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# Urdaibai Biosphere Reserve (Biscay, Spain): Conservation against development?

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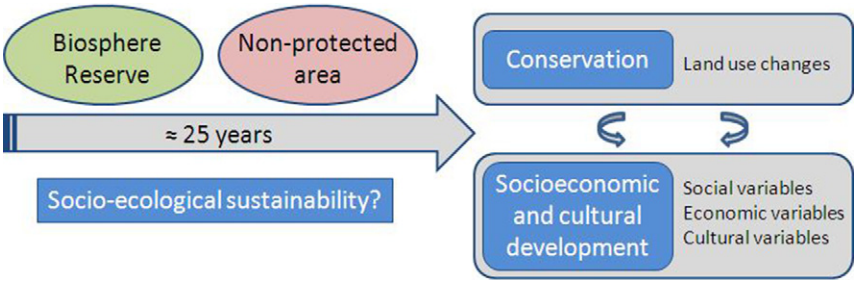
## HIGHLIGHTS

- Protected or not, landscape and socio-economic and cultural tendency hardly varies.
- The designation of the biosphere reserve helps to the conservation.
- The designation of the biosphere reserve has slow down the abandonment of rural activities.
- The biosphere reserve reinforces the local socioeconomics and cultural values.

## GRAPHICAL ABSTRACT

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## ABSTRACT

The protected area approach has extended from conserving biodiversity to improving human well-being. However, the relationship between conservation and socioeconomic and cultural development continues to be controversial. This paper combines land use variables with socioeconomic and cultural variables through multivariate ordination analysis and evaluates their evolution in two areas inside and outside a Biosphere Reserve since the approval of the Governance Plan for Use and Management in the Reserve. The results indicate a similar tendency in the two areas, from the abandonment of traditional rural activities and decline in pine plantations to naturalness, urban sprawl and the growth of the tertiary economic sector, welfare indicators and sustainability index. However, it can be broadly observed that the region included inside the protected area presents better conservation features (native forest) and rural systems (forestry and primary economic sector) than the region outside the protected area while maintaining similar socioeconomic and cultural conditions. We suggest that the designation of the Biosphere Reserve does not influence the local population negatively but does safeguard its conservation, which could have enhanced socioeconomic and cultural development. Thus, even though certain changes must be made to replace the conifer plantations and encourage agricultural activities, the designation of the protected area fulfills its sustainability goal and enhances the local population's quality of life.

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## 1. Introduction

Ecosystems support all humans' activities and lives, and the ecosystem goods and services they offer are vital to human well-being and economic and social development (MA, 2005). Protected Areas (PAs) have become a key instrument for conserving biodiversity. To date, >15% of the world's land and 3% of the oceans are covered by PAs (IUCN, 2016). The primary aim of Pas is to protect particular species or habitats from the pressure of people. PAs are widely recognized to deliver (global) environmental benefits, such as carbon sequestration, biodiversity, and water regulation (Palomo et al., 2011; Castro et al., 2015), but they are also criticised for not being effectively managed to achieve their basic conservation objectives (Watson et al., 2014) and for having

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negative impacts on local populations (Oldekop et al., 2015). Furthermore, their surrounding lands may become degraded or intensified more than usually (DeFries et al., 2007; Martín-López et al., 2011), which increases the conservation and social conflicts inside and outside the PAs.

One of the most debated issues in conservation policy is the socioeconomic impact of PAs, either positive or negative, on neighbouring and local communities. Indeed, the relation between development and biodiversity is very complex. Some studies highlight that biodiversity protection and conservation contribute to one of the most important United Nations Millennium Development Goals, which is poverty reduction (Andam et al., 2010; Ferraro and Hanauer, 2014; Hanauer and Canavire-Bacarreza, 2015). In contrast, others claim that PAs amplify local poverty or that there is no clear effect (West et al., 2006; Upton et al., 2008; Brockington and Wilkie, 2015). Surprisingly, areas of high poverty and high biodiversity overlap globally (Fisher and Christopher, 2007), and it is widely acknowledged that biodiversity loss and poverty are linked problems (Adams et al., 2004). Biodiversity underpins the ecosystem services upon which society depends. Poor people especially often depend directly on such services on a daily basis for subsistence or income. Consequently, they live in a vicious cycle where the more biodiversity is degraded, the more the poor are affected.

Arguments against PAs hold that local population development is restricted due to limitations on some activities or the exploitation of natural resources (Pullin et al., 2013), evictions and land appropriation (Brockington and Igoe, 2006), and crop damage and livestock depredation (Mackenzie, 2012). However, these negative effects are balanced by others, such as the promotion of tourism (Sims, 2010), the improvement of infrastructures and facilities (Ferraro and Hanauer, 2014), an increase of local funding pathways, business and home values (Heagney et al., 2015), research and environmental education, and especially, the preservation and enhancement of the environment in general and in terms of ecosystem services in particular (Balmford et al., 2002; Eastwood et al., 2016). These final aspects do not have direct market price, so the economic value of these areas would be even higher.

Sustainable development has been a political catchphrase for almost 30 years; however, we are still far from reaching global sustainability (Helne and Hirvilammi, 2015; Rodríguez-Rosa et al., 2016). In light of this situation and considering the ongoing increase in the number of protected areas, the politics for implementing sustainable development much be based on studies of the biophysical, social and economic systems at appropriate scales (Le Blanc, 2015). Suitable environmental management requires the consideration of local people's needs. Certainly, as Oldekop et al. (2015) suggested, conservation targets are more likely to be achieved when PAs encourage socioeconomic benefits through sustainability instead of imposing strict protection. That is precisely what a Biosphere Reserve seeks. Biosphere Reserves focus on the involvement of the local communities in management with the aim of reconciling nature conservation and sustainable development (UNESCO, 2016). They represent a model for reinforcing a sense of place or a principle of solidarity between humans and nature (Bouamrane et al., 2016). Their integration in a network with common governance and management could contribute effectively to the solution of the global problems of species loss, the over-exploitation of resources and adaptation to climate change for the goal of global social-ecological sustainability (Lopoukhine et al., 2012). Many cultural landscapes and social-ecological systems closely linked to rural activities, protected or not, have been seriously impacted as a consequence of environmental and socioeconomic changes, such asagrarian intensification or land abandonment (Rescia et al., 2010; Schmitz et al., 2012), directly affecting the socioeconomic and cultural context of territories.

Therefore, assessing the land uses and socioeconomic and cultural changes may explain the influence of protected areas in the maintenance of landscape structures and communities and local economies. However, most of the studies, some of which are mentioned above, have been applied to developing countries. By contrast, this paper examines the land uses and socioeconomic and cultural changes in two developed, contiguous and environmentally similar areas, one included in a protected area and the other one in a non-protected area; and evaluates their evolution to determine the effect of the designation of the protection figure and whether it has contributed to its principal objectives.

## 2. Materials and methods

### 2.1. Study areas

Designated as a Biosphere Reserve in 1984 because of its high naturalistic and cultural value, the Urdaibai Biosphere Reserve (Biscay, Northern of Spain) was also added to the list of Ramsar Wetlands in 1993 and the network of the European Union Natura 2000. It constitutes a rural social-ecological system, being the "caserío", a historic Basque Country farm, a socioeconomic organizing unit of an agro-silvopastoral mosaic landscape. This reserve's origin resides in the seventies as a consequence of the social mobilization against the implementation of a megaproject called "Special Plan for the Integrated Use of the estuary of Gernika-Mundaka", which, ultimately, intended to dry the marsh and transform the estuary into an area of large infrastructure and residential services (Arana, 1997).

The reserve's primary functions include the conservation of naturalistic values (ecological variety and complexity), sustainable socioeconomic development of the territory, and logistical support (research, training, and dissemination and interpretation of the area). To this end, among others, a Governance Plan for Use and Management (GPUM) was approved in 1993 (Basque Government, 2004) and reviewed this year, which articulates the guidelines for management and conservation to reconcile the conservation of natural resources with their sustainable use. It involves the classical zonation of a Biosphere Reserve corresponding to a core area of strictly protected ecosystems (coastal ecosystems, marshlands and green-oak forests), a buffer zone where human activity is limited, and a transition zone extended to the outside area where greater activity is allowed. Moreover, a Plan for the Harmonisation and Development of Socio-economic Activities (Basque Government, 1999), which was recently evaluated, and the Plan for the Interpretation, Research, Training and Education for the Sustainable Development of the Urdaibai Biosphere Reserve 2015–2025 (Basque Government, 2015) were also adopted.

The Urdaibai Biosphere Reserve (UBR) covers 22 municipalities totally or partially. Due to its complicated administrative division and considering that the study is based on the municipal level, the region of Busturialdea (Biscay) was taken as a reference (Fig. 1). The region of Busturialdea has an area of approximately 27,000 ha covering 20 municipalities, all of them included in the UBR except one (Fig. 1). It represents a complex social-ecological system where contrary interests coexist. As a result, its management can turn very conflictive and controversial (Onaindia et al., 2013a). Specifically, the almost complete predominance of *Pinus radiata* and *Eucalyptus* sp. monoculture plantations and their unsustainable management has brought about erosion, worsening water quality and a decline of fresh water supplies, and the loss of aesthetic values, among others (Onaindia et al., 2013b; Rodríguez-Loinaz et al., 2013).

In addition, the non-protected region of Uribe Kosta (Biscay) was selected for the purpose of comparison. This region is next to the region of Busturialdea and has similar characteristic in the sense that it has an important rural past from its Basque cultural heritage, a smaller but valuable (ecologically, social-culturally and economically) estuary and a similar population, although Uribe Kosta is smaller in size. This region has an area of approximately 21,000 ha covering 15 municipalities (Fig. 1).

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