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## Sport fisheries: Opportunities and challenges for diversifying coastal livelihoods in the Pacific



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### ABSTRACT

High population growth rates and poverty are likely to elevate the vulnerability of many coastal communities in the Pacific region to climate change. Alternative livelihood strategies which can generate income and simultaneously conserve fish stocks and their habitats are a priority. This paper investigates the feasibility of 'sport fishing' (recreational catch and release angling for particular species of predatory game fish) as such a strategy. The limited research of sport fisheries in developing countries is augmented with a review of community-based ecotourism, integrated conservation and development projects (ICDPs) and common property management literature to propose design principles. Five pre-requisite principles for the success of sport fishery enterprises are suggested. First, adequate local capacity must be available to manage a tourism business and facilities, supported by cross-scale co-management amongst stakeholders. Second, appropriate governance arrangements must be in place to ensure the equitable dispersal of benefits to all members of the local community, and conflict resolution. Third, resource-ownership boundaries and rights must be clearly delineated before the enterprise begins in order to minimise the potential for future conflict. Fourth, social, biodiversity and ecosystem service co-benefits should result from the enterprise. These should include improvements in income, health, education, food security, the status of the target and non-target species and their habitat and non-fishery ecosystem services. Fifth, monitoring and evaluation of these principles is required within an adaptive co-management framework which takes a social-ecological systems approach and includes all stakeholders in social learning and power-sharing. Through this, broader impacts of the enterprise may emerge which go beyond the standard assessment of ecotourism and ICDP success in financial or biodiversity terms. These principles now need to be tested by researching the experiences of case studies of sport fishing enterprises in the Pacific.

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### 1. Introduction

Fisheries are an important source of protein for developing island nations in the Pacific region, and high population growth rates across much of the region are likely to elevate the importance of fish for food security [1–4]. Rural populations in the Pacific are generally the most impoverished and the most reliant on subsistence hunting and fishing [5,6]. Pacific island nations are also highly vulnerable to the impacts of climate change given their high rates of poverty, geographical characteristics and lack of infrastructure to adapt to environmental stress [7–9]. Pacific nations must therefore find innovative management strategies for fisheries which simultaneously achieve food security,

provide sustainable local livelihoods and contribute to economic development [2].

Ecotourism is one such strategy which has often been promoted by integrated conservation and development projects (ICDPs). The basic premise of ecotourism is that revenue earned by local resource owners from the non-consumptive use of threatened species or habitats generates an incentive for these communities to protect them, thus creating a positive feedback loop for biodiversity conservation and livelihood development [10,11]. This concept has been termed the 'enterprise approach', which underpinned the evolution of ICDPs in the 1990s [12–15], and theoretically enabled local communities to benefit from the sustainable utilisation of their natural resources (Fig. 1a). While there is only limited evidence that consumptive enterprises (e.g. timber harvesting) clearly achieve conservation outcomes, non-consumptive activities such as tourism show greater evidence of positive synergies [12,13].

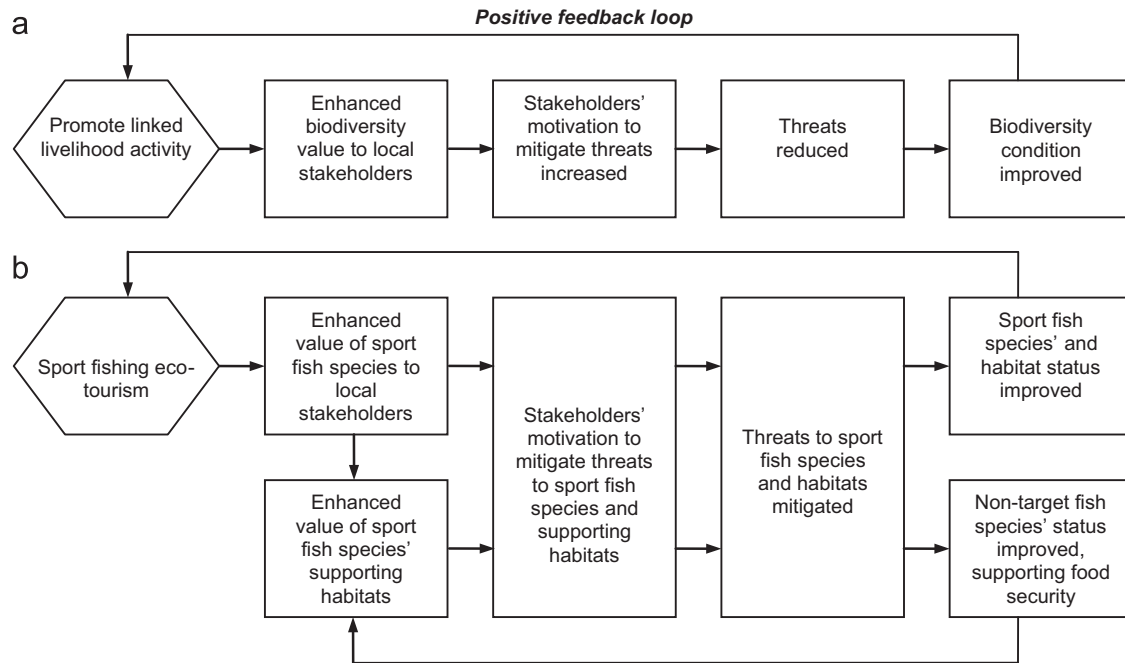
Ecotourism presents particular opportunities to disadvantaged communities because they tend to live in the least developed areas

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**Fig. 1.** Conceptual representations of (a) the enterprise approach to integrated conservation and development (adapted from [12,13]), and (b) the double linkage between conservation of target sport fish and non-target species and their habitats, and livelihoods development created by a community-based sport fishing ecotourism. Hexagons represent enterprises based on biodiversity, and boxes represent outcomes.

which consequently offer the greatest nature-based tourism potential [15–17]. However, despite this great potential, literature providing clear evidence of the conditions required for a successful project is rare [18]. This is of particular note within the Pacific region, where few ecotourism projects have been attempted in a manner that provides quantitative, defensible data from which to design and implement similar enterprises. There are even fewer analyses of sport fishing as an ecotourism activity and its potential benefits for coastal fisheries resources and dependent communities. The Pacific already offers world class angling opportunities for 'blue water' species such as blue marlin (*Makaira nigricans*) and tuna (*Thunnus* spp.), lagoon species such as bonefish (*Albula vulpes*) and trevally (*Caranx* and *Carangoides* spp.), and freshwater species such as the Papuan black bass (*Lutjanus goldiei*), barramundi (*Lates calcarifer*) and mangrove jack (*Lutjanus argentimaculatus*) [19]. However, none of these fisheries have been comprehensively analysed in terms of ecotourism or ICDPs.

## 2. Sport fishing as community-based ecotourism

Here sport fishing is defined as rod-and-line fishing which is carried out primarily for recreation, and targets particular species of fish. Both the choices of gear and the target species for their fighting qualities contribute to the sport of the activity, as the fish is played by the angler until landed or lost [20]. Sport fishing (including game fishing) generally adheres to a particular set of rules and regulations set by governing bodies such as the International Game Fish Association (IGFA) [21]. Given the IGFA's recent inclusion of lagoon, estuarine and freshwater species as game fish [22], this definition is extended beyond the blue water species usually referred to as game fish in the Pacific [21,23].

There is some debate surrounding the classification of sport fishing as ecotourism [24–26], but it can conform to existing definitions (see [27,16]) if it meets the following two criteria. First, fishing methods must minimise fish stress and catch mortality by applying catch-and-release, and second, the tourism venture must contribute to biodiversity conservation and poverty alleviation

through the provision of alternative livelihoods and increased income, and so the enhancement of the value of living fish and their supporting habitat to local communities [24,28].

Theoretically, sport fishing ecotourism could generate an economic incentive for the protection of the fish species targeted by the angler [29]. In terms of the enterprise approach to ICDPs, a double linkage could also occur where the protection of the target species' habitat is beneficial to other non-target species that are important for local food security (Fig. 1b).

## 3. Principles for successful sport fishing ecotourism

There is no blueprint approach for ICDPs [18]. Conditions contributing to the success of projects differ according to the cultural, social, and economic context [17,30,6], and there is no guarantee that positive biodiversity outcomes will be directly associated with livelihood outcomes [31]. It is notable that ICDPs have been subject to high rates of failure in terms of project longevity [32] and the delivery of anticipated social and ecological outcomes [33–35]. Similarly, ecotourism operates within highly complex social–ecological systems, and therefore enterprises need to promote activities and decision-making processes which are context-compatible [36–39].

Past studies have examined the determinants of successful outcomes in the fields of community-based ecotourism, ICDPs and common property management. There is also extensive literature focused on customary management and marine protected areas in the Pacific. Because literature specific to sport fishing ecotourism is scarce, this related experience is drawn upon to identify possible factors that may influence the achievement of both fisheries conservation and improved livelihoods from sport fishing enterprises in the Pacific region. From this, five linked pre-requisite principles for success are proposed and discussed. Given that resources to initiate and sustain ecotourism enterprises are generally limited, the identification of those pre-requisites may be important to guide more effective investment for future projects [40].

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