Introduction

Animal habitat protection is very important; and habitat destruction could cause bad effect to human. (Primack 2006) To allocate human facilities for financial benefit and protect wild animals’ habitat simultaneously, it is necessary to consider moderate development in wild area. A good way to achieve this allocation and protection is making habitat conservation, during human development near wildlife habitat. In habitat conservation, identifying priority habitat area to conserve and protect is the first matter to consider. But the research of determining size, type and location of habitat is pretty hard and complex in biology field. (Hierfl 2008) In traditional identifying approach, hotspot areas are identified from observations data; this method could not precisely estimate the location of habitat because some animals such as leopard and condor tend to move in large area space, some locations in their activity area are not very important to be considered. In order to find the hotspot region for wild animals efficiently, some landscape parameters in that habitat could be estimated and analyzed to help find the real important habitat for animals; for instance, panda tend to live in those area where bamboo exists and scientists could estimate panda’s habitat according to the distribution of bamboo. Those landscape parameters which highly relate to species movement and density could be analyzed and referred during habitat protection. Thus, the relationship between different environment element and animal should be estimated.

Spatial capture-recapture model, which is applied widely in animal population density study, uses encounter probability model to estimate the encounter probability by function of Euclidean distance and make spatial analysis in density research. (Efford *et al*. [2009](https://besjournals.onlinelibrary.wiley.com/doi/full/10.1111/2041-210X.12039#mee312039-bib-0007); Gardner *et al*. [2010](https://besjournals.onlinelibrary.wiley.com/doi/full/10.1111/2041-210X.12039#mee312039-bib-0014); Gopalaswamy *et al*. [2012](https://besjournals.onlinelibrary.wiley.com/doi/full/10.1111/2041-210X.12039#mee312039-bib-0016); [Royle *et al*. 2013a, b)](https://onlinelibrary.wiley.com/doi/full/10.1111/j.0030-1299.2004.13043.x#b1) Spatial capture-recapture model could avoid the bias in density study comes from undefined effective trapping area; and SCR model could estimate animal density based on repeated animal observation data from multiple traps, which is easier and cost less compared with long-time period individual observation data. Royle (2013b) introduces a new model relate to spatial capture-recapture model to solve the problem that encounter probability model in SCR model causes the home range of animal activity to become too stationary and too symmetric because of the lack of landscape effect analysis; by extending landscape covariate parameters into encounter probability model function, Royle’s SCR model could analyze animal space usage with environment influence and predict animal population density with landscape connectivity simultaneously.

In this paper, we use the SCR model in a different purpose, by fitting model based on animal density data to find relationship between animal count and landscape covariates in SCR model. By the reverse usage of Royle’s SCR model, it is possible to find the role of each landscape parameter in animal habitat. Some important information about landscape effect could be given from the estimated coefficient of each landscape parameters in the encounter probability model. The analysis of landscape effect in this method we developed in this paper could solve three important questions: (i) it determine what kind of environment component is important for animal species to live in its habitat and what kind of landscape element is not important to live; (ii) it estimate how does these kinds of landscape components influence animal’s activity selection (positive effect or negative effect) (iii) it calculate the extent of the impact to wildlife from these landscape covariate. (strong effect or low effect) The key concept in our paper is using spatial capture-recapture model to find how do environment components influence animals and how do animals use their habitat.

In following section, we introduce the SCR model for density study, with discussion of basic SCR model and Royle’s(2013b) SCR model with landscape covariate in encounter probability model. Then introduction of the reverse usage of the SCR model for landscape parameters also be discussed in “the reverse SCR model for environment covariate analysis” section. After that, we show the application of this new model to study the landscape effect on leopard in African habitat. Eight different leopard species activity GPS location data is recorded by several traps in their habitat, with some spatial-referenced data covering in that area (elevation and landcover). The result of this application shows how does each landscape element effect eight leopard species to use their habitat, and offers suggestions to protect this leopard habitat.