

Facilitating International Doctoral Education: Agroecology & Capacity Building

Lennart Salomonsson¹, Margarita Cuadra¹, Charles Francis² and Geir Lieblein²

¹ *Swedish University of Agricultural Sciences (SLU)*

² *Norwegian University of Life Sciences (NMBU)*

Abstract: Phenomenon-based and action-centred learning is the foundation for a planned international doctoral program in agroecology and capacity building. Designed for mid-career and young professionals interested in agricultural and food systems development, this program will integrate and make available the technical and educational expertise in agroecology that is current dispersed among a number of universities in Europe, Africa, and the Americas. Placebound professionals will be able to access courses, select academic advisors, and choose dissertation supervisors from among those in the network, while enrolling and completing a doctoral degree in one of the participating universities and graduate programs. Distance learning methods, social learning through blended courses and group projects, and regional technical and educational workshops will provide graduates with a network of agroecology professionals who embrace a whole-systems perspective and transdisciplinary approach to learning for responsible action. Recognizing that many of these graduates will quickly resume or soon be appointed to important administrative roles in universities, ministries of agriculture, or the non-profit sector, we include courses and practical experiences in capacity building to embrace progressive ideas in budgeting, personnel selection and improvement, and program visioning and management. We envision a new generation of agroecology-oriented leaders in research, education and outreach that is comfortable in dealing with complexity and change, coping with food production in a time of climate change, and encouraging such multiple goals as food security and sovereignty, efficient use of scarce resources, promoting a livable environment and enhancing ecosystem services. To be successful this program will require the appropriate multinational and local monetary support that is consistent with the size of the task. Creation of an equitable and accessible food system is essential for the reduction of world hunger and well-being of all.

Keywords: distance education, advanced agroecology degree, agroecology experiential learning, capacity building, farming systems, food systems

Introduction

Achieving a research-based doctoral degree in sciences has been a necessary requisite for securing a responsible position in teaching and research in agriculture in most countries. Most often these degrees have been in the classical academic disciplines such as genetics, agronomy, plant protection, engineering, or agricultural economics. Until recently, most of the research and degree work has been accomplished in credible first-world universities, and graduates have carried this prestige forward to launch careers in education, investigation, and administration. With the growing complexity of global farming and food issues, we recognize the challenges of addressing practical questions from the perspective of single disciplines, and there is emerging interest in such transdisciplinary fields of study such as agroecology. We find it useful to define agroecology as *the ecology of food systems* that embraces production, economics, environmental issues, and social dimensions of the entire food system (Francis et al., 2003), and recognize that

there are multiple definitions of agroecology as a science, a set of practices, and a movement (Wezel et al., 2009).

We also find after many years of teaching experience that returning to farming and food systems 'as they are' in the field and the community brings a relevance to learning that is not easily achieved in the classroom. Too often the focus is on theory first, using the perspective of a single discipline, then applying methods dependent on specific tools used in each field, and delivering information in a one-way lecture in the classroom. Such strategies ignore over a century of research in education, often called 'experience-based learning', articulated well by John Dewey (1897, 1977) and others. A review of the history of experiential learning was published by Moncure and Francis (2011). We have revived this strategy in an agroecology summer travel course in the U.S. (Wiedenhoeft et al., 2003) and in a two-year Agroecology MSc programme in Norway (Lieblein et al., 2012). We have found that starting with the phenomenon in the field builds excitement and relevance for learning (Østergaard, 2010), and demonstrates a complexity of challenges met by students that leads them quickly to recognize a need for transdisciplinary and systems approaches as suggested by Bawden (1991).

Experience in both the North and the South as students, teachers, and researchers has convinced us there are shortcomings of many current discipline-based educational programmes, particularly the lack of a systems orientation to deal with complex challenges found in agriculture. We observe an inability of students to adequately grasp the holistic nature of problems, and how important it is to consider whole systems and the impacts of changes in each component on how a whole functions. This is apparent when the focus is on a farm production system, its inputs and outputs, but even more so when economic, environmental, and social factors are considered integral rather than external to the search for alternatives. Because we ourselves have come from an educational experience that considered systems as mechanistic in nature, with our studies subdivided into carefully described and bounded disciplines of science, it should be easy to understand where students are coming from. But now our appreciation on interconnectedness and complexity causes us to search for other learning strategies. The phenomenological approach that starts with the farm and farmer appears to have promise to lead us out of traditional educational boxes (Østergaard et al., 2010).

Many of our doctoral graduates quickly find themselves placed in positions of responsibility that require much more than competence in molecular genetics, insect physiology, or economic modeling. This is especially true in the South where educated specialists rapidly become department heads, directors of instruction, deans of colleges, or directors of research stations. In these positions they are confronted with the challenges of program visioning and planning, allocating scarce resources toward priority problems, and setting up collaborative programs with other institutions and attracting support from national and international sources that require capacities far beyond what has been learned in graduate school. The holistic approach offered in agroecology and the organizational skills provided through capacity building are provided in this proposed doctoral programme.

In this paper we outline a road map to the future learning landscape in agroecology, one initiated in a participatory workshop in Malmö, Sweden in early 2013 (Salomonsson et al., 2013). In this collaborative activity we explored network goals and potential organizational models, how to select students and build supervisor capacities, what courses and curricula would be most beneficial to students, how contemporary communication technologies would support multiple methods for learning, what resource networks are available and what additional dimensions are needed, how a program could link with other networks and organizations, where funding could be found for resident programs as well as student and instructor mobility, what the opportunities would be for future graduates of the program, and how this educational initiative could be sustained for the future. This is a progress report on development of this exciting initiative.

Methods

Interactive exchanges in small groups and plenary discussions in a larger session were used to decide on the most important issues to be addressed in the future doctoral programme. Dozens of suggestions were generated by small groups brainstorming the topic, and during a break these were organized by the facilitators into logical topics that could be further explored. The general topics chosen were:

- **Network goals and organization:** although the general objective of the network was provided by the organizers as described above, the group felt that it was essential to outline and expand on specific learning goals that should be achieved and the teaching methods to be employed.
- **Selecting students and building supervisor capacity:** it was clear from discussions that much of the success of the program and its graduates would be determined by how quality students were chosen, and that attention should be given to student selection criteria; as important as finding the right student is the orientation of instructors who will guide their discovery learning process.
- **Designing courses and curricula:** in order to attract quality students, this programme in agroecology has to be designed with courses and overall holistic curricula that are not available elsewhere and are accessible to students in multiple locations.
- **Multiple methods for course implementation:** following the ecological principle that one size does not fit all, it appears essential that multiple methods of learning be provided, since students learn in different ways; experiential learning has been the chosen method in agroecology MSc programmes so far.
- **Developing a resource network:** joining universities in an interactive network will allow the overall group to accomplish more than any single university could do, and sharing information resources will be key to this process.
- **Linkages with other networks and organizations:** just as everything is connected in natural systems, we see the agroecology doctoral programme network working closely with other organizations and educational networks.
- **Establishing funding sources:** nothing runs without resources, and especially in the start-up phase it will be essential to locate international and national resources to get the network started and to sustain the educational opportunities once the system is organized.
- **Mobility for students and faculty:** increasingly important in today's interconnected world is the opportunity for mobility, both physical and electronic, for students and instructors.
- **Exploring future employment:** since agroecology is still not well known, the importance of holistic and systemic study of agricultural production and food systems will need to be advertised, and employers convinced that this type of ecological perspective is essential for successful educators and researchers in the future.
- **Sustaining the educational network into the future:** to be sustainable for the long term, a strategy needs to be in place to assure that this new programme can be maintained for the indefinite future, as long as it is serving the needs of tomorrow's professionals.

After these topics were chosen, a small action team was self selected to explore in greater detail the specific steps that would need to be taken in the next year to make the agroecology educational network a reality. These teams have moved at different speeds over the past year since the organizing workshop, and their results to date are reported here.

Results

The progress in organizing the network and moving forward in the action teams has been a slow and deliberate process, due to the challenge of engaging the best possible people who are already fully committed to activities in agroecology education and attempting to tap into their ideas and scarce time. In addition, there are always challenges to initiating new programmes, as most resources are tied into educational institutions and discipline-specific existing programmes.

Network goals and organization:

Our overall goal is to establish a network of university specialists in agroecology who can plan and supervise doctoral studies in the transdisciplinary field of agroecology, and to include in this education a degree of capacity building to prepare talented people for potential administrative roles in their organizations. Initial network goals are to describe learning goals, criteria for recruiting and selection of students, capacities to develop in supervisors, course lists of available and needed distance courses, potential sources of mobility for students and supervisors/instructors, and evaluation criteria for graduates. Student learning goals include developing holistic and integrated perspectives for farming and food systems, enhancing critical thinking skills, providing guidance and practice for effective communication, developing team building and group facilitation skills, enhancing technical knowledge and skills in biophysical and socio-economic sciences, and practicing visioning skills for the future.

Selecting students and building supervisor capacity:

People in the planning group believe that initial selection of students is a key factor in successfully educating graduates who will be oriented and motivated toward responsible action. A number of criteria for selecting students for the graduate agroecology program were listed and described in a recent proceedings paper (Francis et al., 2013). We are convinced that selection should be based on carefully chosen criteria that go beyond the application forms, transcripts of courses and degrees, and standard letters of recommendation. At the very least, a detailed statement of motivation and future plans should be provided, and some form of personal interview with people known to the program instructors would be highly desirable. We have not finalized these criteria, nor dealt with the logistics that would be required to go beyond the current application formalities of our universities.

There is some literature on the selection process, and conventional graduate program admission criteria such as GRE score and cumulative Grade Point Average that are seen as useful in screening candidates but not totally reliable as predictors of success (Ethridge and Hudson, 1996). The competencies expected of graduates are related to their success on jobs when they leave (Walsh et al., 2001) and we think some of these are similar to what entering students should bring to the program. Performance in previous positions including internships could be an important criterion, as on-the-job experience is seen as valuable in creating a well-rounded and competent graduate (Dormody and Torres, 2002). These will be among the ideas we will incorporate into our criteria for selection

We have elaborated a list of criteria in each of the following areas (Francis et al., 2013), and can group them into categories of technical competence, communication skills, action learning capacities, abilities to vision and evaluate future development scenarios and options, and unique personal competencies and skills such as learning from stakeholders and incorporating ethics and values into professional activities.

We recognize clearly that many of these same competencies sought in recruiting students will be similar to those we promote in our instructors and thesis supervisors in the doctoral program network. We will seek people with genuine interest in students, beyond their own personal goals,

and with willingness to dedicate time and energy to supporting student learning and dissertation projects in the field.

Designing courses and curricula:

To the extent possible we will build on the foundation of existing courses and ideas about curricula, but infusing the perspective of systemic thinking and systems evaluation from multiple points of view. The process will be to survey network participants to see what courses are already available, and then decide what additional courses should be developed and made available to students who are pursuing the doctoral degree. We embrace the importance of diversity of courses and approaches to designing a path through the learning landscape that is unique to each student, similar to the uniqueness of place that characterized each niche on the farm and each community. Strength of the program will depend on availability of quality courses that meet the needs of many students, as well as those that are needed for specific students and their academic preparation. We anticipate joint planning and design of some courses with multi-university teams, while others will depend on individual instructors and universities.

Some courses of general interest that have been identified include Systems Thinking and Scenario Development; Local, Regional, and National Impacts of Large-Scale Land Investments; Agroecology and the Rural landscape; Cropping Systems in an Agroecology Perspective; Providing Cases for Developing Course Materials; Internationalization and Institutionalization of Agroecology;

Multiple methods for course implementation:

Recognizing the importance of different learning styles among students, we intend to follow the ecological principle that ‘no size fits all’ and that multiple methods of learning will be respected and provided in course design and delivery. Concepts of experiential learning and phenomenology have been used with success in current agroecology MSc programs (Østergaard et al., 2010), and we anticipate challenges in making courses and delivery methods appropriate across a number of cultures, and using a common language [English] that will enable communication across groups from many cultures and food traditions. While a number of courses will be available on line, we see the needs for blended courses that combine in-person and distance learners, design of projects and social learning that can take place among people located in multiple locations, and development of a learning community across national, cultural, language, and disciplinary boundaries. It will be necessary to physically bring people together in key locations for some learning activities, and we can take advantage of international technical conferences to provide contacts and communication with key leaders in relevant fields of study and development, and adding several days of agroecology workshops to build social learning capacities. This will be efficient by using mobility funds to double advantage for the technical meeting as well as the agroecology network activity. Details of course design and implementation will be unique to each course.

Developing a resource network:

In today’s electronic world it is less difficult to link people with libraries and other information resources than it was in the past, and all possible appropriate means of communication should be employed to make technical resources available to students in the network. We need to identify which types of sharing of resources is most needed, and how a consortium of universities can be more effective than any one institution working alone. Finances to make international data bases in agriculture, environment, and food systems available to all students in the network need to be identified and put to use.

Linkages with other networks and organizations:

The agroecology doctoral program and the network of students and instructors needs to resemble the natural system, in that all people and resources are connected in a seamless web of people and

knowledge that functions quickly and efficiently. There are multiple platforms available today that can facilitate this process, such as Research Gate, moodle, Facebook, EntryScape, and others. Inexpensive or free communication options such as Skype can be used for pairs or small groups to meet and exchange information and ideas. Seminars, classes, and exams can easily be conducted electronically to minimize costs of physical mobility and focus scarce resources to catalyze meaningful professional interactions among instructors, supervisors, and students in the learning community. These networks can minimize the friction of distance and create a functioning network of professional agroecologists on the global level.

Establishing funding sources:

We recognize at the outset that new and innovative programs need funding in the initial stages, and that identifying and mobilizing these resources may be at the expense of some existing programs. Thus there is need for compelling reasons why this new educational network and learning landscape is important to doctoral students and learning for the future. Startup funds will undoubtedly be needed for program planning, recruiting instructors and supervisors, finding and screening students, providing mobility for both students and instructors, and facilitating the necessary activities of the network. The medium-term goal is to get acceptance and financial commitments from each of the cooperative universities, so that this educational activity is internalized into local budgets and some degree of long-term stability can be established for the agroecology doctoral program.

Mobility for students and faculty:

It is not difficult to convince instructors and students of the importance of mobility, since this is a key component of today's professional world in agriculture and food systems. What is needed is a commitment to the principle of mobility as essential to doctoral study, and that funds are needed for students to learn in multiple environments even while focusing on the uniqueness of their own place and the need to solve critical food challenges in that place. Instructors may efficiently move from one educational environment to another in a way that is more efficient than moving a large number of students. And most importantly, we need to reconceptualize the idea of mobility to embrace the electronic technologies available today, and seek ways to speed this type of exchange and frequent interaction among students and instructors in the network. This can make efficient use of scarce resources, if upgrading communication capacities can put people on the internet in place of putting people on airplanes with such frequency as we still do today.

Exploring future employment:

Today's MSc agroecology students often have enrolled in this program on faith, with the expectation that positions will be available in academic, non-profit, government, or private sector organizations when they complete their degrees. Although our wishful thinking is that agroecology and systems approaches to problem solution will be a widely recognized and rewarded perspective in the future, we still lack enough numbers of graduates who can be cited as role models for our current students. It will be valuable to trace the graduates from several MSc programs and catalogue their current jobs as well as ideas on how the agroecology education helped them to arrive to those positions, and how the holistic and systems perspective was useful in the interview and selection process. How are they using these skills from agroecology in what they are doing today? This will be useful as recruiting information to provide for prospective students, and as a useful device for fund raising to support the implementation of the agroecology doctoral program.

Sustaining the educational network into the future:

Natural ecosystems are sustainable because of their diversity, resilience, and ability to adapt to changing conditions. Likewise, our agroecology learning network should display some of these same characteristics if we are to compete effectively in the academic milieu for students and scarce educational resources. Through our courses, curricula, teaching and learning methods, and

student numbers we can establish that this is a concept that is so compelling that it would invoke large opportunity costs not to establish and maintain the program within academia. Through successful graduates and the responsible actions that they can achieve and document, we can reinforce the ideas and value of experiential learning and provide convincing arguments that holistic and transdisciplinary learning is exactly what we need to complement the current learning about soils, crops, animals, microorganisms, and economics that will continue as important components of education. We can link these in meaningful ways, and build on the emergent properties of collaboration that will result from these newly designed learning landscapes.

Conclusions

Agroecology is a growing field that embraces the production, economic, environmental and social dimensions of our current challenges in farming and food systems. Through transdisciplinary research and learning, we can integrate the biophysical and socioeconomic methods that have been carefully developed over decades, and these can be focused on the increasingly complex and ‘wicked’ challenges of providing food for a growing population while maintaining a livable environment. Few of the problems facing the human population have higher priority than providing adequate food, and our best and brightest minds need to be educated and mobilized to address the complex and ever-changing array of resource and environmental issues that arise as we try to produce more food with ever more scarce land and other resources. Priority on these questions and resources to address them must come to the fore, and should take priority over the extraordinary investments currently put into military, industrial, and global commitments that have not been successful in solving growing challenges of food and equity. Business as usual will not be a viable option for the future, as elaborated in the IAASTD Report (2009), and also as Albert Einstein said, “we will not solve our most critical problems with the same minds and ideas that created them.”

References

- Bawden, R.J. 1991. Systems thinking and practice in agriculture. *J. Dairy Sci.* 74:2362-2373.
- Dewey, J. 1897. My pedagogic creed. *The School Journal* LIV (3):77-80.
- Dewey, J. 1977. *Experience and education*. Collier Books, New York, U.S.A.
- Dormody, T.J., and R.M. Torres. 2002. A follow-up study of agricultural education program graduates on teaching competencies. *J. Agric. Educ.* 43(4):33-45.
- Ethridge, D., and D. Hudson. 1996. Can we predict student success in agricultural economics graduate programs? *J. Agribusiness* 14(2):157-171.
- Francis, C., G. Lieblein, S. Gliessman, T.A. Breland, N. Creamer, R. Harwood, L. Salomonsson, j. Helenius, R. Rickerl, R. Salvador, M. Wiedenhoef, S. Simmons, P. Allen, M. Altieri, C. Flora, and R. Poincelot. 2002, *Agroecology: the ecology of food systems*. *J. Sustainable Agric.* 22(3):99-118.
- Francis, C., M. Tilahun, M.M. El-Hassan, T. Ssali, E. Yechanew, L. Salomonsson, and M. Cuadra. 2013. Selecting students for graduate agroecology programs. In: ENOAT Proceedings, I. Manolov, E. Rembialkowska, and C. Francis, editors. 29 Aug – 1 Sep., Plovdiv, Bulgaria.
- IAASTD. 2009. *Agriculture at a crossroads: food for survival*. International Assessment of Agricultural Knowledge, Science and Technology for Development, United Nations, New York, NY.
- Lieblein, G., T.A. Breland, C. Francis, and E. Østergaard. 2012. Agroecology Education: Action-oriented Learning and Research *J. Agric. Education & Extension*. 18(1):27-40
- Moncure, S., and C. Francis. 2011. Foundations of Experiential Education for Agroecology. *NACTA J.* 55(3):75-91.
- Østergaard, E., G. Lieblein, T.A. Breland, and C. Francis. 2010. Students learning agroecology: phenomenon-based education for responsible action. *Journal of Agricultural Education and Extension (Wageningen)*. 16(1):23-37.
- Salomonsson, L., M. Cuadra, G. Lieblein, and C. Francis. 2013. *Agroecology cooperative doctoral education programme*. Report on Agroecology Workshop, Malmo, 18-20 March 2013, AGROECOPRAC Program, Swedish Agricultural University, Alnarp, Sweden. 28 p.
- Walsh, D.A., B.I. Osburn, and M.M. Christopher. 2001. Defining the attributes expected of graduating veterinary medical students. *J. Amer. Vet. Med. Assoc.* 219(10):1358-1365.
- Wiedenhoef, M., S. Simmons, R. Salvador, G. McAndrews, C. Francis, J. King, and D. Hole. 2003. Agroecosystems analysis from the grass roots: a multidimensional experiential learning course. *J. Natural Res. Life Sci. Educ.* 32:73-79.