**Next Generation Careers: Innovation in Environmental Biology Education**

**COMPILATION OF FOCUS GROUPS SESSIONS**

The following focus groups were held, with all participants signing an Informed Consent Form as per IRB approval

The following professional societies held focus groups between April –September 2016:

1. American Association of Geographers
2. A focus group held in Washington DC with representatives from the American Fisheries Society, Tri-Societies, Society of American Foresters, American Society of Landscape Architects, and Future Farmers of America.
3. American Society of Plant Biology
4. Society for the Study of Evolution
5. Botany Society of America
6. Ecological Society of America
7. Society for Conservation Biology

The following were the focus group prompts:

1. How do you see your field interfacing with environmental biology (or affiliated fields)?
2. What can a Bachelor’s degree in your field do for your students?
3. What can you or your institutions do better to help students utilize their degree in environmental biology (or affiliated) careers?
   1. How can you prepare students for existing and future careers in environmental biology fields?
   2. What kinds of support do students need to enter professional fields besides an academic degree? What types of services might they need?
4. What can professional societies do to help students utilize their degree in careers?
5. How do we expand the field to create jobs?
6. How do we market environmental biology as a credible field?
7. If we develop a full RCN, what topics and activities should be organized?

Summary

1. How do you see your field interfacing with environmental biology (or affiliated fields)?

* Geographic information systems and geography
* Biological science teaching in K-12
* Forestry and field sciences
* Environmental implies field orientation, and evolution is not necessarily that.
* E-DNA and environmental response is a potential growth area
* Environmental biology education provides the bigger picture for the study of plant biology. Provide context, an anchor, for asking questions about genetic interplay with the environment and environmental impacts of human activity.
* Biologists with GIS certificates are readily employed.
* Sustainability as part of geography and biology. Sustainability is the new environmental studies and environmental science.

1. What can a Bachelor’s degree in your field do for your students?

* Preparation for graduate/medical school
* Entry level technical positions in biology, ecology and environmental sciences
* Provides skills in critical thinking
* Biological equipment company
* Large NGO’s marketing, corporate practice, HR, communications IT
* Scientific publishing
* Zoos, aquaria, animal rescue, naturalists
* Computer programming and evolutionary biology majors, coding, statistics
* Ability to understand change over time
* Legal systems, evidence
* Provide connections to agencies that can employ students
* Flexibility in skills to fit into many jobs
* In agronomy 20% go to graduate school, 20% back to the farm, 60% go into agriculture industry consultants, NRCS, EPA, etc.
* Forestry 20% go to graduate school, other 80% is split between public and private entities
* There are 235 unique careers in agriculture, but the US Federal Government says there are 2 careers in agriculture, i.e. farming and ranching.
* Geography is big into hydrology, water resources, law, economics
* Students should know what a Section 404 permit is
* DNR jobs, land conservation jobs, knowledge of outdoors, agency jobs

1. What can you or your institutions do better to help students utilize their degree in environmental biology (or affiliated) careers?
   1. How can you prepare students for existing and future careers in environmental biology fields?
   2. What kinds of support do students need to enter professional fields besides an academic degree? What types of services might they need?

* Good vising is critical
* Experiential learning is very important
* Keep track of alumni so that students can connect with them
* One-on-one personal connections are essential
* Broaden ideas of careers to both students and parents. Can use open-houses
* How have people trained in botany (for example) made a difference?
* Need a clearinghouse for internships
* Train career counselors in environmental biology (geography and other) fields so that they can help students.
* Internships, practicums, job-showing matches
* Bring in alumni who are successful in many areas
* Mentoring for grant writing
* Working on improving the image of the field
* Promote entrepreneurship
* Focus on student qualifications to aid in job and internship placement
* Get students to have a wider geographic focus
* Require internships and find funds so that all students can be paid
* More international experience and finding funding for it
* Job hunting strategy workshops
* Intentionality in broadening and diversifying job searches
* Evolution should be taught in a multidisciplinary context
* Certification in various fields
* One-year post-bacc experience
* Getting involved with student associations is helpful. Can provide work and internships opportunities.
* Job shadowing, projects, practicums
* Get more active in restoration and conservation projects

1. What can professional societies do to help students utilize their degree in careers?

* Provide diverse career workshops, networking among Primarily Undergraduate Institutions (PUI), societies need to acknowledge numerous potential career tracks, highlight research at PUIs
* Facilitate undergrads to get to meetings and learn networking skills
* Interact with law makers to encourage policies where nonacademic entities can hire more biologists and increase the job market. Bring alternatives to the fore—bio entrepreneurship. Educate policy makers about the need for environmental biology jobs to solve societal problems
* Develop technologies to help student find careers using the sources of information that students use: Linked-in, twitter, snapchat, snippets.
* Develop places where people know to go and a platform for a good job board
* Student section is building a career site that will facilitate connection to profession mentors.
* GSA’s job fairs of diverse careers, where students can give pitches
* Take advantage of local chapters
* Develop mentoring opportunities that create comport levels for students and high school teachers
* Use citizen science to draw new people into field.
* Society for the Study of Evolution has a Diverse Career initiative to develop better mentor-mentee relationships
* Establish networks with potential employers and recruiters, enable contact with students
* Sponsor career fairs targeted at undergraduates at meetings
* Invite people to tell their stories
* Have meetings during the school year when it is more convenient for students to attend.
* Get young alumni to “give back” to the professional societies, by mentoring
* Lower cost of attending meetings to students
* Get societies to accredit more students
* Continuing education at annual meetings
* American Fisheries Society has the Hutton Fellowship targeted at underrepresented high school students. 80% stay in touch with their mentors.
* Building webinars and outreach to more chapters
* Identify “soft-skills” and have professional society provide training at annual meetings for students
* American Society for Landscape Architecture has an annual student conference, and a scholarship program to get students to attend the annual meeting (10% of the attendants are students)
* Student award program
* Emerging professional community
* Mentoring program in underserved communities
* Professional practice networks to bring educators together
* Society of American Foresters reaches out to students on a state by state, and local level
* Scholarship programs
* Recruitment in underrepresented populations
* Continue to stay in touch with students (how to engage students in professional societies after the meetings?)
* Career fairs are very successful at Future Farmers of America---very diverse organizations
* Get business backing for students to be part of the field (may be easier in agriculture and agronomy)
* Have professional societies teach new skills at meetings
* Importance of human dimensions in fisheries, forestry, environmental protection, landscape architecture, farming
* Work with professionals (in Landscape Architecture) to make sure students have skills they need entering the workforce.
* Teach conflict resolution- essential for outreach and entry level jobs in resources
* Professional societies need to get to undergraduates and make the annual meetings speak to them

1. How do we expand the field to create jobs?

* “silo-ing” of plant sciences in academic disciplines needs to stop
* There are not enough people to fill degree program and professions in agriculture
* Need to offer courses that will help students get government jobs.
* Biotech allied fields
* Climate change will create jobs
* STEM fields need to include forestry, landscape architecture, fisheries, agriculture
* Work with urban populations
* Soils are everywhere!
* Psychological implications and health implications of a healthy environment will add to jobs
* Recycling, green infrastructure
* Sustainability is a catch phrase, but in forestry, fisheries there is a lot of certification programs that can employ
* More funding for jobs in the government and ngo’s
* More paid internships
* Work with industry and have students intern there and look into pharmaceutical industry too
* Not be so myopic with regard to the definition of evolutionary biology
* In general there is not a great value placed on critical thinking. Environmental Biology could inform government policy, lobby for more emphasis on environmental impacts, environmental sustainability, public relations team should have environmental training.

1. How do we market environmental biology as a credible field?

* Provide visibility, link to research gate, alumni, k-12 opportunities
* How do we get undergrads excited about career options
* Overcome bias
* Show that there are diverse jobs in the field

1. If we develop a full RCN, what topics and activities should be organized?

* Explore outreach to environmental career opportunities
* Face to face interactions
* Database or resources for teachers
* Multidisciplinary coarse and outreach activities for colleague network
* Buildup diversity of jobs, university, colleges and how to connect students government, industry and ngo’s
* Need to be regionally focused
* Feature case studies and models
* Personal stories, catalog, podcasts, videos
* Career fairs
* Organize deans, department chairs, and other scientific societies leaders to promote programs and institutional measure to move forward diverse career agenda.
* Capture pockets of excellence as they arise
* Be patient with timelines from conceptual discussion to implementation
* Integrate technology into the project
* Develop the capacity of educators to incorporate skill building into their courses.
* Increase replication of what works
* Bring Millennials into the RCN process to hear from them directly
* Be inclusive of cultural shift. Incorporate inclusion and diversity