

## Chapter 17

# Modeling of Current and Future State of Biodiversity in Central America Using GLOBIO3 Methodology

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### ABSTRACT

*The modeling of the state of biodiversity in Central America using GLOBIO3 methodology was carried out by the Regional Biodiversity Institute for the Central American Commission on Environment and Development. For each country, current and future states of biodiversity under three socio-economic scenarios were explored. The country results were integrated into one regional assessment. The aim of this chapter is to explain how GLOBIO3 was adapted to the national scale. The main issues and the approaches adopted to solve them are described. The results from the Central American experience are presented followed by a discussion on main model limitations and derived recommendations. Finally, the challenges countries face to integrate the results into their government agendas are analyzed. This chapter is expected to be helpful for potential users of GLOBIO3 who are interested in the application of the methodology on a national and sub regional scale.*

### 1. INTRODUCTION

Earth biodiversity is experiencing a series of accelerated deterioration, mainly due to human influence. Evidence shows that rates of extinctions have risen to historical levels and ecosystems ability to

supply goods and services has been substantially reduced (United Nations [UN], 1993).

The most affected by biodiversity degradation are the people with fewer resources. These people usually depend directly on biodiversity and ecosystem services for their subsistence and they have fewer resources to deal with unfavorable environmental condition. As a result, bio-

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diversity degradation represents a major barrier for the achievement of the international objective of poverty reduction (Mertz *et al.*, 2007; World Conservation Union [IUCN], 2010; UN, 2010). In this context, the countries that integrate the Convention on Biological Diversity (CBD) agreed on 2002 to significantly reduce the rate of biodiversity loss at global, regional and national level (CBD, 2006).

To achieve this goal, a broader understanding of the effects of biodiversity loss is needed. Existing knowledge on biodiversity composition and functioning is only partial, same with our understanding on the mechanisms through which humans affect biodiversity and the consequences of the effects. Methods are needed to evaluate the state of biodiversity, to estimate future trends, and to evaluate potential intervention strategies considered by decision makers to achieve conservation goals. In particular, countries need to identify where they stand regarding the CBD target and which are the most efficient ways to achieve it.

This type of evaluation may represent a challenge for many countries. While having the political will to do it, they may lack the financial resources, technical capacity or the relevant information required. This is frequently the case of developing countries, where monitoring systems are weak, resources are scarce and there is still a lack of support for timely decision making. While many developing countries have high levels of biodiversity associated to their geographical location and to their areas of undisturbed ecosystems (United Nation Environmental Program [UNEP] & Central American Commission on Environment and Development [CCAD], 2006), both the population's pressing needs and the economic growth planned in government agendas are expected to be achieved at the cost of natural resource depletion. These conditions make fast, effective, and affordable approaches to biodiversity assessment in developing countries even more a priority.

The case study presented in this chapter is an example of such an approach. The modeling of the current and future state of biodiversity in Central America was carried out in 2009 and 2010 by the Regional Biodiversity Institute (IRBIO) for the Central American Commission on Environment and Development (CCAD). CCAD requested assistance from the Netherlands Environmental Assessment Agency (PBL) and UNEP to support the development of scientifically sound policy support tools as part of their commitment with the CBD. PBL extended its support by assisting in the implementation of a regional biodiversity assessment based on individual country models. GLOBIO3 methodology was used to evaluate the current state of biodiversity and to compare with the future state according to: (1) a baseline scenario with the projection of ongoing growth trends, (2) a policy option of the implementation of the Alliance for the Sustainable Development of Central America (ALIDES) and (3) a policy option of trade liberalization.

The aim of this chapter is to describe the application of the GLOBIO3 methodology in the Central American context. The specific objectives are to describe the adaptation process and to identify key success factors and main constraints. The downscaled methodology is explained and the main issues faced during the modeling experience and the approaches adopted to solve them are described. The results are presented, followed by a discussion on main modeling limitations and recommendations. Finally, the challenges countries face to update the model and integrate the results into their government agendas are analyzed. The chapter is expected to help potential users of GLOBIO3 methodology, such as government agencies, NGOs and institutions who are interested in the application of GLOBIO3 on a national or sub regional scale.

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