

## **PROPOSED FEASIBILITY STUDIES FROM LANDSCAPE ECOLOGY AND ECOSYSTEM SERVICE VIEWPOINTS**

*When we look at the environmental problems that confront us, we often assume that, if only people understood, if only they (particularly the developers) had an ethic, things would be better. After nearly 20 years fighting for conservation in Southeast Asia with this assumption - from the forefront as well as in research capacities - I have come to realize that it is overly simplistic. Many people in Vietnam, in Cambodia, as well as farmers in Wisconsin USA, already understand the pressing environmental problems we face. They have a Land Ethic, yet problems remain unsolved. Why? This essay deliberates on how we might develop feasibility studies in order to advocate Landscape Ecology and Ecosystem Service approach in ECOSHARE community-based conservation project.*

**Landscape Ecology:** if we - as the project or the tribe landowners - are unable to provide the tools to act on an ethic that we already have, then few of our conservation issues of today (logging, declining biodiversity, failing soil health in PNG) will be solved. Perhaps more important, each of these problems require landscape-based solutions that will need resolution simultaneously. A note of definition of Landscape Ecology here: "(1) the spatial relationships among landscape elements or ecosystems, (2) the flow of energy, mineral nutrients, and species among the elements, and (3) the ecological dynamics of the landscape mosaic through time". Explicitly, Landscape Ecology conservation approach will consider the development and dynamics of spatial heterogeneity, spatial and temporal interactions and exchanges across heterogeneous landscape, influences of spatial heterogeneity on biotic and abiotic processes, and management of spatial heterogeneity.

Landscape ecology approach is the most efficient way to achieve sustainability. (Also, sustainability is a concept upon which virtually all people can ultimately agree because it addresses human self-preservation. Few, however, will ever agree on how to define exactly what sustainability is). Ponder this for example: can the community collectively solve soil erosion and nutrient run-off in the forests upstream sufficiently to remove the hypoxic zone downstream? A single resource management (much like single species management in wildlife biology), rarely, if ever, achieves sustainability. Success would require not only the combined efforts of grassroots, NGO, and business alike, but also the right efforts in landscape ecology and the commitment of relevant resources to the efforts.

Here I propose the intermedia efforts for resource management with landscape ecology approach:

- *Land-cover, land-use and vegetation maps:* high-resolution satellite images (5x5m) can be acquired for free from major GIS databases. We need to invest in ground-truth data collection. I have robust skills in Spatial Statistics with experience in all three forms of spatial data (point pattern analysis, lattice data, and geostatistics). With R and the open-source QGIS and GRASS, I can process the ground-truth data and the raster GIS images, the reclassify and convert into land-cover, land-use and vegetation maps. These databases will tremendously help in future resource

management, infrastructure development, as well as correlation with future wildlife and genetic research.

- *Agricultural genetics*: our worldwide livestock diversity originated from wild ancestors by altering the genomes of these animals through domestication process over thousands of years of human influence. In turn, the altered genomes from domesticated animals can cause genetic introgression (the contamination of 'pure' genomes) in wildlife. This is well documented throughout the world but completely unknown in PNG. Close and isolated ecosystems in PNG are ideal to study the topics of genetic introgression and endemism in wildlife species with close relationship to livestock. This is area of my expertise. My PhD is in population genetics and over the last two years, I have studied functional genomics and bioinformatics in my postdoctoral appointment with responsibilities in statistical analyses and running the whole Bioinformatics pipeline for my research team.
- *Bird and ornithological surveys*: this is more of ecosystem service (see below) in which ECOSHARE can establish a company for birding (and wildlife) tours to generate benefit for the project. At the time being, a tour of 20 days (normal time for birding tour) with maximum 8 guests has a value from \$4500 (for a low-end Asia-based company) to \$6500 (BirdQuest). ECOSHARE can employ experienced Bird Leaders and team up with local PNG bird guides. In the long run, we can exclusively employ local PNG bird leaders after rigorous training and capacity building. We first need to perform bird and ornithological surveys at the field sites.

**Ecosystem Service**: assumingly there is minimum levels of land-based environmental problems throughout ECOSHARE project sites, it is still essential to work closed and effectively with local people and/or private landowners. We need stronger and more diverse collaborations that create ecologically effective solutions (solutions that address a species biological needs, here are some flagship or cornerstone species), and place these solutions in a marketplace such that they are economically sustainable (e.g. Agarwood products or local traditional handicrafts).

- *Community feasibility studies*: ECOSHARE need to team up consultants with participatory development expertise (I have a few connection in Thailand and the Philippines in mind) to evaluate the social-econo structures of the field sites and, importantly, identify key agricultural or wide plants of high economic values [More on this.].
- *Sustainable construction and ecotourism*: example is a sustainable beach resort construction project in Con Dao Island, Vietnam (Six Senses Resort). The project site is a sand dune area that faces a deep valley with mountains at North, West and East sides. The freshwater wetland at the site is actually a storage place for a huge volume of run-off and ground water coming from the surrounding mountains. In turn, freshwater from the site, together with organic and inorganic substances, goes through sand dunes, acting as filtration layers, to reach the sea. Nutrient-rich, but balanced by sand filtration, water at the beach is an important factor supporting seagrass beds and the associated marine mammal populations. Construction of the resort is to have, in a greater or lesser extent, ecological and environmental impacts to local environment and landscape. Understanding how the system works and monitoring changes in the site are necessary for the design of mitigation measures and the development of a proper landscape management plan. Such activities are important for eco-label pursuit and marketing mechanism.

So, ECOSHARE should prepare for unintended consequences of success when working to increase biodiversity through conservation efforts. Historically, there has been a mixed track record in improving community livelihood while solving human-wildlife conflicts at the same time. With good preparation, the project might well identify the problems at the start at the project and it is very important to seek ecological and landscape contexts within which solutions can be deployed effectively. We need to: (1) provide needed baseline research (feasibility studies) to clarify both problems and appropriate solutions, (2) support participatory planning by relevant stakeholders in the project sites, (2) monitors results of solutions that are implemented. In term of ecosystem service, we must explore how to balance the production of all resources and also to correlate these with biodiversity and wildlife conservation. All these factors, arguably, arise from the same land and we need to link the benefits of community-based production with markets that will pay for the extra cost for producing sustainability. Further, as a new project over a vast open area, we need to risk open collaboration among diverse groups of local stakeholders as well as with scientific and conservation communities. In doing so, we can create the tools that allows the community to grow a collective land ethic on individual lands. Should we succeed in nurturing this process of sustainability, anything is possible.

Note: Over the past 18 years, I have fought for conservation and resource management from the forefront in Southeast Asia, as well as in executive and research positions. My postdoctoral (Texas A&M University) and PhD (University of Wisconsin-Madison) have focused on disease ecology of Galliformes species and habitat management and conservation of these terrestrial birds at broad-scale landscape levels. I have robust quantitative and molecular skills that are fundamental for future and long-term conservation biology programmes. Currently, I am with Texas A&M University. Nonetheless, my career intention urges to make a difference in the real-life biodiversity conservation and I am part of ECOSHARE as a volunteer and scientific advisor for the time being. I am looking for greater challenges in joining this community-based conservation project ECOSHARE in the near future.