The energetic values of landscape components as a tool to describe the behavior of the brown bear (Ursus arctos L.) in relation to the ecological

187

The energetic values of landscape components as a tool to describe the behavior of the brown bear (*Ursus arctos*, L.) in relation to the ecological requirements

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The aim of research was to study the brown bear presence in relation to the landscape pattern, expressed in terms of energy flows, through the quantification of the energetic values and meaning of the natural (biotic and a biotic) and human-related (road networks, settlements, etc.) landscape components. These values were correlated to the estimation of the energy requirements of the bears monitored with GPS techniques (n=4, males) and to the their presence and behavior. The spatial model of energetic values for landscape components have been developed by GIS technology and in the respect to the ecological requirements of brown bear in the central and north east alps (North of Italy, Slovenja and Austria). Data sources were public databases as Corine Land Cover project (UE), Carta della Natura Project (ISPRA) Digital Terrain Model. The spatial resolutions utilized was 1km^2 and the UTM grid was used. For each quadrant was calculated: habitat cover, geomorphology, human presence, brightness (solar radiation corrected for the tree cover) feeding allowance (food allowance index, IDA), climate (Modis), and energy values expressed as estimation of the potential cost of locomotion, thermoregulation, feeding , resting (output) and as potential energy of food allowance (input). For each animals tracked by telemetry were estimated the energy requirements in relation to the cost of basal metabolism,. thermoregulation, locomotion, feeding for each utilized quadrants and compared to the utilized quadrants and in the respect to different level of utilization. The identification and development of landscape indexes, describing many environmental components with implications on animal energy requirements, has been coupled with a behavioral pattern analysis and the computation of animal energy outcomes and incomes. The obtained thematic maps showed the spatial distribution of these input and output: thought them it is possible make habitat characterizations showing potential satisfaction level in terms of ecological requirements for the Brown bear and obtain useful information for defining the habitat energetic suitability at the trans regional scale. This study has revealed several emergent diurnal-nocturnal and seasonal energetic patterns in the use of landscape resources, and has allowed the implementation of some spatially explicit models for the estimation of energy inputs and outputs; the cost of thermoregulation and locomotion (output) and the potential allowance of energy (input), seems to influence the use of landscape and bear behavior. The future development of this research through the use of other individual location datasets (also belonging to different geographical contexts) may allow to refine the approach and identify more precisely the key spatial variables to be measured in terms of energy, as well as to apply this approach to more sophisticated models like IBMs (Individual Based Models).