Selection of New Protected Areas Emphasizing Vegetation Types Using C-Plan (Case Study: Kohgiluye & Boir-Ahmad Province, Iran)

Jafari, A.*[1], Yavari, A.R.[2], Bahrami, Sh.[3], Yarali, N.[4]
1- Assist. Prof., in Environmental Planning, Shahr-e Kord University, Shahr-e Kord-Iran
2- Assoc. Prof., in Environmental Planning and Management, Tehran University, Tehran-Iran ayavari@ut.ac.ir
3- Assist. Prof., in Natural Geography, Tarbiat-Moallem University of Sabzevar, Sabzevar-Iran
shahram_bahrami2003@yahoo.com
4- Assist. Prof., in Forestry, Shahr-e Kord University, Shahr-e Kord-Iran n_yarali@yahoo.com
Received: July, 2010 Accepted: Sep., 2010

Introduction

Increasing the rate of biodiversity loss due to several reasons have raised concerns about the remaining elements of biodiversity. On one hand it is impossible to allocate vast areas to conservation in competition with other land uses and on other hand it is not clear which parts of the land is of more biodiversity values and deserves conservation. In this situation the using better substitutes such as vegetation cover is inevitable. Vegetation types have been considered as suitable substitutes in many studies.

Materials and Methods

The study area is Kohgiluye & Boir-Ahmad province located in southwest of Iran, neighboring from north and east to Chaharmahal & Bakhtiary and Isfahan provinces, from south to Fars and Booshehr and from west to Khuzestan (Figure 1). The study area with 1609979 ha area (around 1% of Iran) has a mountainous landscape. More than 80% of the area is covered with mountains and hills. The lowest part is of an altitude of 170 m above sea level and the point with maximum elevation is Dena peak with 4409 m above sea level. This indicates a sharp elevation gradient. Other physical and biological characteristic of the study area such as climate (temperature and humidity), soil, biodiversity (floral and faunal) are functions of this gradient. At present about 12% of the study area is under protection which consists of 6 protected areas named Dena, Dena-ye Sharghi, Tang-e Soolak, Kooh-e Dill, Kooh-e Khamin and Kooh-e Khiz & Sorkh.

Fig. 1: Location of the study area in Iran

In this study we used vegetation types as the overall biodiversity substitutes for two reasons; 1. There was no other complete and up-to-date information set on other biotic elements of biodiversity such as mammals, birds, reptiles etc.

Corresponding author:Tel:09122499657 E-mail: alijafari077@yahoo.com

2. Vegetation types could reflect natural and human facts from past and present in the best way. Selecting the areas of the highest priorities for biodiversity conservation have been done according to Systematic Conservation Planning procedure in six steps including 1- selecting an appropriate substitute for overall biodiversity 2- compiling information on the selected substitute 3- setting quantitative goals for the substitution 4- assessing representativeness for the existing protected areas 5- prioritizing new PAs in order to fill existing conservation gaps 6- assessing the viability of substitutes in existing and new PAs network. We used two types of selecting/planning units. The first was obtained from integrating vegetation type units with land type units and the other one was obtained from integrating vegetation types units with elevation belts. For determining conservation goals for each vegetation type we used TARGET veg = 10 * (1+ NR + TH + BV) where NR is the natural rarity of each vegetation type in the study area which is calculated in terms of broadest vegetation type (Am) relative to considered vegetation type (Ai) : NR = (Am – Ai)/Am. TH is the threats each vegetation area faced and BV, the agent we added to the equation, is the biodiversity value of each vegetation type in terms of both physiognomic (diversity of vegetative form) and floristic (diversity of species) aspects. For prioritizing new conservation areas in step 5, we used C-Plan decision support system.

Findings

There are major gaps in existing protected areas in the study area in terms of vegetation types. In other words 38 out of 55 vegetation types are not presented in protected areas network at all. Three out of 17 vegetation types presented in PAs including *Quercus persica, Astragallus susianus – Daphne mucronata – Agropyrum intermedium* and *Astragalus adsendense – Daphne mucronata – Elymus gentieri* occupy more than 62% of all PAs and other 14 vegetation types occupy less than 38% of them. Figure (2) indicates the conservation situation of all 55 vegetation types in terms of existing conservation, established goals and met conservation goals after the selection of new protected areas in terms of percentage of all quantity.

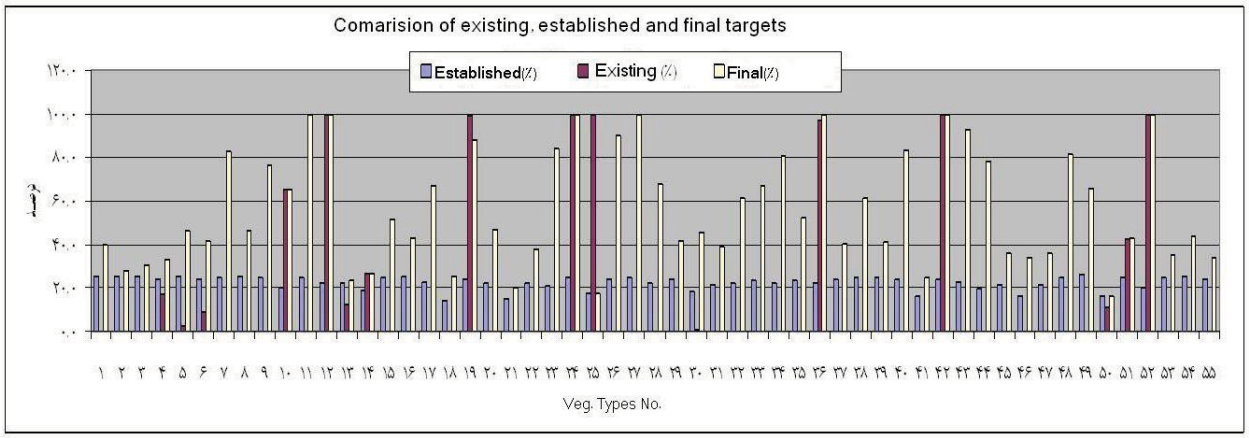

Fig. 2: conservation situation of all vegetation types in terms of existing conservation, established goals and met conservation goals after the selection of new protected areas

Existing protected areas are also poor in terms of vegetation type diversity. Dena with 10 and Dena-ye Sharghi with 9 vegetation types are the most diverse protected areas which constitute only 18.8% and 16.36% of all vegetation types. Other protected areas including Tang-e Soolak, Kooh-e Dill, Kooh-e Khamin and Kooh-e Khiz & Sorkh only have 2,4,4,5 out of 55 vegetation types respectively (3.64%, 7.27%, 7.27% and 9.1%). In terms of

total area allocated to conservation, the selection units which are the results of integrating vegetation type units with land type units concluded more efficient protected areas network (26.27% of the study area vs. 27.18%).

There is also a meaningful difference between total areas allocated to conservation taking or not taking into account the existing protected areas in selecting new protected areas network (26.27% of the study area vs. 22.79%). So, if new protected areas are to be selected in order to fill existing conservation gaps in minimum area, we suppose to use the first kind of planning (selecting) units. However due to the values of existing protected areas in terms of biodiversity elements other than vegetation types we could not ignore them. Thus, in order to fill conservation gaps for all vegetation types, we need to allocate approximately 26.27% of the study area in a good configuration according to all vegetation types' distribution.

Discussion

Unfortunately, in the study area of the present research there is no similar study in order to compare the results. However in national level some natural resources scientists have pointed out conservation gaps in macro vegetative regions especially in Zagros mountains vegetative province which is itself a part of Iran-o-Turanian vegetative region. This study confirms that point of view in a quantitative and local level. Relatively low efficiency of the prioritized protected areas network in both kinds of planning units is due to incomplete coincidence between planning units and vegetation type units. In other word, if a small patch of a vegetation type, which is the only patch of that vegetation type, exists in the study area located in a large planning unit, selecting that planning unit is necessary. The additional area of that unit will decrease the final efficiency of the protected areas network. A solution for this problem is to take the vegetation type unit itself as the planning unit. This study takes an intermediate level of biologic hierarchy into account. It is necessary to consider other lower levels such as species (both animals and plants especially rare and endangered ones) and upper levels such as ecosystems and landscape in order to ensure conservation and persistence of all biodiversity elements in protected areas network.

Key Words

Biodiversity conservation, Vegetation types, protected areas network, Kohgiluye & Boir-Ahmad