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## **Bringing Students Out into the World-Wide Laboratory: Reflections on a study abroad biology course**

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### **Introduction**

During December 2003-January 2004, the author spent two weeks in Australia teaching a study abroad biology course. The course focused on the biodiversity of selected Australian ecosystems (temperate and tropical aquatic ecosystems, tropical and eucalyptus forests), and included an examination of evolutionary adaptations resulting from geological and physical changes and human activities.

### **Why Australia?**

The flora and fauna of Australia is unique. Within the geographic region of New South Wales and Queensland over a dozen very distinctive and unique ecosystems can be found. If students are to study these ecosystems they must go to Australia to do it. My personal teaching philosophy is one where I believe students learn best by “doing” biology and by observing biodiversity in the natural setting, and not just by looking at pictures or videos. You cannot appreciate the delicate balance between organisms in a eucalyptus forest if you don't walk through the forest and see how the plants and animals interact with each other. It's hard to fathom the splendor of the tropical rainforests or the beauty of the Great Barrier Reef if you don't see it for yourself. The benefit to the students is that they have an ecological field experience that can never be duplicated in a laboratory or field station in the United States.

### **Logistics and Planning of the Course**

The course was offered through the Cooperative Center for Study Abroad (CCSA), of which the University of Kentucky is a member. CCSA “develops, plans, and coordinates study abroad programs in Australia, Barbados, Belize, England, Ireland, Jamaica, Kenya, Scotland, Singapore and South Africa. Students can receive higher education credit for successfully completing the CCSA program in which they are enrolled. The classes are taught by faculty from consortium-member schools. Regular or part-time students at CCSA member institutions must register for courses through their home institutions. Students from institutions outside the consortium register

as visiting students at Northern Kentucky University.” (CCSA Brochure, 2004 First Edition). Working through a consortium such as CCSA makes life a lot easier for the instructor. The instructor is responsible for the academic content of the course (submits a course proposal to CCSA, designs the course, identifies the field trips, teaches the course, etc) – CCSA does the rest, dealing with all of the course logistics (registration of students, travel, accommodation, field trips, visas etc). Not only does CCSA coordinate the course but they also send a member of their Board of Directors on the trip to serve as trip director. This individual deals with any non-academic related issues (sick students, lost airline tickets, tour buses not showing up on time etc) and works in partnership with the course instructor. As a first-time study abroad instructor, I found the support of CCSA (<http://www.ccsa.cc>) and the trip director to be invaluable.

Fifteen students registered for this course, six from the University of Kentucky and the other nine students represented seven other member institutions. Some of these students were biology majors others were non-science majors. The course was a 300-level 3-credit hour course that was acceptable as biology major elective credit or as life science/ science credit for non-biology majors. Students were required to have completed at least one semester of college biology prior to registering for the course. The group left the United States on 26<sup>th</sup> December and flew into Sydney and then onto Cairns arriving early afternoon on the 28<sup>th</sup>. The group spent six and half days in Cairns and then flew to Sydney for seven days before returning to the United States on the 9<sup>th</sup> January.

### **Course Design and Format**

The course focused on Australian biodiversity with an emphasis on evolutionary adaptations, and was designed as a field course where students observed plant and animal life in a natural setting. It was not possible to study all of the ecosystems in Australia; instead emphasis was placed on just a few (tropical rainforest, eucalyptus forest, mangrove and barrier reef). Students spent two and a half days on rainforest and mangrove ecosystems, two days on reef ecosystems and a day on eucalyptus forest ecosystems. Additional time was spent at the Botanic Gardens in Sydney, and at the aquarium, zoo and Australian Museum in Sydney (which has an extensive research library). In addition, students had the opportunity to learn about Australian history, culture and music, to do some “traditional” sightseeing, and to enjoy the summer weather.

### **Course Learning Objectives:**

- Identify and name common Australian plants, animals and ecosystems.
- Identify biotic and abiotic components of selected Australian ecosystems.
- Describe the ecological interactions that occur between organisms.
- Discuss the relationship between adaptations exhibited by Australian biota and climatic conditions.
- Discuss the relationship between adaptations exhibited by Australian biota and past human activities.
- Gather, process and analyze information from field activities.
- Gather, process and analyze information from secondary sources.
- Write a research paper.

### **Grading**

The grading scheme was quite different from the more traditional biology laboratory course and included an extensive amount of writing. CCSA requires that students participating in short (2-

3 week) courses complete a post-trip paper/research project worth a minimum of 25% of their grade. Final grades were based on student performance on the following course requirements:

Pre-departure Quiz	20 points (10 %)
Reflective Journal	40 points (20%)
Animal and Plant Reports (2 total)	20 points (10%)
Group Work	10 points (5%)
Post-trip Research Paper	100 points (50%)
Attendance	10 points (5%)
TOTAL = 200 points	

### 1. Pre-departure Quiz

This quiz focused on some of the basic concepts of ecology: ecosystems, food webs, energy transfer in ecosystems, balance and change in ecosystems. The review material and the quiz itself were available online through Blackboard, a course management system. Material was presented in this manner so that presentation would be consistent for all students no matter which institution they were from. This material should have been review material for most of students. As it turned out, a number of the students on the trip had not taken a biology course in some years and so this pre-departure quiz/review turned out to be more valuable than initially anticipated.

### 2. Reflective Journal

Each student kept a reflective journal for the duration of the trip. The purpose of keeping a reflective journal was to provide an opportunity for students to reflect on their thoughts and feelings about what they were experiencing. Each student brought a notebook for this purpose and was expected to write at least 300 words in the reflective journal each day. To help focus the students' thoughts I provided them with a number of prompts (that they had to respond to) to get them started:

#### *i) At the Beginning of the trip:*

- a. Why did you choose this particular course and what are you hoping to gain from the experience?
- b. What fears, worries, concerns and questions do you have about the trip?
- c. What do you expect to encounter?
- d. What do you think life in Australia will be like, and how do you expect it to differ from the U.S.A?

#### *ii) During the trip (each day):*

- a. What did you do that was fun and satisfying today? Explain
- b. Was there anything frustrating about today?
- c. What was the best thing that happened to you? Why was it the best?
- d. How is what you have seen today related to your reading of *The Future Eaters*? Do your observations confirm or contradict the author's observations and conclusions?

#### *iii) At the end of the trip:*

- a. What will you do with the knowledge that you learned on this trip?
- b. Were your expectations met on this trip? Explain.
- c. What was the best thing that happened on the trip? Why was it the best?
- d. Did you encounter something you didn't expect? Were there any surprises?
- e. What will you bring home from the trip (not your list of souvenirs)?

### 3. Plant and Animal Reports (2 two-three page reports)

Each student wrote a 2-3 page report on an Australian animal, and a second report on an Australian plant as assigned by the instructor. For the plant, the student discussed its interesting features, where it typically grows, any evolutionary adaptations of interest and whether it is food for certain animals. For the animal, the students discussed its interesting features, where it is typically found, whether it is nocturnal or diurnal, and what eats it. These reports included drawings and field observations made during the trip.

#### 4. Group Work and Attendance

Students participated in several group activities and attended group meetings (seminars, discussions) while in Australia, and were expected to contribute to class discussions and seminars.

#### 5. Post-trip Research Paper

Australian flora and fauna exhibit an incredible array of evolutionary adaptations. Some of these adaptations are due to geological changes that have occurred over time, others are in response to variations in temperature and the availability of water, and yet others are in response to human activities. During the course of the trip the students gathered and processed information that focused on adaptations related to Australian biodiversity. After the trip they were required to write a 20-25 page research paper discussing evolutionary adaptations found in Australian flora and fauna. Information from both their field observations (from all fieldtrips) and from secondary sources were used in preparing this paper. The following were to be included in the paper:

1. A description of the key events in the formation of Australia as an island.
2. A discussion of the mechanism of natural selection in the evolution of a species, giving examples (drawings, photographs) of variation in two species that were observed on the trip.
3. A description (mean annual rainfall, mean annual temperature, type of plant and animal life etc) of at least three different ecosystems that were studied on the trip. Images (drawings or photographs) of at least 4 plants and 4 animals that were typically found in those areas.
4. A discussion of the effect temperature and rainfall has on the flora of an area and a description of particular adaptations found in plants and animals that allow them to survive in each of the ecosystems described above (illustrated with examples from field observations).
5. A description of the impact of human activity on the tropical rainforest and the sclerophyll forest ecosystems of eastern Australia illustrated with examples (photographs or drawings) from field observations.
6. A discussion of how these observations supported or contradicted the discussion of Tim Flannery in *The Future Eaters* (as it relates to his discussions on Australia). This section of the paper to be no less than three of the 20-25 pages.

#### Student and Faculty Reflection

An evaluation of the trip/course was conducted on the morning that the group departed for the United States. Students provided feedback on both the academic content and on the logistics of the course. Students rated both components very highly and expressed strong satisfaction with the trip/course and considered the cost well worth it. One of the student participants in the class provided the following reflection:

*"The class ... was a remarkable experience and an excellent learning environment. Not only did it provide me with opportunity to travel and to gain cultural exposure, it also was one of the most instructive academic experiences of my undergraduate career. As a result of the class, my interest in Australia, ecology at large, and the teaching methodology of science courses has grown significantly. Although I do not plan to further study*

*ecology, I have a newly rediscovered interest in it and thus related biological fields...Students were forced to be engaged learners: we swam at the Great Barrier Reef, pet the koalas, hiked in the Blue Mountains, and even ate kangaroo. Through inundation, the class itself provided a very interactive method of learning. As a student that spends most of her time poring over text, direct observation was certainly a welcome change. ... an identifiable underlying theme punctuated the course and added an analytical slant to the seemingly normal acceptance of fact in biology courses.” Allison Hensley, Student Participant, Dec 2003/Jan 2004*

This was the first time that I taught a study abroad course. Looking back on the trip, I can clearly see that the key to having a successful trip was good planning and organization. The hard work of the CCSA staff paid off in terms of a smooth running trip – no problems with travel, field trips or accommodation. It is equally important for the faculty member to spend time, prior to departure, planning course activities and thinking through the sequencing of activities. This is one of the times when it helps to be a detail-person, which I am. One of the best measures of the depth of student learning that took place came from reading both the reflective journals and the final papers written by the students. The quality of reflection, the clear articulation of the biological concept of evolutionary adaptation and the enthusiasm of the writing was much greater than I had anticipated. I believe that the whole experience has truly enriched the undergraduate experience for all of these students.

Would I do it again? Most definitely, yes. What would I change if anything? There is not much that I would change. The basic structure of the course worked very well – activities were well received – pacing and sequencing of activities was appropriate (a slower less energetic day scheduled after a long day of strenuous activity). I would modify slightly one of the field trips in Cairns and also allow for more time at the Australian Museum. On a professional level, I found it a joy to teach only 15 students instead of the usual 200-325 students. It gave me the opportunity to try out some course activities (i.e. reflective journals) that are not feasible in classes of 200+ students, and the smaller class size encouraged greater interaction between students during group meetings and discussions. I felt the whole experience challenged me as a teacher and has given me some insights that can also be applied to my on-campus teaching.

### Additional Information

Additional information on the CCSA program may be obtained from <http://www.ccsa.cc> or at Cooperative Center for Study Abroad, Northern Kentucky University, Business-Education-Psychology Center 301, Nunn Drive, Highland heights, Kentucky 41099. E-mail: [ccsa@nku.edu](mailto:ccsa@nku.edu)

**Text Books:** There were two text books required for the course.

***Australian Wildlife: An Introduction to Familiar Species*** by Waterford Press. Available through Waterford Press ([www.waterfordpress.com](http://www.waterfordpress.com)) or Amazon ([www.amazon.com](http://www.amazon.com)) ISBN: 1-58355-035-6, price \$5.95. This is a small fold-out field guide on Australian wildlife.

***The Future Eaters: An Ecological History of the Australasian Lands and People*** by Tim Flannery, Grove Press (1994). Available through Amazon ([www.amazon.com](http://www.amazon.com))

ISBN: 0-8021-3943-4, price \$16.00 + shipping and handling.

This book discusses the ecological history of Australia and other Australasian lands. Its whole emphasis is on examining biodiversity in Australia as a result of evolutionary adaptations resulting from geological and physical change, and human activity. This is an excellent resource for anyone studying evolutionary adaptations and ecological change whether the focus is specifically on Australia or not.