem services, the processes by which the environment produces resources utilized by humans such as clean air, water, food and materials.

Recent economic impact surveys of the green industries provide the following information:

- Total sales for nursery, greenhouse, floriculture, and sod in MA was > $140 million, which accounted for the highest ranking agricultural-related product by sales.
- MA has the largest acreage maintained as turf in New England and ranks 13th in the US with over 1.1 million acres.
- Total economic impact to MA from revenues from the turf industry alone was $8 billion, with direct golf economic impact (376 golf courses) at approximately $2.7 billion per year.
- Based on a 2012 economic impact study of the golf industry in MA, the total amount of charitable giving attributed to the game of golf was roughly $74.3 million.

The initiative will contribute to many ecosystem services and human health benefits:

- Ground water recharge
- Biofilters
- Mitigation of runoff and soil erosion
- Carbon sequestration
- Heat and noise abatement
- Habitats for biodiversity
- Pollinator conservation
- Recreation and exercise
- Therapeutic landscapes/horticulture therapy
- Employment opportunities
- Increase property values

Key Issues

We will need to strengthen the communication of impacts related to ecosystem services that contribute to both environmental and economic sustainability. The following are issues that will need to be addressed at the research and outreach levels:

- Sustaining function and benefits of managed landscapes with less resources (water, nutrients, pesticides)
- Protection of soil and environmental health
- Finding effective alternative pest management strategies that are science based and economically feasible
- Sustainable use of alternative renewable resources

Specific Goals

Significant resources have been invested in recent years in a new greenhouse facility and laboratory/office space for faculty in SSA. Continued resources will need to be provided to maintain and improve the off-campus research farms as well as support staff. The following are anticipated hires to strengthen our research mission:

- Ornamental Plant Breeder (utilize conventional and molecular based tools to develop functional plants under reduced resources and environmental stresses)
- Weed Scientist (address issues associated with climate change, invasives, pesticide resistance, biotech concerns)
- Water and Nutrient Specialist for Urban Landscapes (sustainable and emerging technologies, water and general resource conservation)
Key Collaborations
Existing collaborations:
• Extension programs in Turf; Floriculture and Greenhouse; Landscape, Nursery, and Urban Forestry
Strength future collaborations:
• UMass Departments of Environmental Conservation, Resource Economics, Civil and Environmental Engineering, and Landscape Architecture and Regional Planning
• Water Resources Research Center
• Northeast Climate Science Center

Funding Opportunities
Federal:
• USDA Specialty Crops Research Initiative
• USDA Agriculture and Food Research Initiative
• Horticultural Research Institute

State:
• Massachusetts Water Resources Research Center
• Northeast Sustainable Agriculture Research and Education

Private:
• United States Golf Association
• New England Regional Turf Foundation
• Golf Course Superintendents Association of America

Integrated Food and Farming Systems
Rationale – economic impact, benefits, environmental importance.
According to the Council for Agricultural Science and Technology (CAST) Issue Paper No. 45: Agricultural Productivity Strategies for the Future: Addressing U.S. and Global Challenges, the following megatrends will continue to affect American agriculture into the distant future.
• Declining reserves of easily accessible fossil fuel
• Soil erosion undermining productivity
• Public resistance to bioengineered crops and livestock
• Public concern about animal welfare issues
• Declining fertilizer resources
• Radical global climate change
• Increasing food demand

In response to the situation described above, the Stockbridge School of Agriculture proposes to build upon our current strengths in undergraduate education and academic outreach by enhancing our research capacity in integrated food and farming systems. A recent report released by academics from the six New England states (Food Solutions New England) unfolds the bold vision of by the year 2060 producing most of the vegetables and edible legumes and half of the fruit consumed in the region; all of our dairy and most of our beef and lamb using rotational grazing on grass; all of our pastured pork, poultry and eggs using imported grain, pasture and woodlots; some of our grain for specialty products, feed and vegetable oil.

This expansion must be through sustainable production techniques and integrated farming systems, since the conversion of natural ecosystems into production agriculture has significant negative impacts on biodiversity, carbon sequestration and the hydrological cycle. Agriculture currently relies on heavy use of tillage, fertilizers, pesticides and irrigation to increase productivity, but this has resulted in increased environmental footprint. Mixed farming systems integrating crop, livestock and forest production with efficient use of inputs the key to future food security. These integrated systems also provide ecosystem services such as carbon sequestration, recharge of aquifers, mitigation of runoff, and enhanced biological diversity.
Specific reasons for investment in this area of research are:

- Studying agricultural systems from an ecological framework is needed to achieve long term sustainability and this is the approach used by leading agricultural institutions worldwide.
- Research in this area attracts undergrad and graduate students, as it is unique and topical.
- This research approach is a grantable area of work.
- There is an increasing consumer demand for sustainable and local products.
- Small farms are increasing in New England and they need to be integrated.
- This approach provides a research base for permaculture practice.

Key Issues

This initiative which calls for an integration of crop and livestock production, processing, distribution, processing, consumption and waste-return, is driven by the core values of:

- **Right to Food**: Access to adequate healthy, culturally appropriate food at all times is a basic human right for all.
- **Healthy Eating**: New Englanders will move toward healthier eating patterns, including more fresh fruits and vegetables, whole grains and both plant and animal sources of protein.
- **Sustainable Agriculture**: Regional food production, procurement and access will be advanced embracing environmental practices, economically just principles and socially responsible behaviors.
- **Community Stability**: Strong local and regional agriculture will help New England communities thrive by providing a decent livelihood to farmers and farm workers, while creating and maintaining attractive communities for people to live in, work in and visit.

Specific Goals

*Five to ten years*

We must strengthen the core research capacity of SSA in agricultural ecology, small farm husbandry, public policy, and polyculture/intercropping systems. As retirements become available to address the high priority areas of

- Polyculture Perennial Food Systems (multiple cropping, biocontrol, nutrient cycling)
- Agricultural Ecology (integrated crops, livestock, forestry systems)
- Small Farm Animal Husbandry (management and care, economic integration)
- Public Policy (development of analysis and advocacy for social and food justice)

Success will also require investment in priority infrastructure development at the SSA Research and Outreach Farms in South Deerfield (Agronomy, Vegetable and Turf), Belchertown (Fruit) and Amherst (Teaching and Outreach).

Key Collaborations

- Integration of the animal components of research through cooperative agreements with faculty in Veterinary & Animal Sciences, as well as investment in SSA research capacity.
- Increased focus on the social and economic components of research including food policy, social justice, and food system modeling and market development.
- Enhancement of collaborations with faculty in the departments of Nutrition and Food Science to support new product development for value added and locally processed food items.
- Increased collaboration among agricultural components of UMass Extension and SSA.
Faculty

To reach the goals we’ve set, as stated we will need to significantly restructure the Stockbridge faculty over the coming several years. Nearly half of the Stockbridge faculty members (12 to 14) will probably retire over the next 3 to 10 years. Strategic replacement will enable Stockbridge to reshape the faculty around our vision.

Presently the Stockbridge School currently has 29 faculty members in either Tenure-track, Extension or Lecturer positions. We analyzed the distribution of faculty ranks in eight peer departments in the College of Natural Resources: Veterinary & Animal Sci., Nutrition, Microbiology, GeoSciences, Food Science, Environmental Conservation, Biology and Biochemistry & Molecular Biology. For the three types of appointment, Stockbridge and the means of the other departments had similar proportions: 75% - 80% Tenure-track, 7% - 10% Extension, and 14% - 15% Lecturers.

We combined all Tenure-track and Extension appointments and analyzed the percent of faculty in each rank, Professor, Assoc. Prof. and Asst. Prof. Stockbridge has a higher proportion of Professors, and a lower proportion of Assistant Professors than the mean of the comparison group of CNS departments, as would be expected with an aging faculty.

While tenure-track positions will remain critical attracting and retaining high-quality faculty members, we anticipate also hiring more Extension faculty. The role of Extension professors is central to the Stockbridge outreach mission, as well as research and teaching.

Extension Professionals

Close collaboration between Stockbridge faculty and Extension professionals has long been a hallmark of successful agricultural and horticultural outreach in Massachusetts. The administrative supervision of Extension professional staff in the Center for Food, Agriculture and the Environment has, in some cases, weakened that collaboration. The culture and goals of faculty and Extension professionals have in some cases diverged.

We propose exploring the inclusion of agricultural Extension professionals within the administration of the Stockbridge School. This would, we feel, re-invigorate the long-standing linkages between agricultural research and teaching both on- and off-campus.
Space and Infrastructure

Increasingly sophisticated biological research requires constant attention to improving laboratories in Stockbridge. We made a major improvement with the move to a renovated Paige Labs. However, we envision the need for more laboratory space as we hire in the future.

It would be ideal to build adjacent to Paige Lab. This would also allow the further consolidation of Stockbridge in the northwestern part of campus. The improved collaboration experienced by those who moved to Paige makes it apparent that the School should put consolidation of offices and labs in a single part of campus near the top of our priorities.

In addition to exploring the option of new construction, we will also look at renovating space in the Agricultural Engineering Building and Bowditch Hall. It may also be possible to trade departmental space across campus in Fernald Hall for space near Paige, Bowditch, Stockbridge and Ag. Eng.

Graduate Education

Doctoral Programs and MS Programs

Background

The Stockbridge School of Agriculture is, technically, new to graduate education. The present Stockbridge faculty primarily come from the now dissolved Department of Plant, Soil and Insect Sciences. The graduate program in Plant & Soil Sciences was phased out when Stockbridge was reorganized.

Presently, Stockbridge has students finishing degrees in Plant & Soil Sciences, as well as participating in the interdepartmental graduate program in Plant Biology. Some students with Stockbridge advisors are matriculating in Environmental Conservation. There are currently 35 graduate students being advised by 14 Stockbridge faculty members.

These students are working in the following areas:

- Environmental and soil chemistry
- Phytoremediation of soils
- Environmental stress on plants
- Sustainable agriculture
- Sustainable recreational landscape management
- Horticultural and agronomic outreach
- Plant pathology

Regionally, Stockbridge competes for students with the other New England Land Grant universities, and with Delaware, Rutgers, Penn State and Cornell. The latter programs are particularly strong and competitive.

Stockbridge does well in attracting international graduate students, and 18 of the 35 graduate students now enrolled come from outside the U.S.

The Future

Stockbridge will build graduate student enrollment in the future as it redefines itself in terms of the research issues outlined above. Competing with other institutions with larger departments in the traditional agricultural sciences will not be successful, but building around agricultural ecology and farming and food systems will open new opportunities that interest students.

We will strengthen our participation in Plant Biology by developing applied and whole systems components in the programs. Presently, PB focuses on molecular biology in its core training. To attract a broader range of students, the program will need balance molecular biology with applied agricultural ecology.

Stockbridge should also look to build better collaboration with the Organismal & Evolutionary Biology graduate program. Much of the basic science that underlies OEB can be applied to problems in agricultural ecology.

Most exciting for Stockbridge is the prospect of developing a graduate program in the proposed School for Earth, Sustainability & the Environment (SESE) that will address ecological sustainability research in agriculture. This will open the door to more collaboration with GeoScience and Environmental Conservation on issues that bridge the environment and agriculture. Other departments that we see as important partners in
work on environmental services of managed landscapes include Landscape Architecture and Regional Planning and Civil & Environmental Engineering.

At the same time, we will strengthen existing collaborations with Molecular and Cellular Biology, as our research in Stockbridge will continue to cover the range from sub-cellular to systems. Because an important part of food systems involves social and political elements, Stockbridge will also seek collaborations School for Public Policy, Sociology and Anthropology. Obviously, we would expand collaborative efforts with Food Science and Nutrition. We will also explore the best way to gain capacity in sustainable economics, either with Resource Economics or within Stockbridge.

Stockbridge will also investigate establishing an MS in International Agriculture. We presently have a number of faculty working in Central and South America, India, Bangladesh, China and other countries, and as mentioned over half our graduate students are from outside the US.

As part of our effort to build our international presence, we will explore programs for joint supervision of grad students with universities in other countries with whom faculty already have a relationship, including Jawaharal Nehru University (India), Hokkaido University (Japan), Fujian Agriculture and Forestry University (China), the Federal University of Viçosa (Brazil) and Wageningen University (Netherlands). We will look to establish more international research agreements such as the Memorandum of Understanding between UMass and EMBRAPA (Brazil’s Department of Agriculture).

Stockbridge will also explore income-generating MS degrees, including a 5th year degree in sustainable food and farming, perhaps with the existing Sustainability MS. In conjunction with a strengthened undergraduate major in plant science, we will develop a 5th year MS in sustainable agricultural biotechnology.

Stockbridge will become a destination of choice for those students, both international and domestic, who want to work on and learn about major issues facing sustainability today, including urban agriculture and soil health, environmental horticulture and managed landscapes, and integrated food and farming systems.