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Quo vadis development: assessing the livelihood of indigenous people's communities in Malaysia and the potential for community-based conservation effort

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Abstract

New development activity brings its various impacts for indigenous people often prompting their relocation to a new area. The 1977's relocation of indigenous people in Royal Belum, Perak State, Malaysia, as part of its rural spatial development, questions on their livelihood in a new resettlement area and their relationship with nature within the current context of development. Despite the provision of basic facilities and infrastructure and the introduction of mono-crop cultivation and agriculture for the indigenous people, they are still practicing the 'slash and burn' method and performing their nomadic forest-based lifestyle. This contributes to their living below the poverty line. This present study explains the coexistence of indigenous people in the context of physical development vis-à-vis conservation effort in the Royal Belum. As neglected issue of interactions and conflicts between indigenous peoples and biodiversity conservation, this study outlined the potential of indigenous people's community-based practices based on the factors: (1) self-belonging of Royal Belum Forest; (2) biodiversity conservation concerns; (3) sustainable development supporter; and (4) wildlife concerns. The indigenous people close relationship with the nature offers a unique stewardship function for co-creation and co-management practices of community-based sustainable ecotourism and agriculture for further enhancement of their livelihood. This effort will support the socio-economic of national physical spatial plan as well as the co-development of conservation of Royal Belum world natural heritage.

Keywords Indigenous people · Development · Conservation · Biodiversity · Livelihood

1 Introduction

Of the total global population, 5% is represented by indigenous communities (Jāhāna 2015), where about 370 million indigenous people live (Aikau and Corntassel 2014) inhabiting areas such as forests for more than thousands of years. Their high dependency on the natural forest resources is known as the traditional economic system (Ishak 1998; Mustaffa

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1

2006; Gregory et al. 2013) which has classified as a weak economic approach and contributes to major poverty problem shared by most of indigenous people around the world. High dependency on nature to support their lives tends to overuse valuable resources and threatens biodiversity (Hauff 2002; Redford and Sanderson 2000). In contrary, their close relationship with the environment and their knowledge on life survival as well as the biological diversity, natural resources ecosystem in the forest perform the unique form of stewardship function (McKenzie and Morrissette 2003).

Increasing environmental awareness over the past few decade has highlighted the need to enhance our understanding in human society and biodiversity interact (UNEP 1995). In general, the existence of biodiversity and natural resources is threatened by human activities that cause loss of biodiversity. Increasing human population growth rates, increasing human basic needs, more widespread and more advanced animal domestication, and increasing human competence with technology create more stress to the nature (World Resources Institute et al. 1992). Furthermore, five major human influences affecting biodiversity are (i) agriculture, fisheries, and over-harvesting of resources (Titisari et al. 2019), (ii) habitat destruction, conversion, fragmentation and degradation, (iii) introduction of exotic or invasive organisms and diseases, (iv) overuse of resources resulting in pollution of soil water and atmosphere, and (v) global environmental change (Hunde 2007).

Being on the forefront and closest to nature, indigenous people are the first to engage with their surroundings, building their sense of belonging and creating a positive attitude towards conservation biodiversity initiatives. The positive attitudes of local communities towards community forestry programmes showed an improvement in the local forest management (Kobbail 2012). In contrary, the inability to address indigenous equity and the lack of understanding of indigenous social attitudes and priorities has resulted in less support for conservation efforts (Thompson et al. 2012). Revealing the underlying attitudes of indigenous people leads to acknowledgement of their coexistence and increases their active participation (Becken and Job 2014), which gives valuable input to the strategic development direction. Co-management with indigenous people for conservation purposes is among the potential approaches applied in many countries to balance development and conservation vis-à-vis indigenous people sovereignty (Nepal 2002; Nursey-Bray and Rist 2009).

There is a general assumption that indigenous people are left behind in the development of mainstream society. They are seen as communities that live in an under-developed and under-privileged situation (Arabestani 2013), has their own unique cultural, knowledge systems and belief (Sen and Pattanaik 2017), some are viewed as dangerous and uncivilized (Agrawal and Gibson 1999). Development initiatives in their living areas have forced them to change, which has caused a long-lasting and uneasy situation for indigenous people (Hart 2010). Undoubtedly, indigenous people have suffered from environmental destruction, and sometimes cultural dislocation, caused by various forms of development activities; roads, new resettlement areas, ecotourism facilities, logging activity, and others that force them to relocate to a new place (Nicholas 2000; Colchester et al. 2007). Those studies provide justification to study the indigenous people livelihood especially post-relocation program.

In our case study area, indigenous people are given the opportunities by the new development of oil palm plantation as part of the rural development and a new land development scheme, managed by a collaborative effort between the Department of *Orang Asli* Development or *Jabatan Kebajikan Orang Asli* (JAKOA) and the Federal Land Consolidation and Rehabilitation Authority (FELCRA). The support for rural development program is continuous under the Five-Year Malaysia Development Plan. For example, in the Tenth

Malaysia Plan (10MP) (2011–2015) among the main priority given are accessibility for everyone have a proper place to live in with electricity, access to clean water and health services (Malaysia 2010).

Several local studies acknowledge the existence of indigenous community surrounding Royal Belum post-reallocation program of the Government of Malaysia, for example the involvement of the indigenous community in ecotourism (Khairil et al. 2013), balancing rural–urban development (Rani et al. 2015), conservation of the unique cultural values and recognition of the rich biodiversity (Abdullah et al. 2011), and the crucial role of local people on sustainable development (Kamarudin and Ngah 2007). However, none of the research focus on the indigenous community's livelihood in a new reallocation area, how they cope with the new monocrop system vis-à-vis their nomad cultivation method and how their attitude to their past life with the potential development of community-based conservation and sustainable livelihoods. This kind of research provides a basis for meaningful information to improve the basic conditions of the indigenous community in that area.

Following this evolution, the relocation of indigenous people therefore invites many questions: How is the daily life practice of indigenous people? How is their attitude in the current livelihood? Which activities are still conducted for their survival? Accordingly, several objectives are raised in this study, as follows: (i) to analyse whether the daily life practices in resettled areas is sustainable or not, (ii) to study their attitudes towards the resettled area and original place of habitat, and (iii) to determine the activities that could be introduced as sustainable in resettled area.

Furthermore, the study provides two contexts for the problems that relate with indigenous peoples' livelihood. The two are: (i) the Royal Belum as a forest reserve, its rich biodiversity and the government's legitimate effort for conservation, and (ii) the indigenous peoples' community development as part of the rural development in Malaysia that includes the impact of physical development.

2 Background of the study

This first section describes the Royal Belum forest reserve, its biodiversity richness, the effort from Malaysian federal government to legitimate this area as part of Central Forest Spine, CFS stated in the National plan with the emphasize on community based of ecotourism efforts. It is followed by the analysis of several development initiative launched as the effort to sustain the development of indigenous people live in the new context of rural development of Malaysia at the second section. The last section explains the existence of indigenous people in several development scenario and development effort and how the regulations at country and global level protect the indigenous people live. The three sections provide a comprehensive overview and relevant context for the study.

2.1 The profile of Royal Belum Forest Reserve: development versus conservation effort

Royal Belum Forest Reserve, which is part of the Royal Belum State Park (117,500 ha) and Temenggor Forest Complex (RBTFC) (148,000 ha), is located in the Hulu Perak district, far north of Perak State. As part of the conservation of mega biodiversity resources in Malaysia, covering an area of about 300,000 ha (Ching and Leong, 2011), the initial

biodiversity conservations were made since the Third Malaysia Plan (1976-1980) and in 1988 by the Department of Wildlife and National Parks, Peninsular Malaysia. Later on, it has been identified as an Environmentally Sensitive Area (ESA) defined in National Physical Plan (April 2005) that it shall be integrated in the planning and management of land use and natural resources to ensure sustainable development. As Royal Belum rank 1 under Malaysia's Second National Physical Plan (NPP-2) (2010–2020), the management of ESA defined criteria rank 1 for 'No development, agriculture or logging shall be permitted except for low-impact nature tourism, research and education'.

The importance of RBTFC as conservation area is supported by several facts: (i) categorized as the second largest forested area in Peninsular Malaysia and borders the protected *Hala-Bala* Wildlife Sanctuary and the Bang Lang National Park, Thailand, to the north, Kelantan Forest to the east, and Ulu Muda Forest Reserve, Kedah, to the west (Fig. 1); (ii) an essential water catchment and wildlife conservation by the Malaysian federal government as part of Central Forest Spine, CFS, which is protected under the Malaysian National Forestry Act 1984; (iii) home to 10 of the 54 known hornbill species in the world (Hazebroek and Morshidi 2002), an Important Bird Area (IBA) by Bird Life International (Abdullah et al. 2011); (iv) the home of agarwood trees (known to locals as *Gaharu*) the most expensive wood in the world which is sought after for its aromatic and medicinal properties, as well as for religious purposes (Chua 2008); (v) Temenggor Lake with the

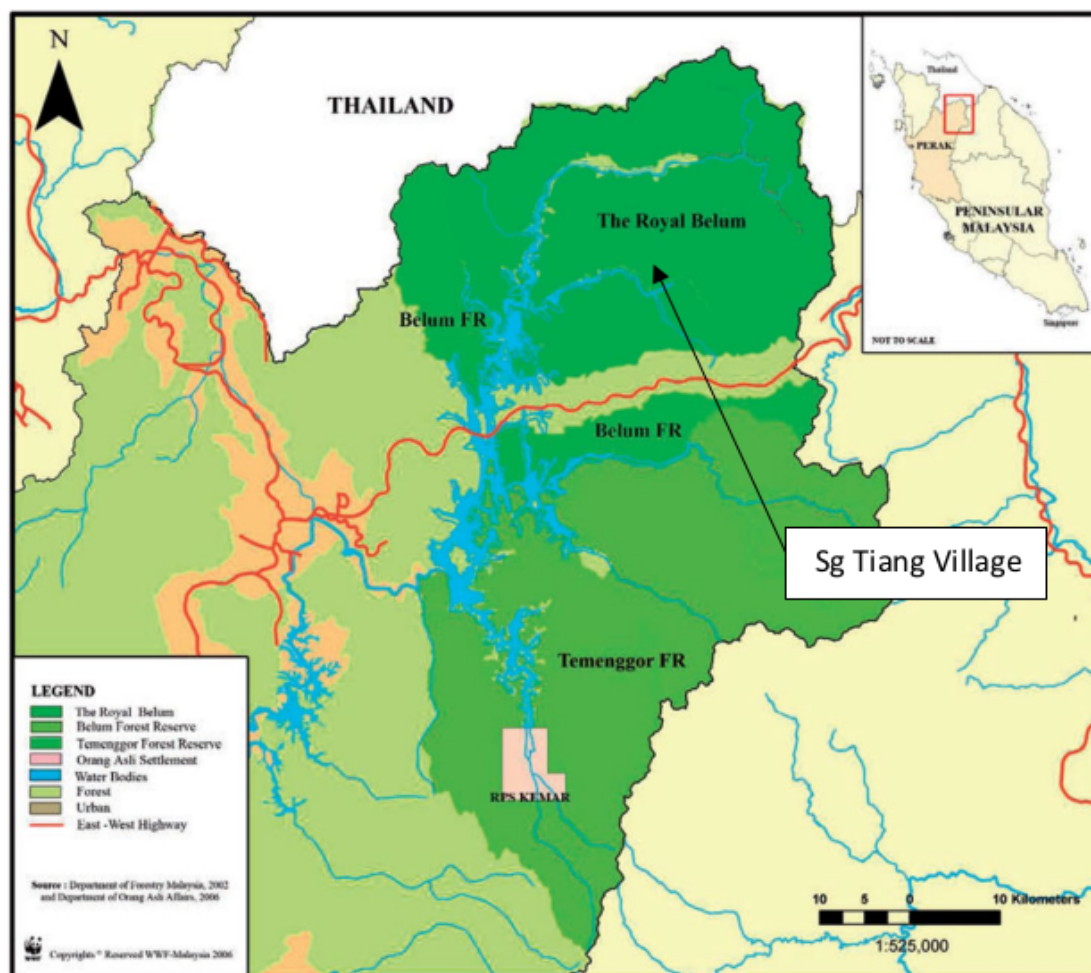


Fig. 1 Map of Royal Belum Temenggor Forest Reserve Complex (WWF 2011)

1 ancient limestone hills created 220 million years old and the unique of the limestone islands at the southern create lake was once majestic rock cliffs created 400 million years ago, before the Jurassic era. These are said to be among the oldest outcrops in Malaysia. Currently, the RBTFC is under the tentative list of United Nation Environment Scientific Cultural Organization (UNESCO) for a natural world heritage site status (The Star, May 2014; The Star, June 2015; UNESCO 2020).

The outstanding biodiversity counted by the most iconic flora and endemic species of Rafflesia, is known as the largest in the plant kingdom (UNESCO 2020). From about 26 species of Rafflesia in the world, there are eight species in Malaysia and four in the State Park, which are represented by four species, namely *Rafflesia cantleyi*, *R. kerri*, *R. azlanii* and *R. sumeiae*. The existence of four endemic species of Rafflesia in the protected State Park is most significant for biodiversity conservation in the World.

The local fauna at RBTFC is at risk due to hunting of tiger parts, elephant tusks, rhinoceros' horns, pangolins, sambar and barking deer. The richness of the fauna diversity has proven a valuable asset for the RBTFC, highlighting the need for continuous conservation efforts. Despite that, the highly prized tree of *Gaharu* or agarwood has attracted poachers, promoting illegal logging practices and unsustainable methods of harvesting, causing a decrease in the number of agarwood species (Abdullah and Chan 2011).

The in situ effort in recognizing the distinctive and unique flora and fauna of the Royal Belum has been materialized in the establishment of a protected area in 1971 by the wildlife biologist W. E. Stevens (Sukswan and Kumaran 2003; Schwabe et al. 2015). Further, the Royal Belum was gazetted as Belum Forest Reserve in 1971 and subsequently in 2007 as a State Park in accordance with the Perak State Park Corporation Enactment 2001 Section 6 (Section 6, Perak State Park Corporation Enactment 2001). In 2012, to strengthen the conservation initiative for that area, it was also gazetted under the Perak State Forestry Enactment as well as National Heritage Site which is the highest recognition accorded by the Government of Malaysia.

The 130 million years old of Royal Belum which older than the Amazon, regulated under the Malaysia National Physical Plan (NPP-2) (2010). The physical plan produce as a national spatial strategy for Peninsular Malaysia or known as 'Concentrated Decentralization'. The need to conserve the Royal Belum for a long-term strategic framework of national spatial planning is stated in this document. It was stated the need to conserve the Royal Belum for a long-term strategic framework of national spatial planning. The document also outlined the direction and pattern of land use, biodiversity conservation, and development in Peninsular Malaysia. Section NPP11 of the NPP-2 states "The nation's biodiversity and tourism corridors should be conserved. At the same time, tourism accreditation/certification schemes should also be provided for international and national level products in order to improve their environmental performance". The statement prioritized the conservation of biodiversity and tourism corridors of the Royal Belum as a Central Forest Spine.

The involvement of community-based tourism is given as part of the effort to include intercultural understanding (National Physical Plan—2 2010). In this respect, community-based tourism has been recognized as a socio-cultural aspect of the local community, in line with tourism development which at the same time take into account the biodiversity dimension as an important asset. The acknowledgement of the local community involvement at the national level document, reaffirms the important of local community to support the potential for indigenous people involvement in community-based tourism in Malaysia.

Furthermore, despite its high biodiversity content, RBTFC is not free from logging activities. Under RBTFC, forest classification of Royal Belum as a state park does not

allow any activities executed or in sort totally protected. Hence, Perak state government has pledged that logging activities in areas surrounding Temenggor Lake and Banding Island has been banned since 2008 (ITTO 2009). However, the Ulu Muda and Temenggor classification as a forest reserve, consists of many functional forests and classified as production forest, protection forest, water catchment, virgin jungle reserve, educational forest, recreational forest allows some activities conducted. This classification creates conflicting implications with the first classification.

2.2 The indigenous people community development in the current context of development in Royal Belum

In general, there are three major ethnic groups of indigenous people in Peninsular Malaysia: *Negrito*, *Senoi* and *Malay-Proto* (Hasan Mat Nor 1998). *Senoi* group as the dominant group, comprise 54% of the total indigenous population in Peninsular Malaysia (JAKOA 2003, Nicholas 2000). However, only two ethnic groups of indigenous people live in the Royal Belum Forest Reserve: the *Jahai* (*Negrito* group) and the *Temiar* (one of the sub-groups under *Senoi* group). The former has a semi-nomadic living mode, shifting cultivation and ranching while the latter have a settled agricultural community (Fadzil et al. 2013).

The development of indigenous people, known as Orang Asli in Malaysia, began in 1977 (Thompson 2007) as part of rural spatial development (Wan Mohd Rani et al. 2015). Despite the physical development of dam and highway, it is coupled with socioeconomic development, monocrop cultivation, i.e. oil palm, rubber and etc. (Nicholas 2000). About 85.7% of indigenous people were categorized as living below the poverty line in 1988 which is RM286.00 or USD 69.48 a month (JHEOA 2003). The Poverty Line Income (PLI) for Peninsular Malaysia refers to income levels below MYR 763 or USD 153.15 (EPU 2013). Poor households in Malaysia consist of peninsular Malaysia (35.1%), Sabah (53.6%), and Sarawak (11.4%). Hence, poverty eradication is a major challenge faced by the JAKOA.

Centralize the scattered living of indigenous people across forest areas to a new resettlement area fell under the Regrouping Scheme, or *Rancangan Pengumpulan Semula* (RPS) of Orang Asli, as the Main Development Scheme under Malaysia Indigenous People Affairs Department or JAKOA in sort (Ali 2005). The aim of this plan, which also encompassed aspects of rural planning and development are; (i) poverty eradication, (ii) improved or modernized lifestyles, (iii) regrouping in one centre with basic living necessities, and (iv) securing safety from communist threats. The schemes include provision of basic infrastructure and facilities such as primary schools, health clinics, housing, and some form of income-generating activities such as rubber and palm-oil cultivation (Thompson 2007).

Under RPS, the land development scheme was also introduced to indigenous people in Malaysia which has planned to include an economic and social development program (Thompson 2007). Under a top-down approach, the mono-crop cultivation under the Federal Land Development Authority (FELDA) was adopted in the scheme which was carried out together with the Federal Land Consolidation and Rehabilitation Authority (FELCRA). As part of efforts to manage the plantation, a cooperative system was introduced with the indigenous people. The indigenous people in Malaysia also have clear systems of land tenure, whether individual or collective, according to the Human Rights Commission of Malaysia or SUHAKAM (2013). This traditional system, based on customary systems,

is handed down from one generation to another. However, it is known land ownership is among the problem face by the indigenous people in Malaysia (Nicholas 2000).

Perak was the first state to implement RPS of indigenous people in Gerik as the largest nearby town to Royal Belum. Up to 1996, there were 18 Regrouping Schemes involving 10,000 indigenous people (Kamarudin and Ngah 2007). As of 2015, there are 35 RPS plans involving 6576 indigenous people, representing the total population of indigenous people in the Royal Belum-Temenggor Forest Complex (Kamarudin and Ngah 2007). Gerik as one of the districts of Hulu Perak is located on the East–West Highway, west of the forest, and had a population of 33,400 in 2016 (Perak State Basic Data 2016). The physical development of the East–West highway that links Gerik has improved accessibility and dramatically increased the mobility of indigenous people. In the end, it contributes to the indigenous community's civilization and development. As part of the physical development in this area, there is a 127-m high hydro-electric power of the Temenggor dam which provides electric supply which locates in a Temenggor Lake. The dam development in 1972, located inside the Royal Belum affects the physical landscape and the livelihood of the indigenous people (Schwabe et al. 2015). Hence, the reallocation was conducted which was shown as a top-down and government-led effort which has been seen as forced action on indigenous lives.

Despite the effort to relocate the indigenous people under the RPS and due to dam development in Royal Belum 1970 s, earlier settlement of the Malays, the non-indigenous people located along the north east of Perak State was relocated to the Royal Belum State Park due to the communist intervention that cause 'emergency period' from 1948 to 1960 (Lim and Jimi 1995). The Malays resettled at *Kampung Gandah* which is located about 16 km southwest of *Gerik* also known as *Belum Lama* or the *Old Belum*, meanwhile the new resettlement area for the indigenous people is known as *Belum Baru* or the *New Belum*. Post-colonialism, the indigenous people are part of the Malay race for the country social structure development (Nah 2006).

2.3 Coexistence of indigenous people in development vis-à-vis conservation

Relocation and regroup of indigenous people to other places create a various dimension of issues such as psychology, socioeconomic, politics and infrastructure. The findings indicate they relocation for Australian Aboriginal people cause problems such as loneliness, the emotional distress of separation from family, financial distress and the practical problems associated with travel and accommodation (McGrath and Patton 2006). Furthermore, the introduction of commercial mono-crop agriculture challenges the nomadic pastoralism of indigenous people (Thompson 2007; Kamarudin and Ngah 2007) and cause issues to their traditional land (Masron et al. 2013). The gazettement of forest protection and the creation of forest parks for recreation has affected indigenous peoples' livelihoods and added to classic issues surrounds indigenous people as a neglected society such as lack of political representation and participation, economic marginalization and poverty, lack of access to social services and discrimination (Agrawal and Gibson 1999; Chatty and Colchester 2002; Mushuku 2014). However, the development of physical infrastructure for ecotourism facilities such as road development increased assimilation of indigenous people with the 'outside' society and improved accessibility (Agrawal and Gibson 1999).

Land designated for conservation and development of national parks creates restriction for the indigenous people access to the natural resources (Chatty and Colchester 2002). National parks as an in situ and exclusive type of conservation biodiversity aim

to protect the area as it is. The indigenous peoples' access to the resources which have been known as the main sources for their livelihoods is based on subsistence use of local and natural resources, shifting agriculture and nomadic pastoralism and often supplemented with hunting, fishing and collection of forest products. Restriction in national parks and other protected areas has been a major threat to the sovereignty and cultural survival of indigenous people and their importance to nature. Hence, the evaluation of the attitude of indigenous people in the post-relocation period is important to be studied for further continuation of development strategy.

Under the JAKOA and FELCRA oil palm agriculture scheme, the agriculture land of indigenous people in Malaysia is managed by the traditional system, handed down from one generation to another (JAKOA 2014). This system is allowing the rights of the indigenous people over their lands to be retained. This is in line with the statement in International Labour Organization (ILO) Convention 169, the Article 7, explains the relation between indigenous people's rights and development, "*the indigenous peoples have the right to decide their own priorities for the process of development as it affects their lives, beliefs, institutions and spiritual well-being and the lands which mean to exercise control over their economic, social and cultural development*".

Several acts protect the indigenous people's right, livelihood and sovereignty. The National mechanism of protecting indigenous people such as the Aboriginal Peoples Act 1954, the customary rights of the aborigines' with the following sections of the Acts; (a) aboriginal reserves (Section 7), (b) aboriginal areas (Section 7), (c) rights of occupancy (Section 8), (d) compensation to fruit or rubber trees (Section 11), (e) compensation for use of aboriginal area and aboriginal reserve (Section 12) (The Commissioner of Law Revision, Malaysia 2006). At the global level, several treaties support the existence of indigenous people and the relationship with environment such as Agenda 21, Convention on Biological Diversity (CBD), ILO Convention 169 (Convention Concerning Indigenous and Tribal Peoples in Independent Countries) and United Nations Declaration on the Rights of Indigenous People (UNDRIP). The treaties acknowledge the importance of indigenous peoples' roles and functions in the broader context of sustainable conservation biodiversity.

In the Earth Summit in 1992, the crucial role of indigenous people was stated that '*Indigenous people and their communities and other local communities have a vital role in environmental management and development because of their knowledge and traditional practices*' (Earth Summit 1992:13). In Agenda 21, the convention acknowledged '*the enormous contributions indigenous communities have made to the maintenance of many of the earth's most fragile ecosystems*'. This statement reaffirmed the coexistence of indigenous communities' contributions; both in terms of traditional knowledge and of the practices that respect the carrying capacity of the natural resources to achieve sustainable development. The statement recognizes the importance of indigenous peoples' rights and knowledge for the conservation of these areas in the future.

Indigenous knowledge plays an important role in maintaining resources conservation. A number of studies have emphasized the importance of indigenous knowledge on conservation biodiversity (Kofi-Tsekpo 1993; Robbins and Dewar 2011; Muboko and Murindagomo 2014). A high level of knowledge of natural resources is linked to the attitude of the indigenous people. It is therefore important to analyse attitudes towards development and the related issues such as changing land use, exclusive protected area, ecotourism development, and protection of biodiversity. Such an investigation would uncover underlying attitudes, leading to acknowledgement of the coexistence of indigenous people and an increased emphasis on active participation of the local community (Becken and Job 2014).

The development scheme which forces the indigenous people to change their traditional lifestyle of slash and burn also align with the Convention on Biological Diversity, Article 8(j) Traditional Knowledge, Innovation and Practices, where the indigenous practices and lifestyle is no more relevant for the conservation and sustainable use of biological diversity (INDEX 2004). Preventing the loss of biodiversity is increasingly the central aim in managing the environment. The nature of biodiversity is multi-dimensional, spanning genes and species, functional forms, adaptations, habitats and ecosystems, as well as the variability within and between them (Laurila-Panta et al. 2015). From that perspective, socioeconomic aspects have only minimal priority. However, the socioeconomics plays an important role in sustaining the coexistence of community with nature. All these dimensions of biodiversity are tightly interconnected, affecting the state, stability, and productivity of the ecosystem as well as ecosystem services (Schneiders et al. 2012). Berkes (2004) concludes that conservationists need to see ecosystems as complex, social and historical systems that function on multiple scales and dimensions. That is why community based-conservation practices need to be more tangible and realistic. Community-based conservation efforts as an 'in situ' approach where communities gaining power and responsibility over their natural resource consumption need to be supported by the guidance on conservation management practices (Berkes 2004).

Indeed, the complex adaptive systems of conservation biodiversity is problematic due to the nature of the natural environment, the uncertainty in practice, operating across multiple scales and dimensions, and involving multiple stability domains (Ishwaran et al. 2008). This is added to a global commons' importance for humanity, a regional commons importance for ecotourism, and a local commons importance where ecosystem service for human wellbeing at the community level is concerned (Capistrano et al. 2005). The last point urges us to find a common root problem that can be shared and solved at the local or community level.

Any inclusive conservation biodiversity initiative or community-based conservation approach emphasizes the participation of local people. Community-based conservation is defined as, "A range of activities practiced which acknowledge the coexistence of people and nature, as distinct from protectionism and the segregation of people and nature" (Western and Wright 1994). Broader definitions of community-based conservation practices place specific emphasis on local people as humans are an integral part of the natural environment to be conserved and are intricately linked to social-ecological systems (Berkes 2004; 2007; Spinger 2009). This relationship emphasizes the co-partnerships between conservationists and local people, as well as the integration of traditional and indigenous knowledge to make conservation effort more inclusive.

Under IUCN, the Indigenous Community Conserved Areas (ICCAs) practices are gaining national and international recognition. It is an important area for the conservation of biological and cultural diversity by putting emphasize on the active role of community-based conservation initiatives as a form of actions under climate change mitigation and adaptation (Hirschnitz-Garbers and Stoll-Kleemann 2011). In this context, development needs to reconcile and find a balance between the conservation of biodiversity and cultural values, and economic and social development (Hoang Tri et al. 2013).

3 Research methods and analysis

The research was conducted in Sungai Tiang Village located inside the Royal Belum Forest Reserve. It is part of the third Royal Belum Scientific Expedition, which was carried out in September 2014. The village is one of the advance resettlement areas among the 35 villages

under the RPS program of *Orang Asli* Social Development Plan (SDP), of the Department of Indigenous People Affairs of Malaysia, commonly referred to JAKOA (Fig. 1).

Sungai Tiang Village has better physical infrastructure and facilities development compared to the other villages adjacent in resettlement area, namely Aman Damai Village and *Kejar* River Village. These basic facilities include a primary school, a kindergarten, a clinic, a community hall, and wooden houses. Solar system for electricity was installed to the indigenous peoples to overcome insufficient power supply for long distance and wide spread of indigenous people house. There is also a small-scale agricultural industry, such as tapioca and local fruit plantations, raw honey collection, Agarwood (*Gaharu*) collection and freshwater fishing adjacent to this area, which is sold outsiders the region (Wong 2003). Considering all the above factors in *Sungai Tiang* Village's compared to other resettlement areas of the indigenous people in Royal Belum Forest Reserve (Fig. 1). It was assumed that they have the better of socioeconomic status and level of civilization. Hence, we selected this area for further interview by using the standard questionnaire.

Standard questionnaire developed was covered questions on the daily practice of indigenous people in resettlement areas, socio demographics, and economic profile as well as their daily that affect conservation of biodiversity and natural resources (Global Biodiversity Strategy 1992) and biodiversity state (Hunde 2007) of the area. Among the activities identified were forest resources collection, consumption for medicinal purposes, fishing, animal hunting and ranching and agriculture. This was followed by the attitudinal series of statement related to conservation biodiversity and sustainable development in the form of five units of the Likert scale (1. strongly disagree, 2. disagree, 3. no opinion, 4. agree, 5. strongly agree).

Since, the research was focused on the indigenous people, particularly on their daily life practices that affect biodiversity and conservation effort, the purposive sampling method was deployed (Bernard 2002). Furthermore, the face-to-face interview was conducted to indigenous people by using the standardized questionnaire developed for this study. This to avoid their difficulties to understand the question due to the low educational level of indigenous people. After 50 interviews were performed, the screening conducted accept to only about 37 of the questionnaire's sets were retained for further analysis.

The descriptive statistics, such as frequency and percentage difference, cross tabulations were used to obtain the respondents' profiles and their daily life's practice. Furthermore, the exploratory principle component analysis (PCA) was used to study their attitudes towards the resettled area and original place of habitat. Several basic requirements of PCA, such as Kaiser–Meyer–Olkin (KMO) measure of sampling adequacy, Bartlett's test of sphericity, eigenvalue of more than 1.0 to determine the factor (Kaiser 1974), and the scree test (Catell 1966) were fulfilled. Small size of sample bellow 50 were sufficient to obtain reliable factor under the condition of high communality and high number of observed variables (De Winter et al. 2009). In this case, the factors related to conservation biodiversity in surrounding forest reserve close to the resettlement area of indigenous people. Hence, it was concluded that under the conditions PCA can generate stable estimates of population loadings for sample sizes below 50. The analysis was carried out using the Statistical Package for Social Science (SPSS) Version 19.0.

4 Results and discussion

4.1 Respondent profile: socioeconomic and daily practices

The general profile of the respondents shows that male groups predominate, with 67.6% compared to 32.4% of females. The *Jahai* group made up most of the respondents, with 91.1% compared to 8.1% from the *Temiar* group. Even though 73% of the respondents were Muslims, 27% did not state any religious belief. The age structure of the indigenous community was made up primarily of 19-30-year-olds (40.54%), followed by 31-40 (18.9%) and 41-50 (32.4%).

Most respondents from the two indigenous groups, *Jahai* and *Temiar*, had been in *RPS Banun* for 10 to 30 years (40.5%). This was followed by those who had lived in the area for more than 30 years (35.1%) and less than 10 years (18.9%). The longer period of living in that area predict the changes in their daily life pattern, as more activity under new development was established in that area engage the indigenous community. This was related with the main intention to impose new culture and change their dependency on the previous pattern of life.

About 68% (25 respondents) of indigenous people had an income below RM500. This is followed by 27% of respondents (10) with an income between RM501 and RM1000, and 5.4% (2) with a monthly income of more than RM1000. This result reflects the indigenous people standard of living which are still bellows the standard poverty line of Malaysia, MYR 763 per month (EPU 2013). Despite the indigenous people's development effort for more than 40 years since 1977, the results show the majority of them who are living in resettlement area in Royal Belum Forest Reserve are still under a low-income category (Table 1). As of year 2008, out of the total population of Orang Asli in Perak, about 88% or 901 people are living in poverty (JAKOA 2008).

The statistic support by our study where the indigenous people's type of work are rubber farmer (21.6%) ($n=8$), followed by fisherman (16.2%) ($n=6$), teacher (5.4%) ($n=2$), gardener (5.4%) ($n=2$), officer in state forest research (2.7%) ($n=1$). Some maintain their previous work of harvesting forest resources, with 8.1% ($n=3$) of respondents indicating work involving the collection of agarwood and rattan. Some of them who are not working

Table 1 Job categories of indigenous/local people in Royal Belum Forest Reserve

Job categories	Frequency	Per cent
Gardener	2	5.4
General works at school	3	8.1
Teaching	2	5.4
Rubber farmer	8	21.6
General works at village	1	2.7
Forest resource hunter	3	8.1
Fishermen	6	16.2
Tourist guide	1	2.7
Security	2	5.4
Officer in State Forest Reserve	1	2.7
Housewife	4	10.8
Jobless	4	10.8
Total	37	100.0

1 are housewife (10.8%) ($n=4$) and unemployed (also 10.8%) ($n=4$). (Table 1). The various job categories describe the type of work that close to nature, i.e. fishermen, forest hunter, tourist guide, officer forest reserve and also the level of economic development in this area, i.e. teacher, security in regard to indigenous people development effort.

The other method practiced by the Orang Asli in Royal Belum involves the slashing of the trees (27%) and leave it (10.8%). The slash trees method, which serves to fulfil the basic living needs, is one of many unsustainable agricultural practices that destroy the habitat and diminish biodiversity (Hunde 2007). It is a common practice of indigenous people to survive, as a semi-nomadic living and shifting cultivation among many indigenous or local communities in the forest area (Frey 2013; Fadzil et al. 2013). Furthermore, increased deforestation not only results in reduced biodiversity, but has spill-over effects such as soil erosion, nutrient depletion, flooding, increased levels of greenhouse gases, disturbances in the carbon cycle, and loss of forest potential products such as pharmaceuticals, timber and fuel.

Respondents were also asked about their daily life practices in multiple range of choice. The idea is to explore various practices applied and obtain an idea of priorities. Among them, agriculture which was conducted after land clearing was identified as the primary activity, represented by 25.5% of respondents (Table 2). In total, about 33.3% depend on natural-resource consumption, e.g. collection of forest resources such as agarwood, rattan, etc., and forest resources consumption for medicinal purposes. The latest shows the value for local knowledge of indigenous people in this area that needs to be protected. In detail, about 19.6% of the respondents perform forest resource collection of materials such as agarwood and rattan.

This result proved that hunting on natural resources in RBTCF is still a common practice by the indigenous people. They have special right to hunt or collect forest product/hunting provided that it just for their own consumption/subsistence. This result supports the earlier finding that some of the respondents still work as forest hunters or are classified as resource-based activity. The hunt for that precious forest product for commercial purposes by foreign hunters becomes illegal and prevalent as Thailand border close to the RBTCF (Abdullah and Chan 2011).

About 27.5% engage in fishing, 6.9% in hunting for food, and 4.9% in animal ranching. The results show that despite the extensive mono-crop cultivation introduced the government to indigenous people in the resettlement area, they are still involved in the traditional economic system, which involves resource-based economic activities such as fishing and

Table 2 Major activities of indigenous people in Royal Belum

Activities	Frequency	Per cent
Agriculture	26	25.5
Animal ranching	5	4.9
Forest resources collection (agarwood, rattan etc.)	20	19.6
Forest resource consumption for medicine purposes	14	13.7
Fishing	28	27.4
Animal hunting	7	6.9
Others	2	2.0
Total	102	100.0

1 resource gathering such as agarwood and rattan, which have high market value. Other practices by indigenous people highlight the pressure on resource consumption due to over-hunting which affects biodiversity (Chatty and Colchester 2002), for example on indigenous land in Central America (Redford and Sanderson 2000). Subsistence hunting in the Amazon resulted in significant changes to the animal population structure (Peres 2000).

On the other side of the coin, about 13.7% of respondents consume forest resources for medicinal purposes. This result indicates the indigenous people in Royal Belum have local knowledge that needs to be acknowledged. The adoption of indigenous knowledge systems for natural resource management in resettlement areas of indigenous people has been shown in Chiderdzi and Zaka District, Zimbabwe, showing how it can reduce resource depletion (Mushuku 2014). However, further detailed research needs to be conducted to explore the potential of indigenous community knowledge in this area.

In the context of community-based conservation effort, indigenous people's traditional knowledge has the potential to be adopted in various forms of the biodiversity conservation approach. Beside community-based conservation biodiversity, the mutual coexistence, high dependency on nature, and balance between indigenous people and the natural environment represents various forms of indigenous knowledge system, such as traditional belief systems and taboos and customs in a more synergistic way. Indigenous people's knowledge systems will enhance the participation of indigenous communities in resource conservation and management. This is one way to avoid a repeat of the 'tragedy of the commons', where there are restrictions on the consumption of natural resources.

Various forms of community development activities have to be introduced to reduce restrictions on resource access in protected areas. Springer (2009) proposed a range of community or 'place-based' approaches to indigenous territorial management such as community forestry and fisheries, and community-based wildlife management. This is a way to reconnect indigenous people with their lands and resources, and recognize basic human needs as part of ecologies and landscapes. Examples of success programmes are Namibia Community Based National Resources Management (CBNRM) program, community forestry in Mexico, and locally managed marine areas in the Pacific (Springer 2009).

The Man and Biosphere (MAB) Programme established in 1971 by United Nations Education Scientific Cultural Organization (UNESCO) is one of the programs that focus on a community-based conservation initiative as an 'in situ' approach. The program contrasts with the protected area concept, which is a more exclusive approach and involves indigenous people relocating to another area (MAB 2017). Hence, inclusive conservation effort needs to include the local community to redefine their involvement in the current context of stewardship function even in conservation areas (Titisari et al. 2016; Zen et al. 2019).

Some research has proven that ecotourism can be combined with several sustainable livelihood practices. Research by Rao et al. (2003) in Nanda Devi Biosphere Reserve, which highlighted the role of ecotourism activity in buffered zone outside the core zone of protected area, promotes the mutual beneficial combination of environmental conservation and sustainable livelihood. The inclusive type of protected area of Biosphere Reserve offered by MAB, UNESCO and Indigenous Community Conserved Areas (ICCAs), under the International Union for Conservation of Nature, (IUCN) promotes the incorporation of economic development and the conservation of nature adjacent to the local community. This closes the gap between local communities and their surroundings due to the exclusivism of the protected area.

In detail, the study identified that the *Jahar* and *Temiar* indigenous communities continue to practice land-clearing methods even though they have been living in the new

resettlement area with a new economic development scheme of monocrop plantation for as much as 35 years. About 37.8% of the local community still practice the 'cut and burn' as a method for agricultural purposes. The shifting cultivation practise is not far from their considered permanent settlement and they knew that clearing forest reserve apart from their designated area is an offence. They rarely encroached the forest reserve. This method, which is also known as 'slash-and-burn' is followed by shifting cultivation and ranching, which are also the most commonly practiced agriculture methods in the Amazon (Frey 2013), is not aligned with the Convention on Biological Diversity.

The old method would not be a sustainable option considering the increasing indigenous population, as it is one of the four major human activities that have a negative impact on biodiversity and natural resources (Global Biodiversity Strategy 1992). It causes habitat destruction, conversion, fragmentation and degradation (Hunde 2007) and to the environment in general. Most indigenous communities practice shifting cultivation, which involves farmers cutting and burning the land, planting annual crops for a few years, and leaving it fallow for up to 10 years. The secondary forest would grow during the fallow time, with the land becoming secondary forest and the soil recovering its nutrients (Frey 2013).

Environmentally friendly living requires the sustainable use of natural resources so that biodiversity, as one of the major environmental components, does not decline in long-term use. Increasing numbers of indigenous people would affect the future of biodiversity if destructive current practices of unsustainable living, such as forest hunting, were to continue. A simple solution, such as promoting the use of kerosene and liquid petroleum gas, LPG and other source of energy such as sun, water, wind, biomass and geothermal energy as alternative fuels and source of energy would to help minimize pressure on the forest for firewood (Maikhuri et al. 2000) and develop achieve sustainable environmentally friendly living (Hunde 2007). The latest technology urgently needed possible in a remote area where a conventional electricity grid is difficult to build. These approaches make sense in economic as well as environmental terms.

The research on indigenous daily practices provides a link with the conservation biodiversity effort in the context of environmental resources management. By knowing the current daily practices of indigenous people, it will provide a foundation for developing the community-based conservation approach in the wider context of sustainable development. The inclusive conservation biodiversity approach is preferable in stricter protected areas which have caused sensitivity with indigenous people over land ownership. This has been demonstrated in South America and Asia (Bedunah and Schmidt 2004).

4.2 Attitudes towards biodiversity conservation practices

The aim of this section is to analyse the indigenous community's attitude towards various activities related with ecotourism development, conservation of forest resources, plantation, biodiversity and wildlife conservation. These activities affect the community's daily life, as they remain dependent on the Royal Belum.

The results of the study show that the PCA conducted has 0.538 Kaiser–Meyer–Olkin (KMO) Measure of Sampling Adequacy. The 0.538 (MSA) value of more than 0.5 shows that the distribution is adequate for conducting factor analysis through Bartlett's Test of Sphericity, significant at p value of less than 0.05. The determination of factor number with Eigenvalue of more than 1.0 (Kaiser, 1974) resulted in four major factors being identified. The four identified factors were considered as adequate in explaining variances in the item variables. The Scree Catell test (Catell 1966) returned 68.4% variance percentage

explain by the four factors. The first factor, named as 'Self Belonging to Royal Belum Forest Reserves' explained 20.2% of variance by four item variables; (i) 'Illegal logging needs to be prohibited to prevent forest devastation', (ii) 'I did not support the resort and facility for ecotourism in Royal Belum', (iii) 'I strongly believe in signs received from the forest, such as dog barking being a bad sign', and (iv) 'Forest reserves have taken over local people's land and caused poverty' (Table 3). The four item variables detail support for the status quo of the forest support by strong sense of belonging and creating a positive attitude towards conservation biodiversity initiatives.

Despite the fact that the indigenous people in Royal Belum have lived in the resettlement area (located adjacent to the forest) or village under RPS since 1977, the results show they still have positive feelings and self of belonging towards the Royal Belum Forest. The Orang Asli villagers in that area believe that Royal Belum is part of their heritage, and it is the primary source of their livelihood (Schwabe et al. 2015).

The attitudinal aspect of the indigenous community reflects the positive and strong conservation norms that are needed for further conservation activity. Attitude is one of the four core elements for successful community-based conservation efforts (Brooks et al. 2006). The other three core elements are ecological, economic, and behavioural. Successful community-based conservation projects allow for the use of natural resources, and include communities to provide market access. This could be one of the potential areas to explore in developing and improving the economic condition of Orang Asli in Royal Belum Forest Reserve.

The potential of the RBTFC as a spot for ecotourism development has been emphasized since the National Ecotourism Plan was developed in 1996. Due to this, the positive attitude of the indigenous community is crucial to construct durable and sustainable community-based conservation practices in the future (Hirschnitz-Garbers and Stoll-Kleemann 2011). The positive attitude of indigenous people in Royal Belum shows the potential for the development of community-based tourism. It has been elaborate more in several studies (Butler and Hinch 2007; Weaver and Lawton 2007; Ryan and Huyton 2002).

The second factor, which explains 19.3% of the variance, is given as 'The Biodiversity Conservation Concern'. This is based on the five item variables that describe the concerns of the Orang Asli and their willingness to participate in the stewardship of the forest to protect the flora and fauna for the future generation, their positive feeling towards visitors, their support of the exploitation of forest resources, and the knowledge that taking care of natural resources, including of flora and fauna, is important for future human needs. Positive attitude towards biodiversity conservation concern support by their extensive knowledge of the flora, fauna and climate-ecosystem relationship. This has been recognized in strengthening the sustainable development of the natural forest resources (Bridgewater 2002).

The third factor, named as 'Sustainable Development Supporter' explains 15.4% of the variance. The factor explains the support from the indigenous people for ecotourism in Royal Belum, land use changes for cultivation, and the need for flora and fauna protection for future generations, reflecting their willingness to be included in such activities. The last factor, which explains 13.6% of the variance by two item variables, details local people's concerns over wildlife. It is named as 'Wildlife Concerns'.

A positive attitude of indigenous people indicates acceptance, which can legitimize the effects of the long-term success of any development activity. Knowledge of their perception towards the environment is also important in order to develop strategic and practical solutions in the local context. The important roles and contributions of indigenous knowledge and practices to biodiversity conservation have been highlighted by Brown et al. (2005).

Table 3 Attitude of indigenous people towards conservation biodiversity

Factor name	Component (α)	Rotation sums of squared loadings cumulative (%)	Initial eigenvalues
<i>Self-belonging to Royal Belum Forest Reserve</i>			
Illegal logging needs to be prohibited to prevent forest devastation	0.805		
I did not support the resort and facility for ecotourism in Royal Belum	0.754		
I strongly believe in signs received from the forest, such as dog barking being a bad sign	0.708		
Forest reserve has taken over the local people's land and caused poverty	0.706	20.202	3.105
<i>Biodiversity conservation concerns</i>			
The forest reserve belongs to the government and the local community needs to be educated in order to take care of it	0.711		
Visitors will benefit the local and indigenous community	0.673		
The local community needs to be prevented from utilizing the forest resource as they like	0.618		
The forest is an important element in taking care of natural resources	0.589		
Forest and fauna conservation is important for human needs	0.566	39.501	2.858
<i>Sustainable development supporter</i>			
I support ecotourism in Royal Belum Forest Reserve	0.847		
I am not supporting forest land clearing for oil palm or rubber plantation	0.830		
Protected flora and fauna is important for future generations	0.702	54.864	2.153
<i>Wildlife concerns</i>			
Wild animal hunting needs to be prohibited to avoid forest devastation	0.871		
Wild animals cause agriculture distraction and it has to be stopped	0.812	68.427	1.465

Extraction method: principal component analysis

Rotation method: varimax with Kaiser normalization

Rotation converged in 4 iterations

1 Furthermore, local wisdom provides easier and smoother implementation of development initiatives in certain areas.

5 Conclusion

In general, the findings show a high dependency of the indigenous people in resettlement area on the traditional economic system, which entails more resource-based economic activities such as fishing and resource gathering (of products such as agarwood and rattan, which have market value). The study also reveals that the Jahar and Temiar indigenous communities continue to practice land-clearing methods and the 'cut and burn' method, which are followed by shifting cultivation and ranching. This effort contra the conservation biodiversity practice and indicate unsustainable daily life practice which is also against the Convention on Biological Diversity. This method would not be a sustainable option considering the increasing indigenous population, as it is one of the four major human activities that have a negative impact on biodiversity and natural resources and cause habitat destruction, conversion, fragmentation and degradation.

Although some of them are involved in new economic development activities such as in rubber and oil palm plantations and work based on ecotourism, such as tour guides, their income falls under the classification of 'weak economic' which contributes to poverty in the group. New economic development schemes need to be attractive which introduce more economic incentives, skill-based conservation biodiversity practices for indigenous human development that benefit them.

These two findings are important in accordance with formulating co-management practices of conservation and in working towards more conducive and strategic community-based participation for which contributes to the Royal Belum Forest Reserve in the long-term. High dependency with nature as a resource-based activity shows that more environmentally friendly agro-based economic practices or activities need to be introduced through the indigenous community conservation effort in order to minimize the environmental effects, support more sustainable livelihood practices and refer to the status of RBTFC as Central Forest Spine that highlights its importance to the development of the community based eco-tourism effort in National Physical Planning II.

The overall result on the attitudinal factors of indigenous people shows their positive feelings and self of belonging towards the Royal Belum Forest. This positive result has potential to be developed as a basis for the community-based conservation practices at the community level, especially for indigenous people. For example, co-creation of resource-based community activity, community-based sustainable agriculture and agroforestry between JAKOA, tourism department, forestry department and indigenous people will strengthen their involvement with current ecotourism activities. Furthermore, the continuous effort in establishing this program will help to reduce the number of households living below the poverty line. It also highlights the need for capacity-building for indigenous communities to support the program. Further research needs to include other physical environment characteristics to support the results of this study. The study significantly contributes to the Section 11 of National Physical Plan 2, where community-based ecotourism needs strong support from the local community, hence indigenous people.

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