

Reality and constraints of a biological corridor in the central zone of Mexico

Antonio VILLANUEVA^{1, 2}, Jacques IMBERNON¹

¹ Cirad, UMR TETIS, Campus international de Baillarguet, 34398 Montpellier Cedex 5, France

² AgroParisTech, Doctoral School ABIES, 19 Avenue du Maine, 75732 Paris Cedex 15, France

Contact: antonio.villanueva@cirad.fr & jacques.imbernon@cirad.fr

Keywords: Biodiversity, forest, biological corridor, fragmentation, connectivity, anthropic pressure, Mexico



The **Central Valley (central area)** of Mexico is a priority zone for the conservation of biodiversity because of its highly diverse fauna and flora. Although it holds many protected natural areas, it is under high anthropic pressure: mining activities, agriculture expansion and urban sprawl of large conurbations (Mexico City D.F. and Toluca).

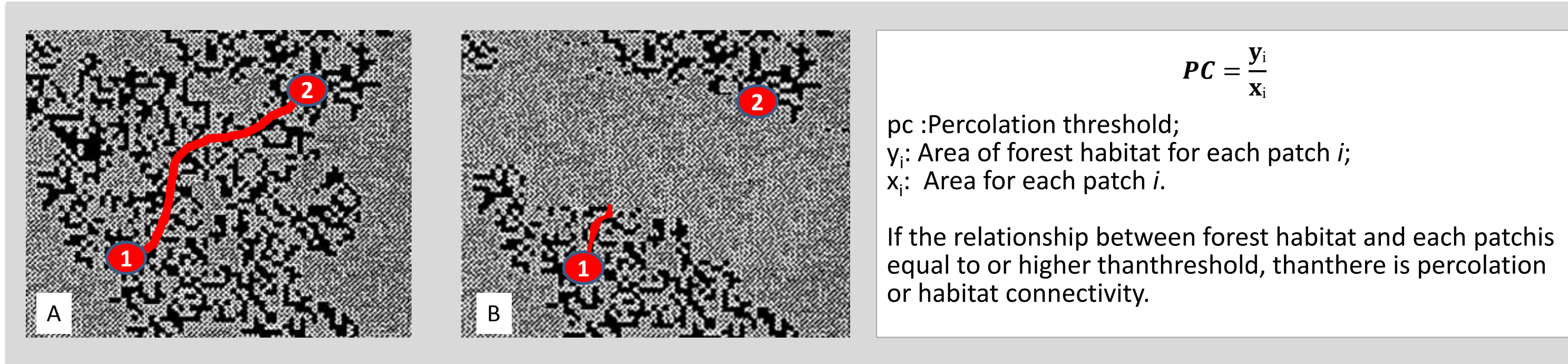


Forest types are: Temperate coniferous, deciduous temperate, broadleaf, tropical or subtropical and mixed. Common species include: *Abies religiosa* ('oyamel'), *Cedrela odorata* (cedar) et *Pinus* spp.

Shrubs, called 'matorral', take various forms: xerophyte, thorny 'magueyales' or 'chaparrals'. In the Trans-Mexican volcanic belt they are represented by common species of secondary subtropical scrublands: *Ipomoea arborescens* ('paloblanco'), *Caesalpinia pulcherrima*, ('tabachin'), *Acacia pennata* ('tepame'), *Fouquieria macdougalii*, ('ocotillo macho') and *Stenocereus thurberi* ('pitahaya').

Connectivity modeling

A percolation model evaluates in a landscape the probability that an organism moves between patches according to the proportion of its habitat within a patch [Decamps *et al.* 2007]. The model allowed to define the connectivity of the forest in the Central Valley area.



Landscape fragmentation in the biological corridor

This corridor is fragile because it is under high anthropic pressure:



Landscape fragmentation is widespread in the protected natural areas and the corridor (Figure 3).

Conclusions

High anthropic pressure in the forest spaces of the *Central Valley* poses a risk to the connectivity in the corridor. The protected natural areas have a major part to play in the conservation of this connectivity. Implementing their protection is essential.

In particular, to ensure connectivity between habitats, efforts have to be made (i) in areas that connect the protected natural areas and (ii) to preserve 'matorral' shrubs. These shrubs represent a lower value than forests in terms of biomass production or carbon sequestration, but their disappearance would create new barriers within the biological corridor of the *Central Valley*.

References

- CONABIO, 2010. Cobertura del suelo de México, 2005 a 250 metros. Portal de geoinformación, catalogo de metadatos geográfico. Elaborada por el centro canadiense de teledetección, sector ciencias de la tierra, ministerio de recursos naturales, 2010. Cobertura del suelo de México, 2005 a 250 metros.
- DECAMPS H., DECAMPS O., 2007. Organisation de l'espace et processus écologiques. *Économie rurale* : 297-298 p.
- MCGARIGAL K, SA Cushman M, ENE E., 2002. FRAGSTATS: Spatial Pattern Analysis Program for Categorical Maps. Computer software program produced by the authors at the University of Massachusetts, Amherst. Available at the following web site: <http://www.umass.edu/landeco/research/fragstats/fragstats.html>

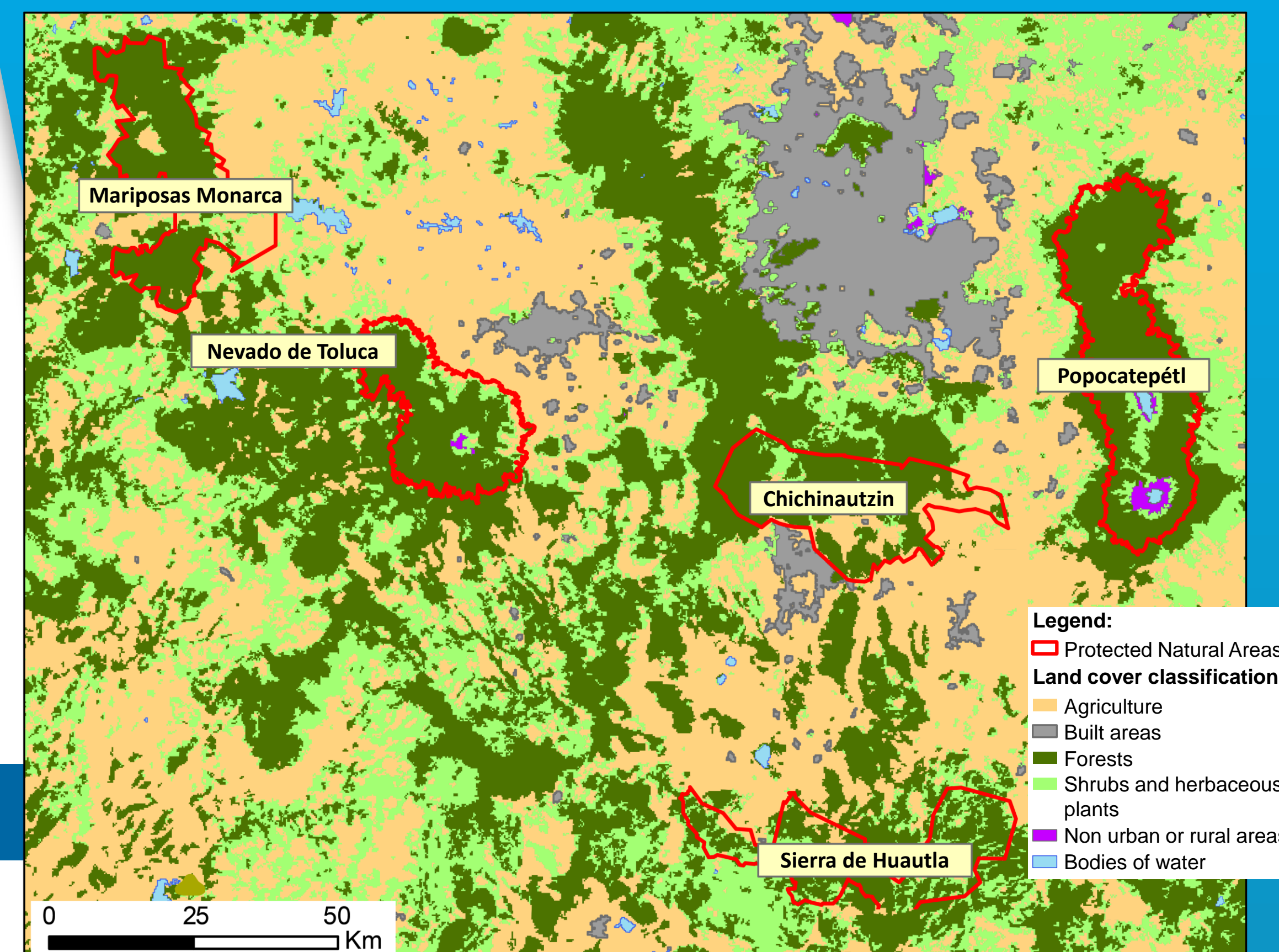


Figure 1: Land cover in Central Valley, Mexico in 2005 (CONABIO, 2010)

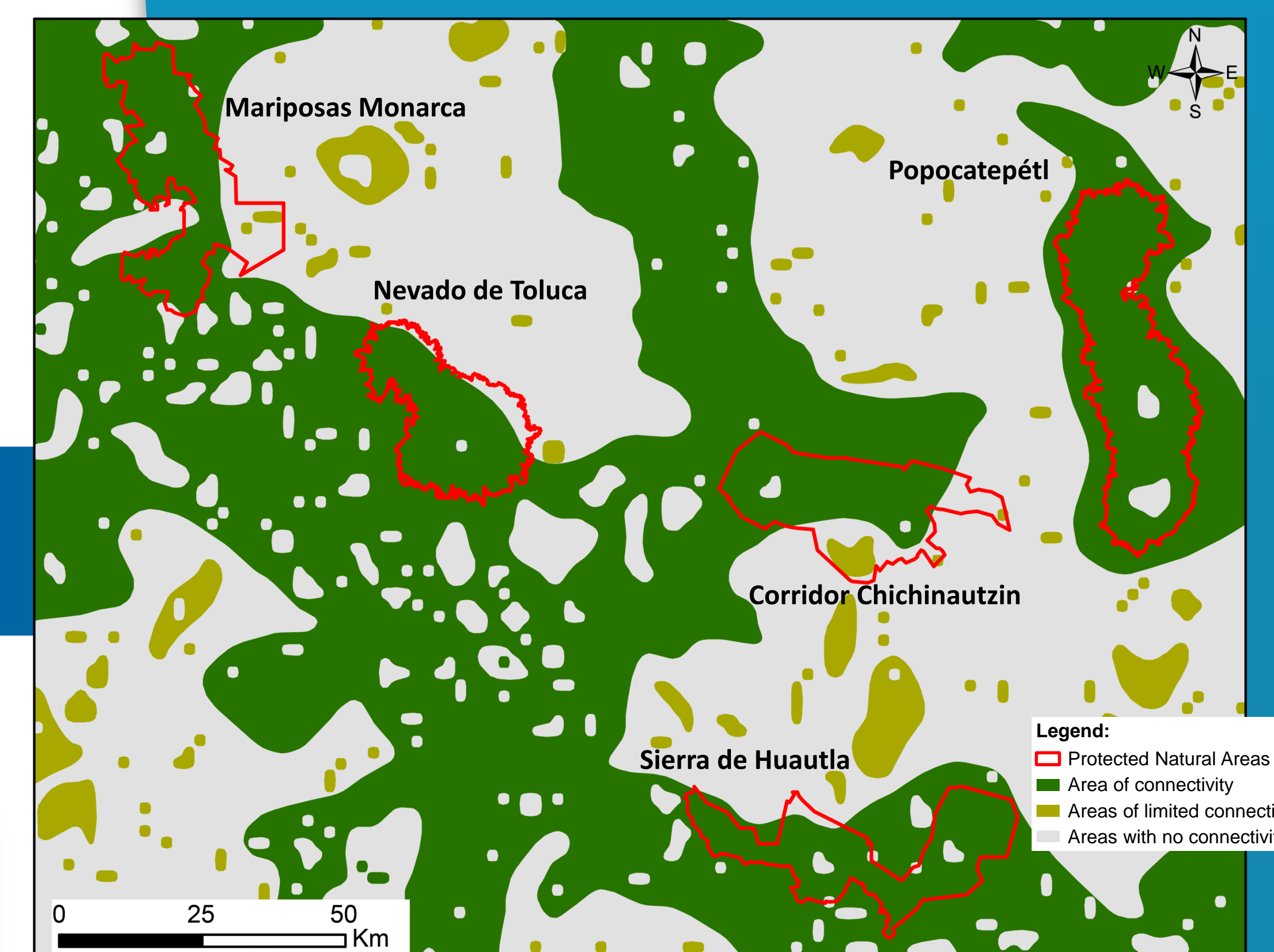


Figure 2: The modeling of Biological Corridor

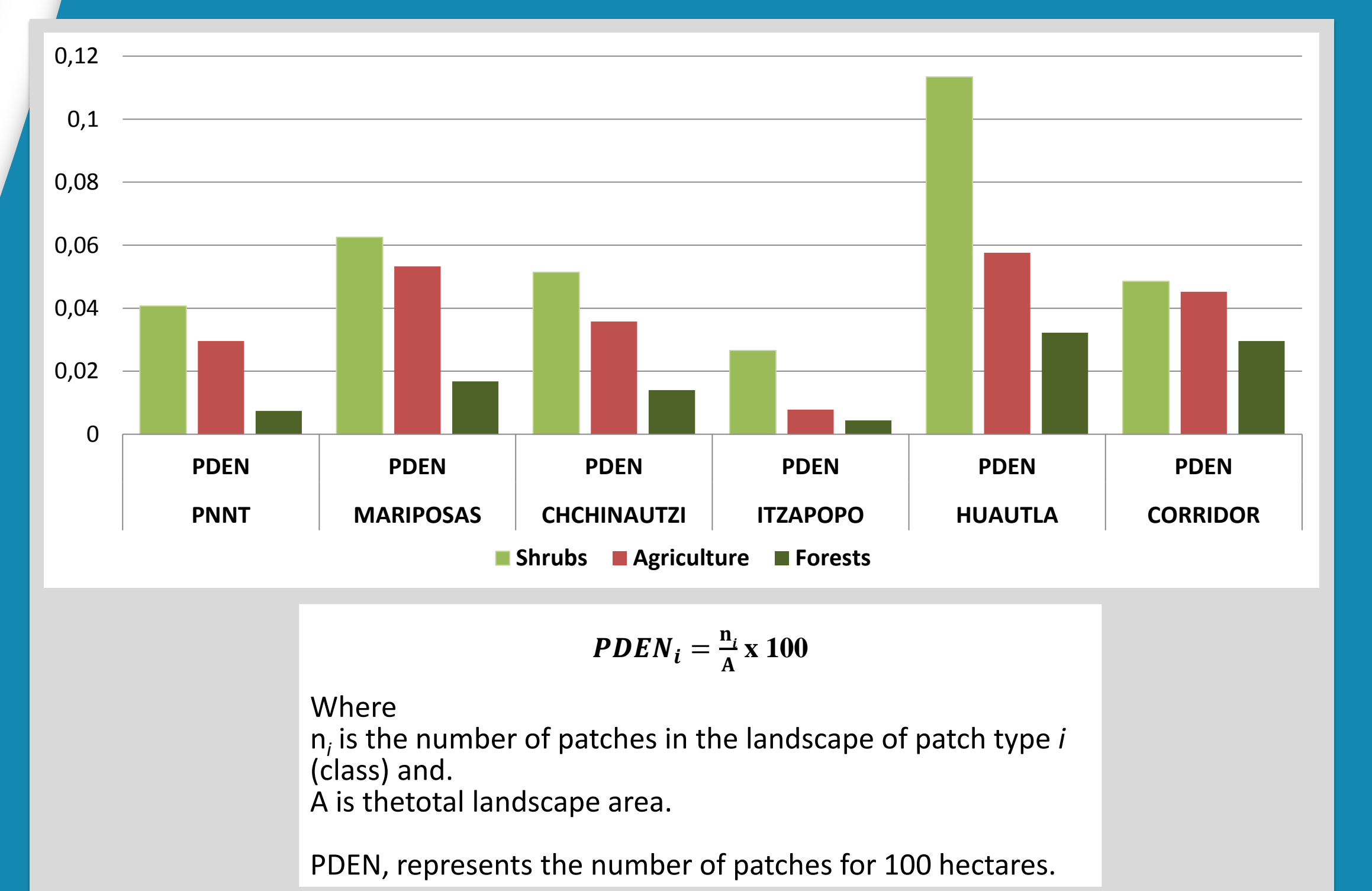


Figure 3: Indicator of patch density (PDEN) in the protected natural areas and the biological corridor.