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Nature's contributions to people in the context of a changing traditional rice cultivation landscape in the Upper Baram, Malaysia

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ABSTRACT

Traditional rice agroecosystems face socioeconomic, political, technical and environmental challenges that are resulting in changes in the traditional land use and management system and its contributions to indigenous farmers. This study explored the contributions made by swidden and wet rice agroecosystems in a traditional rice cultivation landscape and how this landscape has been influenced by recent changes in land use and management. Data were gathered from two villages in the Upper Baram, Malaysia, using semi-structured interviews with 43 farmers, and examined by qualitative content analysis. Farmers perceived different benefits from the rice agroecosystems over and above rice, such as non-rice food supply, habitat creation and support of their identity. The wet rice agroecosystem benefits farmers through higher rice yields, while the swidden rice agroecosystem provides a greater diversity of material contributions. Recent trends in land use and management towards the wet rice agroecosystem and plantations, driven by farmer preferences, land use policies and socioeconomic factors, are challenging the contributions available to farmers from the traditional rice cultivation landscape. Actors involved in decision-making in the traditional rice cultivation landscape should therefore consider the impact of land use and management changes on the diversity of contributions provided by rice agroecosystems.

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Ecosystem services; IPBES; agricultural transition; indigenous people; Borneo

Introduction

Traditional rice agroecosystems are based on the interaction of generations of smallholders and indigenous farmers with nature (FAO, 2018; Tekken et al., 2017) and they make essential contributions to farmers' livelihoods (Garbach et al., 2014). The primary contribution of rice agroecosystems is the production of rice (*Oryza sativa*), but they can also provide other material contributions, such as non-rice food (Cruz-Garcia et al., 2016; Garbach et al., 2014; Lu & Li, 2006), and non-material contributions, such as support of cultural identity (Barker & Janowski, 2011; Cramb et al., 2009; Tekken et al., 2017). They can also offer regulating contributions, such as flood control by wet rice agroecosystems (Jiao et al., 2019) or the creation of plant and animal habitats on fallow land by swidden rice agroecosystems (Rerkasem et al., 2009).

Traditional rice agroecosystems are, however, being challenged by socioeconomic, political, technological and environmental changes that are influencing indigenous farmers' livelihoods, income and subsistence, and affecting the contributions provided by their rice agroecosystems (Dressler et al., 2017; FAO, 2018; Fox

et al., 2014; Mertz et al., 2013; Millennium Ecosystem Assessment, 2005; Zhang et al., 2017). For example, in the rice terraces of the Ifugao, Philippines, agricultural intensification by the unregulated use of agrochemicals has had an impact on soil quality as well as rice yields, and commercialization and lifestyle changes have led to the loss of traditional practices (Aguilar et al., 2021; Castonguay et al., 2016). In the Upper Baram region of Malaysia too, the influence of modern agricultural technologies has had an effect on indigenous farmers' traditional knowledge around rice farming (Hollaus et al., 2022). Moreover, as described about the Benuaq Dayak in Kalimantan, Indonesia, the introduction of rubber gardens, while having the potential to increase farmers' incomes, has resulted in the abandonment of swidden rice fields, which in turn has led to a decline in rice self-sufficiency, failures in the social safety net and a shift in livelihood patterns away from collaborative work towards individual work and from profit sharing to individual profits (Terauchi & Inoue, 2010).

Other scholars have noted that swidden rice cultivation has undergone significant changes in recent decades (Heinimann et al., 2017; Mertz, 2009; van Vliet et al.,