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Who receives biodiversity royalties?

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1 Introduction

Biodiversity provides various ecosystem services, which have been assigned different types of value over time, including an economic value (IPBES, 2022). The economic value has implications for the conservation of biodiversity over time, ensuring its persistence, as is the case of the green economy proposed by UNEP. In order to assign values, the biodiversity has been classified according to the benefits that man obtains (Pascual et al., 2023). Most of these values are associated with outdoor activities promoting tourism and recreation (Kabil et al., 2022). In general, outdoor activities are considered as ecotourism with a low impact on biodiversity (Fennel and Weaver, 2005; Casimiro et al., 2023). They may require a trained guide, specific equipment, and, frequently, additional services (Maciejko and Grzeskowiak, 2024).

Many outdoor activities take place within protected and conserved areas (PCA), managed by governance (UNEP-WCMC, 2020). Some activities allowed within PCAs include wildlife sighting (birdwatching; Janeczko et al., 2021), hiking routes traced in different natural scenarios and involving various difficulty degrees (Chhetri et al., 2004). In coastal areas, windsurfing, kiting, paddle boarding, diving, snorkeling, and catch-and-release (Freire et al., 2020; Lucrezi et al., 2020; Lara-Pulido et al., 2021; Lloret et al., 2021; March et al., 2022).

The relationship between biodiversity and the assignment of an economic value to it, as well as its direct and indirect impacts on the local and global economy, is still poorly understood. Probably because it has been analyzed separately in the different spheres (social, cultural, economic, political, and biological) rather than in a comprehensive way, overlooking networks between them (Paul et al., 2020).

The economic benefits obtained through biodiversity royalties, defined as the income derived indirectly from biodiversity (Monroy-Gamboa et al., 2023), have different origins and scopes. Various activities associated with biodiversity (ACABIOs) are carried out (Monroy-Gamboa et al., 2023) that are not always considered among the range of ecosystem services. ACABIOs generate direct and indirect inputs and expenses. Our hypothesis is that a high percentage of biodiversity royalties is either unreachable or remains within the towns with biodiversity economy. The economic benefits are diffused as the tourist uses the services at different scales (regional, national, or international).

Wealth producers do not consider that part of the economic benefits come from ACABIOs. This process, together with the dispersion of economic resources outside the ACABIO due to the financial location of operators and service providers, is considered one of the main reasons why most places with high biodiversity also have high rates of poverty, economic inequality, and infrastructure deficiencies. It is essential to highlight this phenomenon so that reinvestment in ACABIOs increases. Biodiversity royalties should be considered as a financial contribution from activities associated with biodiversity. Three axes (destination pathways, destination royalties and formal and informal economy) are developed

below in order to discuss the economic revenues at different levels and why a percentage of this income should be reinvested in conservation *per se*.

2 Axes of the biodiversity royalties

The biodiversity royalties could be divided in three different main axes.

2.1 Destination pathways

The destination pathways of biodiversity royalties are those services or products in which the expenditure is made at towns with biodiversity economy (TOBIECO; Monroy-Gamboa et al., 2023).

2.1.1 Lodgings

At the TOBIECO level, lodgings include family or community accommodations, which represent 100% of the profits, generally do not pay taxes. At the regional level, there can be hostels, glamping sites, hotels, or houses for rent. The owner of these facilities keeps the income and may pay taxes. When fees are paid in cash, no invoice is produced, and no taxes are paid. Any revenues from hotel chains and the respective taxes are raised at the federal rather than local level.

Internet booking services from international chains generate profits and taxes in the country of tax registration. Frequently, this is different from the country where the service is being provided, because these companies are settled in developed countries; consequently, these revenues do not reach the origin ACABIO country. Part of this income could be used to finance activities that benefit local biodiversity, allocating them to the conservation and use of those ecosystems that generate biodiversity royalties. The magnitude of this tax could be estimated using an economic method to value the natural resources and the environment.

2.1.2 Food

In TOBIECOs, food is available from food stalls, markets, or places where seasonal food is served, which is sometimes purchased directly from local producers (Fernández-Ferrín et al., 2019). Trade is one-to-one without intermediaries, so they do not generate taxes. Self-employment or family employment is common and positively and directly impacts familiar economy. At the regional level, there are small restaurants.

National restaurant chains involve other types of expenses because they offer a standardized menu with specific and larger inputs, having expenses related to their employees, rent, services, and taxes. Restaurant considered gourmet may use imported inputs and hire international chefs; frequently, performed by a foreign person of the ACABIO country.

2.1.3 Services

The TOBIECO may hire informal employees, who can work as non-certified guides, automobile carers or chargers; in these cases, the service is paid directly to the provider, without taxes. At regional level, services are provided by people living in the TOBIECO, and even being part of the ACABIO, including boat transport, certified

guides, and people renting out specialized equipment. These providers can be self-employed or belong to a cooperative or business that hires them, offering payments and rights as workers. This category includes providers of public services, such as doctors or police officers, in addition to public services such as cleaning, sewage, and water. Services at the national level include those provided to the whole country, such as electricity.

2.1.4 Souvenirs

Artisans are generally TOBIECO inhabitants who use local inputs directly obtained from the ecosystem. These are also one-to-one sales, so the profits go directly to the craftsman-trader and no taxes are paid. At the regional level, shops sell not only handcrafts (traders buy products directly from artisans) but also other types of products already manufactured in other regions, for which taxes and services are paid. Manufactured products are considered to unfairly compete with handcrafts because of their low price and nil local involvement in their elaboration.

2.1.5 Preparatory trade

This refers to the sales of products acquired by people in their country or place of origin. For example, a person will need some equipment or products. The tourists will buy these inputs in their origin place so, the economic benefits remain in the country or place of origin. This is better conceptualized at the international level but can also occur at the national level. These economic benefits are never considered part of the financial gains that the PCA should obtain.

2.1.6 Employment

All destination pathways offer employment options for various population sectors. In general, self-employment or informal employment is common in TOBIECOs, which positively impacts the family economy with no tax payment. On the other hand, there are no labor or social security benefits, so the local poverty level is maintained.

At the regional level, employment contracts involve commitments by employers. Usually, jobs are in the services sector with low salaries; employees work in activities involving little training. At the national level, more specialized professionals or service providers are hired in addition to the low-income core staff. They are paid higher salaries, and most of them do not belong to the local community. The big companies involving senior high-level positions offer the highest salaries for top managers, who are paid in international currency and are not local inhabitants either. The effect they produce in the country of origin, where they achieve a percent increase in economic activity over the previous level, is hard to assess.

2.2 Destination of royalties

2.2.1 TOBIECO

Most biodiversity royalties are generated by some ACABIOs. The profits derived from ACABIOs have a direct positive impact local inhabitants and their families. Generally, activities and products do not produce the expected due taxes. All profits remain with the individual providing the service or selling self-manufactured products.

Indirectly, some people sell their products to other informal traders, such as in the case of various inputs to a restaurant. The traders that directly sell their products earn 100% of the profits. In these cases, production is limited and has little economic gain, thus limiting local wealth creation. Considering biodiversity royalties as a whole, this sector gets the lowest profits percentage.

2.2.2 Regional level

Regional income is higher than that of TOBIECOs, which are local, due to the services and jobs that produce taxes. Some are state taxes or are associated with tourism or local or state administration services. In this way, local and regional governments obtain profits from ACABIOs. ACABIOs produce jobs for local inhabitants or people from communities near TOBIECOs.

2.2.3 National level

Most taxes collected by ACABIOs, regardless of where the TOBIECO is located, belong to the federal government and remain in the country. These taxes involve consumption, jobs, services, and rents related to service provisioning in ACABIOs, as well as revenue collection from access to PCAs by visitors.

2.2.4 International level

This level includes several inputs required to carry out ACABIOs and some of the visitors come from a different country than TOBIECO. It includes the purchase of flight tickets and accommodation reservations on websites; therefore, the respective taxes remain in the country where the purchase was made. These economic resources rarely reach the country where ACABIOs are carried out, and, in these cases, these profits are monopolized by federal tax collectors, so these never reach local or regional governments. High-salary jobs can also be generated at this level, involving highly specialized jobs given to foreigners who are paid higher salaries than local employees and in international currency.

There are always exceptions in each of the categories mentioned above. Furthermore, each place is different, so the information outlined in this document is not static and can vary according to each particular situation.

2.3 Formal and informal economy

The strongest argument of mega entrepreneurs for not financing ACABIOS is that biodiversity locations do not need to be financed directly by companies. This discourse is based on the facts that the economic activities related to biodiversity produce and pay local and federal taxes, which the government theoretically returns as a budget, and that tourism produces local wealth. Generally, companies and governments do not consider that biodiversity royalties are used for national and international public administration not linked to ACABIOS. Indirectly, the total regional, national, and international biodiversity royalties may represent more resources than local revenues (for example, the taxes associated with international flights are higher than the profits of local inhabitants from handicrafts or local food). The biodiversity royalties of ACABIOS are a direct source of profits and taxes at different levels, including the countries where TOBIECOs are located and the visitor's country of origin.

3 Discussion

Biodiversity royalties associated with ACABIOs are a set of economic resources that range from the local point to the economic activities in developed countries (Monroy-Gamboa et al., 2023). The present analysis shows how biodiversity has economic effects at various levels and is a driving force of the economy. Conversely, many entities that get considerable revenues for biodiversity royalties do not carry out any activities at TOBIECOs that directly support the local inhabitants or the economy and do not contribute to preserving and managing biodiversity. The way in which biodiversity royalties are spread results in that their economic benefits are not linked to biodiversity conservation, the minimum benefit is for the local people who are the ones living in the biodiverse place, reflecting an inequitable economic impact on society.

The true value of biodiversity is not correctly valued and, therefore, is underrated (Kabil et al., 2022), less than 5% of it is methodically valued (IPBES, 2022). It is necessary to understand and assess the effect of biodiversity royalties at the regional, national, and international levels, and their contribution to the economy of various social groups and localities, regardless of their value to the environment. Biodiversity royalties can allocate economic value to the discourse on the protection of biodiversity as a natural resource that provides economic benefits for many people, so they can be used to ensure the conservation of biodiversity over time.

Author contributions

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