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《国際ワークショップ》報告

**Islands as Conservation Laboratories:  
Possibilities for International Institute for Okinawan Studies  
at the University of the Ryukus**

James A. Danoff-Burg\*

**Summary**

The Ryukyu island chain, and the University of the Ryukyus in particular, are uniquely suited to create a novel approach to islands studies in the southwest Pacific islands. The human and ecological history of the island chain has made it a hub of biodiversity and commerce for the western Pacific, a fact that is reflected in the current complement of biological diversity. The Ryukyus could serve as a laboratory in which to study many island conservation theories that have direct comparability with New York City, including the relationship between human movements historically and current biodiversity, habitat fragmentation, urbanization, centers of origin, invasive species impacts, and the impact of military exercises on biodiversity. Interestingly, the geographic distribution of the human population on Okinawa in particular mirrors that of Long Island, New York. Given that Long Island includes the eastern part of New York City (the boroughs of Brooklyn and Queens) and that the impact of urbanization decreases to the east, in a manner identical to Okinawa (but to the northeast), New York and Okinawa may be considered ecological analogues. Many comparative studies between these two islands are conceivable. Because of their geographic locations and research focus of the faculty, Columbia University and the University of the Ryukyus could possibly be important long-term collaborators. I look forward to the opportunity of being a part of this collaboration.

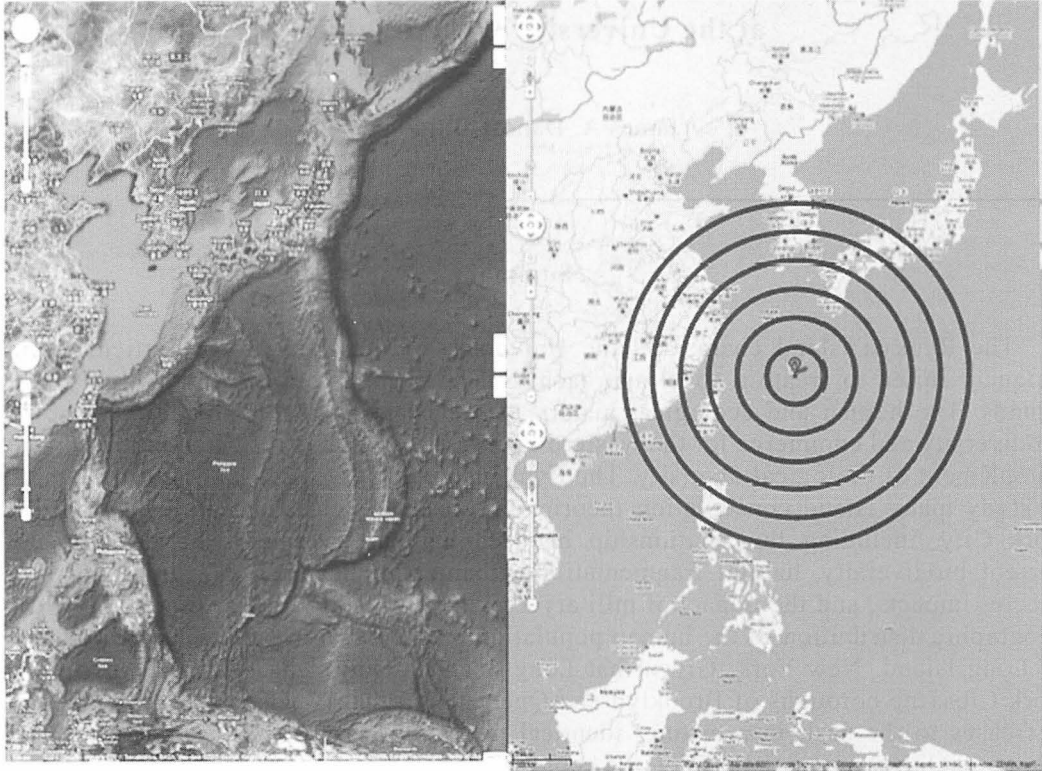
Islands are tremendously valuable settings for the study of ecology, evolution, and conservation. The processes of ecology and evolution are often simplified on islands and therefore usually have many fewer influences than do most continental land areas. As a consequence both are more easily studied and their implications for the conservation of species are clearer and more easily implemented.

Although politically the Ryukyus are part of two Japanese prefectures, ecologically they are primarily allied with southern Pacific islands. Flora and fauna on Okinawa, and the Ryukyus more generally, are indeed a composite drawn from all over

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the western Pacific. As such, I have argued that conservation research projects in Okinawa should focus on the western Pacific, rather than focusing mostly on mainland Japan, given geographical proximity (Figure 1).



**Figure 1: Geographical and Political Proximity of the Ryukyus.** (a) Geographical map including marine sea-bottom topography. (b) Political map including concentric circles, each indicating 500 km distances, centered on Naha City. Both base images taken from Google Maps ([www.maps.google.com](http://www.maps.google.com)).

Interestingly, biogeographers usually classify Okinawa as having Indo-Malaysian botanical affinities, indicating that much of the biodiversity on Okinawa and presumably on the rest of the Ryukyus have their ancestral origins in Indonesia and Malaysia. This is an interesting classification, given that currently the wind comes from the northeast, from the direction of Japan (Figure 2).



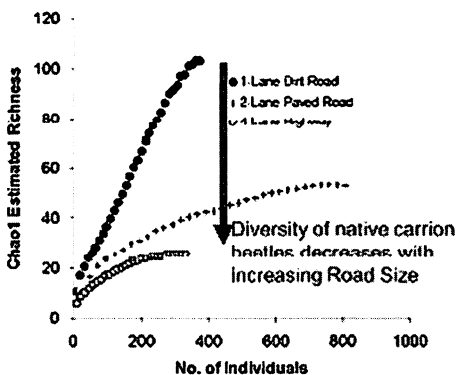
**Figure 2: Map centered on Okinawa, with 500 km distance gradients indicated.** Red area indicates the current average annual wind direction, with most of the wind coming from the northeast (wind information from [www.windfinder.com](http://www.windfinder.com), map from [www.google.com](http://www.google.com)).

Reasons for these two seemingly conflicting observations include three important ideas that reveal opportunities for new islands studies at the University of the Ryukyus. First, the typical ocean currents coming from the southwest may be more valuable than prevailing wind directions in terms of dispersing biodiversity around the Pacific. Second, the prevailing wind direction likely has shifted in the recent geological past. Last, the extensive trade history of movement of people during the Ryukyuan Kingdom likely led to the movement of plants and animals that are associated with humans. Many of these organisms will have become naturalized in the Ryukyus and are thereby contributing to overall biodiversity in the Ryukyuan island chain. More recently, the actions of World War II and the movements of the United States military will have had a significant impact on the spread of invasive species.

Combining biogeography and community assembly studies within the field of ecology and evolution with human history, economics, culture, and linguistics could be a fruitful interdisciplinary research direction for the International Institute for Okinawan Studies (IIOS).

Many of the most important theories of ecology and evolution have been discovered in islands, including adaptive radiation, the taxon cycle, community assembly theory, island biogeography, management of metapopulations, and the single large or several small (SLOSS) debate in conservation biology, among others. Most of the study of islands has focused on oceanic islands such as the Ryukyus, although the research conducted on any island category are usually informative for other types of islands. These theories become more important as biodiversity becomes more threatened and more unique habitats become imperiled all over the world. Island theories are directly applicable to biodiversity conservation-on all types of islands.

Research that I have conducted over the last 15 years has focused on habitat islands in urban settings, in both New York City and in the Dominican Republic. As one of the four categories of islands (oceanic, continental shelf, and non-marine islands being the other three), habitat islands are excellent analogues of the others. In



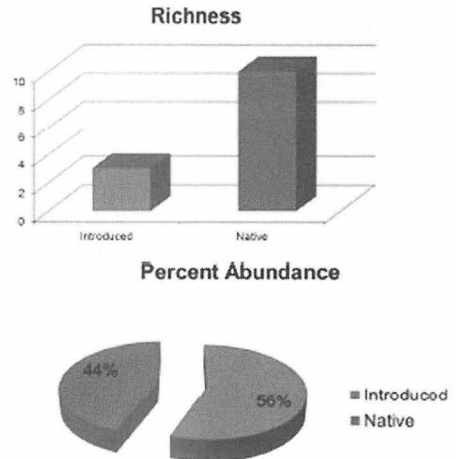
**Figure 3: Decreasing native carrion beetles with increasing road width and pavement.** From Dunn & Danoff-Burg (2007), from Orange County, New York.

fact, because the same theories are similarly relevant on these island types, ideas generated on oceanic islands inform the management and conservation of habitat islands and vice versa.

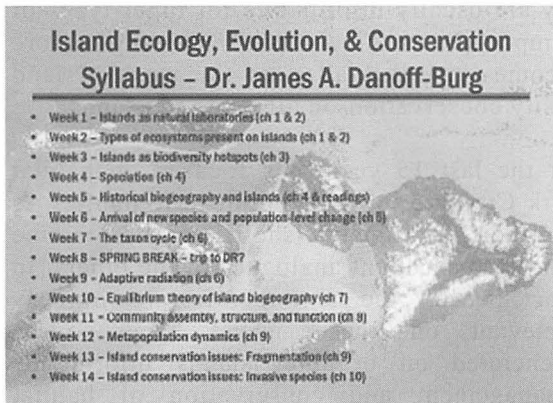
I briefly present a series of research projects, focused on habitat islands in New York City, that explore the impacts of urbanization and fragmentation on carrion beetles, dung beetles, and ants. Two seemingly contradictory outcomes have resulted from these efforts: increasing fragmentation leads to a shift towards non-native species and towards more pest species (Figure 3) but even the most fragmented and urban patches are still of

conservation value (Figure 4).

In a rapidly urbanizing world, the smallest green spaces become of increasing importance for biodiversity conservation, particularly for the little things that run the Earth. Indeed, the idea of what is considered natural needs to be reconfigured when thinking about urban areas. Natural in the sense of untouched and undisturbed areas are rarely encountered in and near urban spaces. These trends are particularly prominent in the most intensely urbanized area in North America, New York City. Based on these data, I advocate for a new definition of what is natural in urban settings and that we should not try to manage these as though they were untouched wild ecosystems. Rather, we need to recognize the diversity of human impacts on these areas and acknowledge that Urbanized Nature will be different than Natural Nature.



**Figure 4: Comparable richness and abundance of native and invasive ants in New York City street medians.**  
From Pecarevic et al. (2010).



**Figure 5: Syllabus of the Island Ecology, Evolution, and Conservation graduate course.** A Columbia University course created and offered by Dr. James Danoff-Burg.

Teaching that I have done over the last decade have been conservation focused, with an emphasis on islands, fragmentation, restoration ecology, and entomology. I would be willing to partner with relevant faculty who would be interested in offering similar courses at the University of the Ryukyus. In addition, I would be honored to be able to come to the University of the Ryukyus to offer the graduate level course that I have developed and taught for a few years now, entitled Island Ecology, Evolution, and Conservation (Figure 5). This course could be an elegant addition to the curriculum of the New Islands Studies direction at IOS.

For the last four and a half years I have directed a program in the Dominican Republic called the Environmentally and Socially Sustainable Economic Growth (ESSEG) on behalf of Center for Environment, Economy, and Society. The ESSEG program is designed to build a robust, long-term economic future for Miches on a foundation of environmental sustainability. Key to its design is the hypothesized mutually beneficial pairing of two forces that have traditionally been viewed as antagonists: development and environmental conservation. As such, this design forms

the basis for what should be the improved health, education and economic well-being of the 22,000 people living in and around the Municipality of Miches.



**Figure 6: Schematics of the Environmentally and Socially Sustainable Economic Growth program.** A poverty alleviation and environmental restoration program offered by the Center for Environment, Economy, and Society, acting on behalf of Columbia University in the Dominican Republic.

In many ways, Miches is a habitat island on an oceanic island and can be used as a model for sustainable development in small island developing states across the whole of Oceania. Miches is emblematic of the abundant natural assets and considerable economic challenges that exist in the Dominican Republic, the Caribbean as a whole, and other small-island and developing states. For this reason, the ESSEG-DR initiative states as a new model of development for developing countries everywhere . a model of the synergy of sustainably managing one fs natural assets and building a robust, sustainable economic future based on those assets.

Its lessons, practices, and experiences will be exported to other parts of the Dominican Republic, other small island developing states, and throughout the world. In this way, the ESSEG-DR initiative extends well beyond the borders of Miches and will serve to demonstrate in concrete terms how one resolves the conflict between environmental sustainability and economic growth in real places, in real time, among real people. The parallels and applicability to the poorer and more isolated islands in the Ryukyu Island chains are tremendous and direct.