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Kalimantan's biodiversity: developing accounting models to prevent its economic destruction

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Abstract

Purpose – The purpose of this article is to explore the current and historical state of accounting for biodiversity in Kalimantan (Borneo). It is also to evaluate various models for stand-alone biodiversity reporting in the context of the work undertaken in Kalimantan by the United Nations Collaborative Program on Reducing Emissions from Deforestation and Degradation in Developing Countries (the REDD program). Economics and politics play a dominant role in hindering biodiversity conservation in the region. This article develops and presents an integrated biodiversity measuring, monitoring and reporting model with the aim of undermining the biodiversity damaging activities in the region. The model enables the provision of comprehensive information on biodiversity to support and inform stakeholders' decision-making and economic activities in relation to Kalimantan.

Design/methodology/approach – Kalimantan was selected as a case study site to identify the destruction of biodiversity caused by businesses driven by narrow and selfish economic motives. A number of measuring, monitoring and reporting models for biodiversity are analysed under Reducing Emissions from Deforestation and Degradation (REDD's) Kalimantan Forests and Climate Partnership's reporting framework.

Findings – Various social, political and economic impediments to the conservation of Kalimantan's biodiversity currently exist. A comprehensive and multifaceted framework of biodiversity reporting and disclosure needs to be implemented in order to promote accountability for Kalimantan's biodiversity. Such a framework is needed to ensure transparency in relation to the activities of stakeholders that impact biodiversity in the region. Biodiversity reporting can also promote the monitoring and control of the use of Kalimantan's land and labour by businesses. It can inform the economic decision-making at both the international and regional levels that needs to occur in order to protect and rehabilitate Kalimantan's biodiversity and biodiversity habitat.

Practical implications – In this article an integrated biodiversity measuring, monitoring and reporting model is presented. In addition to Kalimantan, this model can also be applied to biodiversity reporting in any economically developing region that requires international intervention, investment and guidance to ensure the protection of its biodiversity. The framework developed expands on the current REDD reporting framework for Kalimantan.

Originality/value – This is an original research paper.

Keywords Accounting, Reporting, Biodiversity, Kalimantan, REDD

Paper type Research paper

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1. Introduction

Biodiversity has been described as a necessity for the survival of the human race and a key requirement of economic development (Jones and Solomon, 2011; Treat and Callahan, 2008; Erlich and Erlich, 1992). In spite of its importance, the majority of those in positions of economic and political power, especially in developing countries, oppose measures to conserve and protect the earth's remaining biodiversity (Shah, 2013; Mikkelson *et al.*, 2007).

The opinions of local community members and other stakeholders, including representatives of non-government organisations (NGOs), reflect the overall tone of public discourse on the issue of biodiversity protection in Kalimantan (Manosevitch and Walker, 2009). While there is evidence of arguments against biodiversity destruction in Kalimantan, generally the public and stakeholders are working in opposition to biodiversity protection and conservation. This poses a risk to Kalimantan's biodiversity as stakeholder expectations in relation to sustainability (and biodiversity) play a key role in legitimizing business activity in the region (Lee, 2005). And dialogue and action in support of biodiversity protection, including enforcement of relevant legislation within the business and government sectors, are limited (Owen *et al.*, 2001). Indeed, those in power do not ensure accountability on issues of biodiversity (Gray *et al.*, 1995, 1997) in Kalimantan. There is an urgent need to acknowledge and address the corruption, lack of accountability and resultant destruction of biodiversity in Kalimantan which is occurring at a rapid pace, posing a risk of irreversible loss.

The key stakeholders in Kalimantan include the regional Ministry of Forestry; businesses operating in the region, such as those in the palm oil industry; NGOs based in Kalimantan, including Greenpeace; the Indonesian Government, and other governments who are involved in projects such as the demonstration by Reducing Emissions from Deforestation and Degradation (REDD) in Kalimantan; and international buyers of Kalimantan's products, including palm oil and timber. The local communities of Kalimantan as well as the countries that surround Kalimantan, such as Singapore and Malaysia, are directly impacted by actions that cause biodiversity destruction in Kalimantan, such as mass forest clearing and burning.

Stand-alone biodiversity reporting has a major role to play in conveying important information related to biodiversity to stakeholders to enable them to make informed decisions and implement biodiversity protection in Kalimantan. The models chosen for use in biodiversity reporting need to be comprehensive and multi-faceted so that various factors relating to biodiversity can be brought to light. These factors include a demonstration of stakeholder accountability for biodiversity and transparency in relation to the loss of biodiversity resulting from human activity. Furthermore, stakeholders who are concerned about, and willing to take action to support, biodiversity protection require accurate and informative biodiversity reporting. These stakeholders, including members of civil society, international buyers and large corporations, are in a position to exert influence on the local government and businesses operating in Kalimantan to achieve biodiversity conservation.

The aim of this article is to present the current and historical state of accounting in relation to biodiversity in Kalimantan, and to propose various models for stand-alone biodiversity reporting in the context of REDD's climate change reporting and accountability framework. It is proposed that a combination of these monitoring and reporting tools be applied to protect biodiversity in Kalimantan by ensuring greater

transparency and providing better information on biodiversity in the region. This article adds to the accounting literature on biodiversity reporting by analysing a region that is economically resourceful and productive in the short term but whose biodiversity is challenged in the long term.

The paper is structured as follows. Section 2 outlines the extant social and political problems in Kalimantan and the unethical activities of government and business, especially the palm oil business, which threaten biodiversity, and act as complex and widespread barriers to biodiversity conservation. In section 3, the accounting standards relevant to Kalimantan's biodiversity are evaluated. Section 4 presents a detailed analysis of the implementation of REDD's demonstration activity in Kalimantan, and the related reporting and financing framework. Multiple biodiversity measuring, monitoring and reporting instruments can be applied under the reporting objectives of REDD's and AusAid's Kalimantan Forest and Climate Partnership (KFCP) project, for stand-alone biodiversity reporting. The KFCP reporting framework, which is included in the KFCP design document (Australia-Indonesia Partnership, 2009) is then expanded on to develop the measuring, monitoring and reporting framework for biodiversity presented in this paper. The concluding section synthesizes the important elements of the biodiversity reporting model proposed.

2. Kalimantan: biodiversity, accounting and palm oil

Indonesia is home to the world's third-largest forest after Brazil and Zaire (Food and Agriculture Organization of the United Nations, 1993). This forest area comprises about 6 per cent of the world's total remaining tropical forest. Indonesia's forests contain about 10 per cent of the world's plant species, 12 per cent of the world's mammals, 16 per cent of the world's reptiles, and 17 per cent of the world's bird species (Directorate General of Forest Utilization and the Food and Agriculture Organization of the United Nations, 1990). All of the Indonesian islands have been classified as biodiversity hot spots, and contain unique types of flora and fauna that are endangered by human activity (Mittermeier *et al.*, 1998).

Corruption and lack of accountability seem to be significant characteristics of contemporary Indonesian society (*Jakarta Globe*, 2011) and are particularly prevalent in the forestry industry, leading to detrimental impacts on biodiversity. According to Purvis and Wolosin (2011, pp. 2-3), "[f]or a long time Indonesia's forest economy has been notoriously inefficient and corrupt, with profiteering and resource exploitation [...] Mismanagement and corruption are deeply embedded in Indonesia's land-use sectors, and entrenched interests will fight against efforts to increase transparency and rationalize natural resource decisions".

Kalimantan was selected as the case study site for this research to enable investigation of the complexity of the region's biodiversity and its vulnerability to harms produced by social, political and economic factors. In addition, it is currently the pilot study site of a major Australian and Indonesian governments' partnership initiative on climate change and biodiversity in Indonesia.

As the Indonesian part of Borneo, Kalimantan is divided into five provinces: West Kalimantan, Central Kalimantan, South Kalimantan, East Kalimantan and North Kalimantan (Geohive, 2009). Two-thirds of Kalimantan contains tropical forests, rich natural resources, exotic flora and fauna, and biodiversity elements that are yet to be discovered. The rainforest has more than 15,000 species of flowering plants, including

3,000 species of trees. The fauna include 13 different primates, such as orang-utans and proboscis monkeys. This area provides a habitat to 44 localised mammals, such as the rhino and dwarf elephants; 39 localised bird species; and over 160 species of fish. It is also home to 100 endemic (localised) amphibian species, 47 species of lizard and 41 species of snake. The Kalimantan mountains are inhabited by 24 local bird species (Asian Centre for Biodiversity, 2010). The island's forests include mangrove, peat swamp and freshwater swamp forests; lowland dipterocarp forests; ironwood forests; and hill dipterocarp forests, as well as the largest heath forests in South-East Asia (Asian Centre for Biodiversity, 2010).

In the mid-1990s, Kalimantan's forest cover was estimated at 75 per cent. By 2005, only 50 per cent remained. The Indonesian Government plans to set up the largest fruit palm plantation in the world by 2020; if this goes ahead, it is estimated that Kalimantan will lose about two-thirds of its forest cover by 2020 (Asian Centre for Biodiversity, 2010).

The local communities consist of the Dayaks (the original inhabitants), and Malay, Chinese and Javanese people (IndonesiaPromo.com, 2003). The region has been rapidly urbanized and is home to a growing industrial zone. Kalimantan has been classified as a major producer of palm oil and timber (Casson, 2000; Laurance, 2004), is exploited for its natural reserves (Dauvergne, 1998) and is promoted for tourism (Lonely Planet, 2009).

The prospect of short-term economic gains has fuelled a lack of measures to protect biodiversity, and led to plunder, exploitation and abuse (O'Neill *et al.*, 2008). Increasing public and stakeholder awareness about Kalimantan's biodiversity and biodiversity-related issues through reporting and transparency is especially important in the face of such forces that oppose biodiversity conservation. With a growing population, and the push for economic expansion, the pressure on vulnerable ecosystems is rising. Immediate action including responsible, controlled and sustainable use and consumption of Kalimantan's biological resources is therefore required, informed by biodiversity-related communications that are meaningful, thorough and well informed (Wood and Waterman, 2008).

Accounting reporting and disclosure in relation to biodiversity can play a key role in communicating relevant information, such as that on the link between the decline of biodiversity and certain human activities (Martennson, 2009) in Kalimantan. Yet biodiversity reporting cannot be restricted to the rigid economic definitions of the accounting framework. Measurement methods developed in the non-accounting sciences that are based on more than narrowly defined economic values need to be incorporated into biodiversity reporting. This is important as scientific knowledge on biodiversity needs to be reported in order to educate people on the broader importance of Kalimantan's biodiversity to humankind, beyond short-term and limited economic gains.

In developing more comprehensive reporting systems, complex underlying social factors also need to be taken into account, specifically to evaluate the levels of responsibility and transparency required to protect biodiversity in Kalimantan. Unfortunately, as Gray (1992) has emphasised, human values are all too often dominated by short-term economic self-interests. And this tendency is indeed prevalent among the economically dominant stakeholders in Indonesia, including palm oil businesses in Kalimantan.

Since 2001, the local government in Kalimantan has encouraged new investment in the region without ensuring the protection of the island's biodiversity. This situation

has been exacerbated by a lack of accountability for biodiversity by the local government, despite the general perception that governments are "increasing[ly] (bearing) burdens of accountability for resources (that have) been passed from the citizenry to government" (Brillof, 1990, p. 6). There is no publicly and widely available reporting by the local government on Kalimantan's biodiversity and the impacts of human activities on it. There is also a lack of enforcement of the legislation that would limit business activities in the region and promote better protection and sustainability of Kalimantan's biodiversity.

In terms of corruption, illegal logging and mining in Kalimantan is costing the country over US$36 billion per year (Jakarta Globe, 2011). Approximately 1200 mining firms and 500 oil palm plantation companies have been operating illegally in Central, East and West Kalimantan. Transparency and disclosure by the local government in relation to these illegal activities have been limited. For example, the Forestry Ministry has decided not to release the names of the companies who are conducting illegal logging and are under investigation by the Judicial Mafia Eradication Task Force (Jakarta Globe, 2011). Government officials from the Ministry of Environment and the Corruption Eradication Commission are also being interrogated over allegations of abuse and the illegal issuing of licenses for logging and mining. The various forms of biodiversity protection that are lacking in Kalimantan, specific to certain regions, relevant stakeholders' analyses, and recommendations for improvements are presented in Table I.

2.1 Palm oil industry and labour in Kalimantan

Like the legal and illegal logging carried out in Kalimantan, the palm oil industry is also playing a major role in destroying the region's biodiversity. The industry is supported by local government officials who have been accused of issuing illegal permits in biodiversity-protected areas (Hasan, 2011). These palm oil companies are not only permanently damaging the natural environment and its ecosystems, but also negatively impacting the local communities. This impact was described by a community representative in East Kalimantan as follows:

> Life was idyllic in the village of Muara Tae, before palm oil companies moved in, before then, we'd never experienced unrest, but from 1995, when the first of the palm oil companies came in, things got worse because they didn't respect our way of life. Without letting us know, they began clearing the forest as they saw fit. Because of the palm oil plantations, our water has become polluted and many of our springs have dried up. We took our case to the local government, but they ignored us. We are completely against these companies because they have compromised our way of life. What hope is there now for our grandchildren? (Satriastainti, 2011).

Demand for palm oil is driven by both the biofuels and global food markets (Maple croft, cited in Haryanto, 2011), which has led to the rapid loss of plant and animal species in Kalimantan. The following statement by a Greenpeace representative provides a saddening picture of this loss: "If the forests are not protected, what are left of the Sumatran tiger are the stories, just like the Java and Bali tigers" (Maharuddin, from Greenpeace Southeast Asia, cited in Haryanto, 2011).

Another major issue in Kalimantan relates to ownership and rights to the land. As Peluso argues, "[f]orest mapping by government forestry planners allocates rights of resource use and land access according to forest types and economic objectives, only

Legislation	Region	Threats due to non-enforcement/lack of legislation	Stakeholders	Stakeholders' actions for or against biodiversity	Recommendations
No enforced restrictive legislation for forest protection (Craven, 2001)	Last remaining lowland dipterocarp forest of East Kalimantan	Biodiversity loss	Local communities, university, scientists, farmers, road builders and developers, NGOs (Craven, 2001)	For: Forest data monitoring, reporting and analyses (Venter *et al.*, 2009), For: community protection of the forest (Imbrechts, 2011), Against: rapid agricultural and human settlements' land development	Computer mapping for land monitoring (Craven, 2001), development of region-specific database on forest cover, current land use, biological values, ecosystem services and social and economic returns including income for local businesses and communities (Venter *et al.*, 2009)
Provincial Government Regulation No. 1 (1995) to control forest fires (Consultative Group on Indonesian Forestry, 1998)	West Kalimantan	Insufficient coordination and mitigation of forest and land fire, traditional norms and practices against biodiversity, culture of denial among provincial officials in relation to negative impacts on biodiversity, "incentive policy" for crop development versus biodiversity protection	Ministry of Forestry and Estate Crops, Planning Board of West Kalimantan Province, local communities and businesses	Against: Delayed provision of information to the Provincial Planning Board of West Kalimantan Province by the Ministry of Forestry, inadequate action for biodiversity conservation, illegal use of expired land concession rights by businesses	Change in existing regulation, implementation of guidelines on Community Forestry including forest rehabilitation and protection, strict enforcement of land concession rights
Ineffective restrictive legislation on road and bridge development (Hance, 2012)	Balikpapan Bay East Kalimantan	Farming, illegal logging, forest fires, poaching of wildlife, range contraction of species, mangroves and marine life threatened	Federal, provincial and local governments, NGOs	Against: regional government's lack of consideration of environmental assessment reports prepared by NGOs	Serious planning and action for alternative paths bypassing the mangroves and the rainforest, as suggested by NGOs in the region

Table I.
Factors impacting Kalimantan's biodiversity: legislation, stakeholders and recommendations for improvements

rarely recognising indigenous occupancy rights or forest territories customarily claimed or managed by local people" (Peluso, 1995, p. 383).

People working on the palm oil plantations have lost the land that they and their ancestors owned for generations. Local community members have been hired as workers at a fraction of their income prior to the introduction of the commercial palm oil industry. Marx (1967, pp. 104-105) provides a bleak picture of the worker in such situations:

> A great advantage of the division of landed property [such as the Indonesian Government providing permits to palm oil and other businesses to exploit Kalimantan's forests] is that its mass perishes through property in a different way than in industry; it drives the overwhelming majority of the population into the arms of industry and reduces its own workers to utter wretchedness. It engenders and enlarges the power of its enemy, capital, industry, by throwing poor people and an entire activity of the country onto the other side. To the owner [in our case, the government] it yields the utmost rent, to the farmer [here, the palm oil companies] the utmost profit [. . .] the workers on the land have already been reduced to the minimum.

Community dissatisfaction, frustration and poverty (as seen in Kalimantan) can have a profoundly negative impact on biodiversity (EcoLogic Development Fund, 2012; Fisher and Christopher, 2007). Opinions may differ about the level of economic "satisfaction" required at the community level to ensure that the community protects Kalimantan's biodiversity. Nevertheless, as emphasized by Fisher and Christopher (2007), ensuring that the basic human needs for survival are met, including the availability of a stable food supply, can prevent communities from attacking and destroying local biodiversity for consumption. On this point, the killing of the endangered orang-utans in Kalimantan for food could be stopped if the economic conditions of local communities were improved.

2.2 Local and international businesses, and the consumption of palm oil

Among international businesses, values are shifting towards supporting Kalimantan's biodiversity, yet there remains a long way to go. Were businesses to adopt a supply chain approach to their biodiversity reporting, which considered the impacts of palm oil production and use, responsible buying and consumption of Kalimantan's palm oil would be promoted. This would broaden the scope of the stand-alone biodiversity reports, and inform decision-making on biodiversity-related matters.

Unilever, Nestle, Tesco and Sainsbury established an international initiative in 2004 – the Roundtable for Sustainable Palm Oil (RSPO) – to promote responsible palm oil use and consumption. The RSPO's purpose is to certify the production of palm oil from non-destructive plantations (*The Economic Times*, 2008).

The RSPO sets some interesting criteria on reporting and selection (in relation to biodiversity and suppliers, respectively) in its document "Principles and criteria for sustainable palm oil production". According to its principles, growers and millers of palm fruit in Kalimantan should provide sufficient information to other stakeholders, including international buyers, on the environmental, social and legal issues related to their plantations, processes and operations. The RSPO also requires that the management documents of these businesses that contain biodiversity-related information should be made publicly available. However, there is an exception to these criteria: information in relation to sites that are habitats of "rare" species, where

"disclosure could increase the risk of hunting or capture" (RSPO, 2007, p. 4), is deemed to be confidential and no disclosure is therefore required for these sites. This would make the entire region of Kalimantan an exception to any reporting and disclosure requirements on biodiversity. Moreover, criterion 5.2 requires the collection of information on the status of rare, threatened or endangered species in the areas impacted by the grower, but any information on what a business plans to do with such data need not be publicly disclosed. In fact, the RSPO requests that this information not be publicly disclosed.

The RSPO also places the greatest responsibility on Indonesian law for the protection of biodiversity. However, as noted earlier, biodiversity protection laws are non-existent in Kalimantan. As a result, if companies who are members of the RSPO buy palm oil from growers in Kalimantan whose actions are detrimental to the island's biodiversity, their palm oil products would still be RSPO certified and classified as sustainable.

An example of such misrepresentation within "sustainable" supply chain reporting (with biodiversity components) is seen in the case of the company Cargill, which is the largest importer of palm oil in the US and supplies palm oil to many other regions of the world. According to Mathews (2012), Cargill does not have any policies to source palm oil only from companies in Kalimantan that support biodiversity. Mathews states that: "Without its own safeguards around [...] [and no reporting on] species and climate impacts, the palm oil giant cannot ensure its supply chain does not include palm oil from controversial plantations [...] Cargill admitted that [...] it bought at least one shipment [...] from PT Best [...] a company in Central Kalimantan that has illegally cleared thousands of hectares of orang-utan habitat and has hired people to hunt down and kill orangutans" (Mathews, 2012). Yet Cargill is a member of the RSPO and claims that the active support of "sustainable" palm and palm oil among its suppliers is its goal and vision (Cargill, 2011). According to Greenpeace (2012), major Indian companies such as TC, Britannia, Godrej and Ruchi Soya are sourcing palm oil from non-sustainable and destructive suppliers operating in Kalimantan such as Duta Palma – another RSPO member company.

References to "sustainable palm oil" are exemplary of the loose use of the term "sustainable" by many businesses – as not referring to anything explicit, measurable and reportable as far as the sustainability of biodiversity in Kalimantan is concerned. Detailed and accurate reporting needs to be undertaken by all of the major business buyers (Houdet *et al.*, 2010) of Kalimantan's palm oil produce. Companies who use palm oil in manufacturing should demonstrate that it is sourced from ethical farmers and not from businesses that are contributing to the destruction of Kalimantan's biodiversity. Moreover, all local business decisions made, and processes used, by the farmers in Kalimantan ought to be reported, including:

- Disclosure on the methods used to clear land for palm oil plantations. The method adopted should include selective clearing and leaving patches of forest in the plantation (Koh, 2008).
- Demonstration of support for biodiversity on the land that is under the business's control, including disclosure on the costs of relocating animals to biodiversity reserves if the plantation is unable to support biodiversity.
- Demonstration of taxes paid to the government for biodiversity protection.

- Demonstration of the implementation of effective agricultural techniques that produce maximum yield with minimal land use.
- Demonstration of adequate wages paid to workers. Poverty is causing a detrimental impact on biodiversity – for example, through the killing of endangered orang-utans for food. Higher incomes would act as a deterrent against such activities.
- Demonstration of the business's support for the local community: businesses need to spend money on implementing or supporting improvements in the local communities such as setting up schools. The provision of education on issues related to biodiversity for people of all ages is also important for improving biodiversity awareness and support.

The Global Reporting Initiative (GRI) framework for biodiversity (GRI, 2007)[1] offers detailed guidance on how a supply chain approach to biodiversity reporting can be achieved. This framework accounts for the direct and indirect impacts on biodiversity of all businesses involved in palm oil agriculture, production and sale. The information required under the GRI framework includes the size of a business's land in or near areas of "high biodiversity value" (p. 9); a description of the significant impacts of business activities; details of the impacts of products and services used and generated by the business on biodiversity; the steps taken by the business to protect or restore Kalimantan's habitat; the strategies developed, or actions planned or undertaken, to manage impacts on biodiversity; and a list of specific species (based on the International Union for Conservation of Nature list of threatened species) with habitats that are affected by the business's operations, disclosed according to level of extinction risk (GRI, 2007). The GRI biodiversity reporting framework is preferable to the RSPO's reporting framework as it requires detailed information on the impacts of business operations on particular species, especially endangered ones, while the RSPO requires the opposite – that there be no public disclosure on the impacts of business activities on endangered species.

3. Relevant accounting standards for biodiversity reporting in Kalimantan

Corruption is a major barrier to the protection of biodiversity in Kalimantan. Everett *et al.* (2007) have argued for the development of a means of addressing such corruption, which includes detailed reporting and disclosure to promote greater accountability.

Indonesia previously had an accounting standard on forestry (PSAK No. 32) that required a degree of accountability in the form of reporting and disclosure on the impacts of business activities on local biodiversity. However, this standard was replaced by IAS 41, which only covers the use of natural resources (such as plantation forests) for economic gain (International Financial Reporting Standards (IFRS), 2011). IAS 41 is limited in its application in terms of the protection of biodiversity as it does not consider factors that are relevant to regrowth, degeneration, production or the procreation of the biological elements. It excludes biodiversity loss, and the impacts of the processes of clearing the land, such as mass burning and clearing for palm oil plantations.

These two accounting standards – PSAK No. 32 and IAS 41 – are now compared in order to demonstrate that, in terms of financial reporting regulation, the situation in Kalimantan has worsened.

3.1 PSAK No. 32

PSAK No. 32, also referred to as Accounting for the Forestry Industry of 1994, was an Indonesian accounting standard that was specifically developed for businesses engaging in one or more forest concessions, including in Kalimantan. However, no disclosure by any business of the implementation of this standard in Kalimantan can be found on the Internet. The standard was intended to provide a more holistic picture of the processes involved in harvesting in natural environments such as forests. It defined foresting for timber as a cycle: beginning with planting, followed by repeated harvesting, with a complete time span of no more than 35 years and planting of more forests within a time frame of eight years (Deloitte, 2007).

Forest companies were defined in PSAK No. 32 as forest concession holders who have rights and obligations including in relation to planning forestry activities, engaging technical and professional resources to implement forest management, planning and implementing forest exploration activities, setting up forest reservations, and implementing forest monitoring and protection measures (Deloitte, 2007). Setting up forest reservations and implementing forest monitoring and protection measures have a positive impact on biodiversity conservation through the limitations imposed on forest land use for business activities. Thus, stewardship for biodiversity protection under the influence of business would have been promoted through this standard.

The standard also promoted prudence on the part of businesses, emphasising that company financial statements should include disclosure on the cautious use of Kalimantan's forest land and on biodiversity-related issues to inform the decision-making of various external parties, including government institutions and the general public. PSAK No. 32 stressed the legal compliance requirements facing forest companies with forest concessions, and their obligation to operate within the governmental regulations (PP Andal of 1987; the Government Regulation on Environmental Impact Analysis) and fulfil the disclosure requirements of interested parties who wanted to remain informed of developments in Kalimantan's forestry industry (Deloitte, 2007).

Under the standard, notes to company statements were to include information on the activities and costs relating to reforestation of the natural forests, evidence of a selective cutting and planting program, a description of the company's forest protection and preservation activities, and information on its compliance with government regulations in relation to biodiversity conservation.

The standard also required that the reporting of costs of timber and other forest products should include costs relating to biodiversity-supporting activities, such as planning, planting, maintaining and restoring the forest; fire control and associated forest protection measures; and meeting environmental and social responsibilities. Conservation costs were to be charged to production costs.

Thus, PSAK No. 32 highlighted the need for businesses to report on fire control and forest protection costs. These costs were to include outlays for the construction and/or procurement of fire control and forest protection equipment. The standard required that these should be capitalized as deferred charges and amortized over the maximum period of benefit, up to the end of the concession period. Costs related to fire control and forest protection efforts, including the movement of manpower, materials and supplies, as well as fire insurance costs, were to be expensed as

production costs (Deloitte, 2007). In reality, the failure of businesses to implement fire control and forest protection measures has led to the irreversible damage of biodiversity in Kalimantan. This lack of biodiversity protective actions has been accompanied by a complete lack of accessible public disclosure in relation to the costs of fire control and forest protection efforts.

Finally, companies' technical and financial obligations to the government were stipulated in PSAK No. 32. Thus, the disclosure of technical obligations was to be actioned by a company through the development of Environmental Impact Assessment reports, a Statement on Environmental Information, an Environmental Management Plan and an Environmental Control Plan. Financial obligations were defined as requirements to provide reforestation funds and funds to fulfil a company's environmental and social responsibilities to the government.

Although a direct framework for biodiversity conservation and reporting was absent in PSAK No. 32, the reporting requirements for the implementation of controls, including selective cutting and protection measures, could have assisted in biodiversity conservation.

3.2 The motivation behind PSAK No. 32

The question arises as to why the government introduced PSAK No. 32 when there has been no evidence of its implementation in business reporting on biodiversity protection and restoration in Kalimantan. The answer relates to the changes implemented by Emil Salim, Indonesian Minister of Population and the Environment during the 1980s. While in office, Minister Salim introduced substantial changes in the area of environmental and biodiversity protection. His efforts resulted in the development of the PP Andal of 1987 (the Government Regulation on Environmental Impact Analysis). This Regulation required businesses to prepare an Environment Impact Statement that was to be submitted to Salim's Ministry of Population and the Environment (Cribb, 1988). The Minister also encouraged government support for various environmental protection measures including the development of an accounting reporting standard on environmental and biodiversity protection. And he improved public awareness of environmental and biodiversity degradation through public campaigns and education programs.

However, despite these initiatives, the implementation of any regulation or accounting standard aimed at supporting or ensuring biodiversity protection in Kalimantan has been lacking. For example, the Indonesian Government's reforestation program of the 1980s excluded Kalimantan's coastal regions that had been heavily cleared by commercial loggers (Prannowo, 1985).

PSAK No. 32 was withdrawn by the Indonesian Financial Accounting Standards Board, effective from 1 January 2010. IAS 41 was introduced as its replacement.

3.3 IAS 41

IAS 41 is the current international accounting standard on agriculture. It focuses on biological assets, agricultural produce at the point of harvest, and government grants. In this standard, biological assets are not considered from the perspective of conservation or protection. Rather, they are defined as living assets measured at fair value less point of sale costs at the balance sheet date.

Under IAS 41, agricultural activity is defined as the management of the transformation of biological assets (living plants and animals) into agricultural produce (the harvested product of the entity's biological assets) (IAS 41.12, IFRS, 2011). According to this standard, biological assets (such as the non-plantation forests in Kalimantan) do not carry either intrinsic or extrinsic value for anyone except the "farmer", who need only consider the market value of the produce and the associated costs of the process of transformation from plantation to saleable inventory.

For farmers, burning off is a cheap and fast method to prepare the land for agriculture on a large scale (Northoff, 2005). IAS 41 does not cover methods of land clearing that are detrimental to biodiversity. Yet there are substantial risks associated with forest clearing using the "slash and burn" method. For example, in 1997-1998, burning off in Kalimantan got out of control (Levine, 2000), resulting in a fire that led to the permanent loss of certain tree species on the island (Hiratsuka *et al.*, 2006), and health impacts that were felt in a number of regions, both within and beyond Indonesia (Kovats *et al.*, 2003).

In conclusion, PSAK No. 32 provided an opportunity for Kalimantan's businesses to report on their activities in relation to biodiversity protection. It also emphasised the importance of businesses and government demonstrating their financing of biodiversity conservation and protection in Kalimantan. This opportunity was lost completely by the replacement of PSAK No. 32 with IAS 41. The consequences of this failure to implement an effective biodiversity reporting framework for Kalimantan's biodiversity are discussed in the next section.

3.4 Implications of the lack of an effective biodiversity reporting and accountability framework in Kalimantan

According to Dalem (2010), "the reality of Kalimantan's forests is logging, mining and palm oil plantations as far as the eye can see". Illegal timber trading results in the loss of US$100 million per year in East Kalimantan, the supply of which in international markets is causing the prices of tropical timber to decrease (Reuter and Acciaioli, 2011). Activities such as the illegal trading of Kalimantan's timber or the excess supply of palm oil have reduced the value of the marketable biodiversity in this region. Biodiversity that is not marketable does not carry any perceived non-economic (social, scientific or ethical) value among Kalimantan's business owners, resulting in its rapid loss.

Countries that have not regulated against illegal timber imports from Kalimantan allow such timber to enter through neighbouring countries such as Malaysia and Singapore (Doherty, 2002). Moreover, less than 10 per cent of the revenue raised from timber logging in Kalimantan flows back to the region (Centre for International Forestry Research, 2004).

There is an absence of accountability in the form of publicly available biodiversity reporting from the businesses operating in the forests of Kalimantan. According to Kalimantan's regional office of the State Minister for the Environment, companies operating in the region who are involved in forest resource consumption are "abettors of natural disasters as a result of environmental damage" (Sulaiman, 2008). At the same time, the government publishes no list of companies that includes the details of any biodiversity damage caused by their activities. Lack of biodiversity-related reporting and disclosure is a major problem in the region.

4. Reducing Emissions from Deforestation and Degradation in Developing Countries (REDD), AusAid and the Kalimantan Forest and Climate Partnership (KFCP): modelling for Kalimantan's biodiversity conservation and related reporting

Recently, there have been international efforts to protect the remaining biodiversity in Kalimantan. One such project has been initiated collaboratively by REDD, the Indonesian Government and the Australian Government. The Australian Government's funding organisation for this KFCP project in Kalimantan is AusAid – an agency within the Foreign Affairs and Trade portfolio.

REDD has developed a reporting framework for implementation and performance reporting for its projects in Kalimantan. It is analysed in regards to its application by AusAid in its annual performance reports since AusAid's annual performance reports for the KFCP project are to be based on this framework. In addition, biodiversity reporting models are evaluated with the intention of developing a comprehensive framework for measuring, monitoring and reporting on Kalimantan's biodiversity as REDD's framework is not sufficiently detailed or focused for this purpose.

REDD is an international collaborative United Nations (UN) program, with multiple partners that include the UN Forum on Forests, the Global Environment Facility, the UN Framework Convention on Climate Change and multiple governments including the Australian Government. It strongly supports active financial markets for biodiversity that it is hoped will assist in negating government backing of illegal and unethical actions that damage biodiversity (Pearce, 2001), such as illegal logging in Kalimantan. Also, in terms of persuading businesses to implement financial measures that support biodiversity protection in Kalimantan, Peterson *et al.* (2012) highlight the need to establish a relationship between biodiversity business risks (such as the risk of a non-sustainable supply of timber from Kalimantan) and a practical financial matrix in the form of financial markets. Examples of such markets include those that trade in carbon stored in forests (Pearce, 2001) and other novel approaches towards financing biodiversity protection projects (Jenkins *et al.*, 2004; Panayotou, 1994) such as those implemented under REDD.

Long-term funding is needed to support REDD's work in Kalimantan, to enable material and positive biodiversity-related impacts. In terms of the amount of funds required, according to Jaenicke (2010) the REDD projects collectively worldwide, including those yet to be commenced and those currently being undertaken in Kalimantan, would cost industrialized countries approximately US$50 billion until 2020. The development and operation of novel active financial markets for Kalimantan's forest assets, including its biodiversity, could provide a crucial source of such funding.

There are three types of financial market-based mechanisms that might support the long-term viability of REDD projects in Kalimantan, which are outlined below:

(1) *A carbon market-based mechanism*. REDD-certified emissions reductions could be used by companies and national governments to meet emissions reduction targets in their national cap-and-trade systems. An issue that must be considered under such an approach is whether REDD credits should be used to replace other emissions reduction schemes or whether this should be a matter of choice for investors. This approach has been adopted by the Australian Government in seeking to meet its emissions reduction targets through financing projects in Kalimantan.

(2) *A market-linked approach*. This would involve an auction process. Emission allowances could be auctioned at an international level, and the revenue raised could then be used to fund biodiversity protection projects in Kalimantan.

(3) *A voluntary funds approach*. This could operate at a national or international level to raise funds from different parties. However, this option cannot be used for compliance targets (Global Canopy Programme, 2009). If the Australian public or Australian companies were to voluntarily raise funds for Kalimantan's biodiversity protection, separate from the compliance funding, the voluntary funds would carry the attraction of being tax deductible while being used for Kalimantan's biodiversity conservation.

At present, the majority of REDD's projects are being funded by different governments in collaboration with the Indonesian Government. Specifically for Kalimantan, in order to develop a case for Indonesia's participation in future carbon and biodiversity markets, REDD's demonstration activity, the KFCP, has been implemented by the Indonesian and Australian governments.

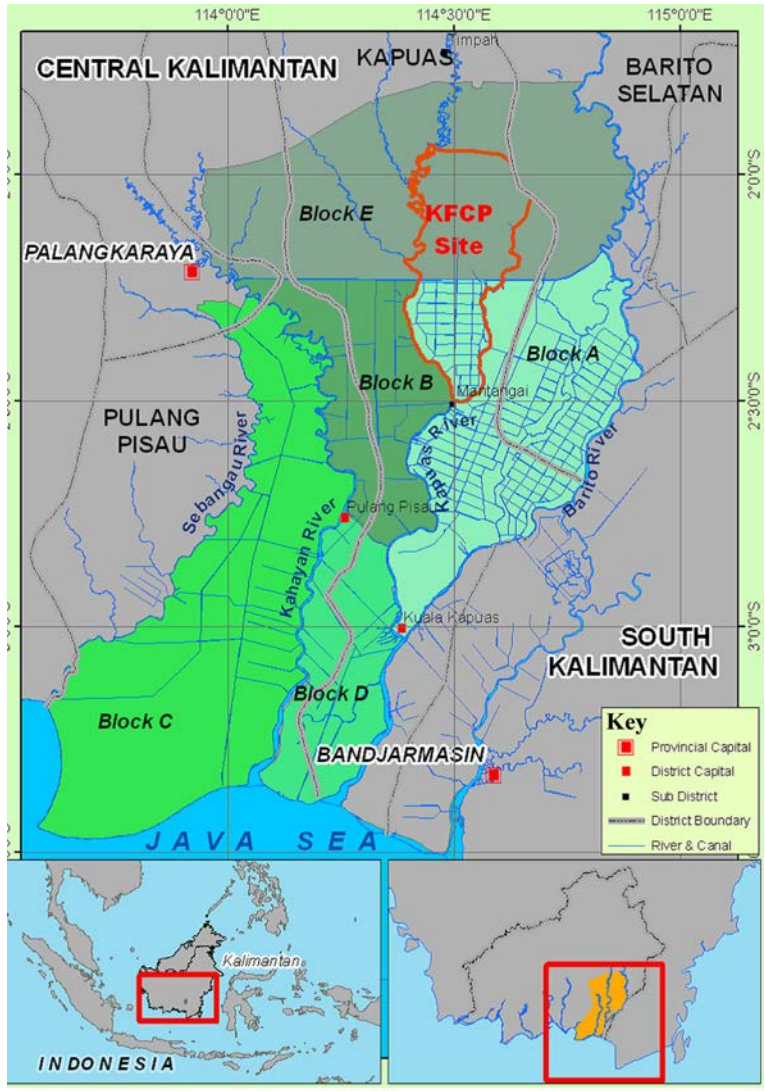
The KFCP is the current cooperative scheme between the governments of Indonesia and Australia, and is a REDD pilot project. The area of Kalimantan that is covered by the KFCP is shown in Figure 1. The project encompasses 120,000 hectares, incorporating seven villages in the Kapuas and Timpah sub-districts in the Kapuas district of Central Kalimantan (Australia-Indonesia Partnership, 2009).

In 2008, when the Indonesia-Australia Forest Carbon Partnership was ratified between the President of Indonesia and the Prime Minister of Australia, US$30 million was committed to the KFCP project for carbon control and biodiversity protection and conservation.

The measurement, reporting and verification (MRV) system that informs financing decisions under the KFCP project has been developed by REDD to monitor change in land use and to capture information on the carbon stock of the forests of Kalimantan. Remote sensing plays a major part in the operation of the MRV system, which monitors forest area and measures its biodiversity. It is also intended to capture the impact of any human activity on Kalimantan's forests (UN-REDD, 2011).

The application of the system includes the collection of information on "forest inventories". On this point it is important to note, however, that from the biodiversity reporting perspective the definition and potential application of forest inventories and the measurement of Kalimantan's biodiversity only relate to carbon capture. The initial project design document describes forest inventory only in terms of spatial (area covered by Kalimantan's trees) and dimensional (width and surface area of trees for carbon capture) characteristics, rather than providing detailed information on the specific biodiversity (flora and fauna) and the impacts of human activities on these.

When the carbon capture approach to biodiversity reporting under the MRV is compared to other biodiversity measurement and reporting models, the classification of the MRV as a biodiversity reporting model appears questionable. Similarly, the Australian Government's purported commitment to "active biodiversity markets" as an important prerequisite for the primary goal of emissions reduction (and biodiversity protection) in Kalimantan (Australian Government, 2011) does not appear to be justified, based on the lack of attention to, and detail on, biodiversity provided by the MRV. Another point of contention is that biodiversity protection has been defined as



Source: Australia-Indonesia Partnership (2009)

Figure 1.
KFCP site in Kalimantan

one of the major benefits of the MRV system (UN-REDD, 2011; Jaenicke, 2010), yet a detailed framework of biodiversity reporting for Kalimantan is not provided by the MRV.

The initial KFCP design document (Australia-Indonesia Partnership, 2009) stipulated a requirement that a substantial amount of disclosure was to be provided in subsequent reports in relation to the project. The information and reporting required, based on REDD's goals for the KFCP project which indirectly relate to biodiversity protection measures, include the following:

(1) Demonstrating the emissions reductions that can be achieved through the KFCP's activities. This would imply reduced clearing of Kalimantan's peat land, fewer fires and less destruction of the island's biodiversity.

(2) Trialling novel approaches to REDD financing. The long-term financing of projects such as the KFCP is crucial in order to protect biodiversity from large-scale destruction by providing monetary incentives for forest land protection and rehabilitation.

(3) Providing information on the positive and negative social and economic impacts of the REDD demonstration for Kalimantan's communities. Economic betterment of the local communities may result in less damage and greater support for biodiversity. This information should entail a demonstration of the effective management and conservation of tropical peat forests, based on scientific knowledge, with the potential to apply these techniques throughout Indonesia.

(4) Reporting on the co-benefits of the cash payments for REDD's services to target villages by REDD for their efforts towards conserving biodiversity. This information would demonstrate the achievement of economic and biodiversity win-win strategies.

(5) Reporting on the policy options and institutional responsibilities identified that would contribute towards the REDD initiatives. Local governments and the Ministry of Forestry have a key role to play in protecting Kalimantan's biodiversity by strictly enforcing legislation in relation to burning and illegal logging. REDD also aims to change the designation of the KFCP area. Currently it is classified as "production forest" but REDD is hoping for it to be changed to "protection forest" or "wildlife reserve" shortly after the commencement of the project (Australia-Indonesia Partnership, 2009); however, this has not yet occurred.

These reporting requirements are now evaluated in the context of AusAid's annual progress reports, which have been published since the commencement of the KFCP in Kalimantan.

4.1 Reporting of REDD's biodiversity and climate change initiatives in Kalimantan

AusAid's annual reports are supposed to include the details of the KFCP's progress according to the goals outlined by REDD. AusAid's 2009-2010 annual report briefly introduced the KFCP project as "Australia helping Indonesia to implement a 120,000 hectare project in Central Kalimantan [...] to demonstrate practical, effective and equitable ways to contribute to REDD" (AusAid, 2010, p. 7). However, the report provided no further details on the program's biodiversity conservation performance for the year. A link to the design document would have helped clarify that there was a detailed plan laid out for Kalimantan's climate change and biodiversity initiatives. A comparison of actual performance against the objectives identified in the design document should also have been provided.

In AusAid's 2010-2011 annual report (AusAid, 2011), only a brief statement was provided on the project's performance for the year. The only information it provided on the KFCP in relation to Kalimantan's biodiversity was as follows: "Several provinces,

including Central and East Kalimantan, are developing low carbon strategies" (p. 38); "Despite procedural delays, Australia's first demonstration activity in Central Kalimantan will make a significant contribution [. . .] to make Central Kalimantan a pilot province for REDD" (p. 38); and "Australia's forest carbon partnership made headway in Central Kalimantan but [there are] delays in [. . .] progress" (p. 39).

The most recently published 2011-2012 report (AusAid, 2012) offered slightly more detail. It highlights some important points that are relevant to Kalimantan's biodiversity, as follows: there is extremely limited government funding available at the provincial and local levels in Kalimantan for biodiversity protection and conservation. It also reported that formal agreements have been signed between the seven villages and AusAid in Kalimantan for these communities to receive payments under the climate change initiatives of the KFCP for their contribution towards rehabilitation of Kalimantan's biodiversity (AusAid, 2012).

The 2011-2012 annual report also detailed the provision of community training on the "successful planting" of seedlings for biodiversity rehabilitation. Yet the term "successful planting" is not clearly defined, and no information is given on the long-term sustainability of these plants. Nor is any information provided on any potential clearing and cutting restrictions for the future in relation to these secondary forests. Such restrictions were mentioned in PSAK No. 32 but are not covered by any current legislation. Yet such restrictions ought to be implemented by the Indonesian Government to meet its obligation under the agreement to conserve Kalimantan's biodiversity. Specific disclosure on the nature and type of forest and biodiversity inventory that is being created under the KFCP is also lacking in AusAid's annual reports.

In relation to the MRV, the 2011-2012 report offered a short description of the financial and technical support provided to the National Space Agency to generate land cover change maps over Kalimantan from 2000 to 2009. There is also a link given to a publicly available website (IndoFire)[2] that provides real-time maps for the whole of Indonesia, and in particular the details of any burning fires. Detailed monitoring information is needed to evaluate the status of Kalimantan's biodiversity and any damage caused to its forests. Yet these maps are limited in terms of biodiversity reporting as they do not convey any information about the state of Kalimantan's biodiversity as far as destruction, displacement or losses resulting from fires.

The current level of disclosure in AusAid's annual reports on the objectives of REDD in Kalimantan is limited in terms of biodiversity conservation and protection. Indeed, there is significant disparity between the framework of reporting identified in the KFCP design document and the disclosure evident in AusAid's annual reports.

There are several accounting and non-accounting biodiversity reporting models that deal with the scientific aspects of biodiversity measuring and reporting. These could be used to report on Kalimantan's biodiversity as part of AusAid's annual reporting by region, as stand-alone sections of biodiversity reporting. These models are now discussed as potential additions to any biodiversity reporting undertaken to fulfil REDD's climate change and biodiversity protection reporting requirements for Kalimantan.

4.2 Demonstration of biodiversity conservation and reporting using scientific modelling

The management and conservation of Kalimantan's tropical peat forests should incorporate a detailed consideration of the biodiversity that the forests sustain to

improve understanding of (and reporting on) the value of this biodiversity to humankind, and to report on any progress made towards biodiversity protection. A number of sophisticated models for capturing this information that consider the multiple elements of biodiversity have been developed in both the accounting and scientific fields.

4.2.1 Changes in land use and Koh et al.*'s change sensitivity analysis model.* Kalimantan's capacity to sustain its biodiversity has faced substantial challenges as a result of numerous activities, including mass clearing and burning, and agriculture, particularly palm oil plantations. Some of the island's land has also been abandoned after the agricultural practices have ceased and efforts to rehabilitate it and return it to its original form have failed.

Koh *et al.*'s (2011) change sensitivity analysis model can be used to consider the impacts of changes in land use on Kalimantan's biodiversity. Their matrix-calibrated species-area model is (source: Koh *et al.*, 2011):

$$\frac{S_{new}}{S_{org}} = \left(\frac{A_{new}}{A_{org}}\right)^{\gamma \sum_i^n p_i \sigma_i}$$

where S and A represent species richness and primary forest area, respectively; and the subscripts "new" and "org" represent the transformed and original landscapes, respectively. p is the proportionate area of habitat relative to the total converted land area, and n represents the total number of habitat types. γ represents the mean slope of the species-area relationship. σ represents the sensitivity of a species to three types of land changes: cleared peat land, closed canopy oil palm, and regrowth mosaic and regrowth forests in Kalimantan (Koh *et al.*, 2011). This model could be used as an indicator of changes in forest biodiversity that result from land conversion, both prior to and since the KFCP project's activities. It could also be applied to different species (Koh *et al.*, 2011), first at the KFCP site and later in other regions of Kalimantan. This tool is useful in demonstrating the negative impacts of various types of human activity, including the mono-agriculture of palm oil plantations in Kalimantan.

However, this model is limited in application as Koh *et al.* (2011) were only able to capture remote sensing information in relation to birds, relevant to a converted area of 2.4 million hectares (77 per cent of total land mass allocated to palm oil plantations in Kalimantan) and to sections that were larger than 200 hectares only, given the satellite technology available to them. If this model were applied to information captured via more accurate land mapping and monitoring technology, such as that provided by IndoFire, the data collected on land conversion and multiple species loss would be more accurate. Moreover, Koh *et al.* applied the model to forest-dwelling birds only since these birds can also be present in non-forest areas but require forests for their long-term existence.

Koh *et al.*'s model needs to be applied to all of the species in Kalimantan that are impacted by land clearing for agriculture or by timber businesses, and land rehabilitation under REDD. If the model were applied to areas of Kalimantan of diverse sizes, and used to assess the impacts on various species of flora and fauna, it could be accurately classified as a biodiversity-sensitivity-to-land-change model. Furthermore, the species extinction predictions calculated using this model need to take into account species under "extinction debt"[3], which can be described as the lag between species

loss and habitat destruction. For example, the biodiversity destruction caused by the clearing of Kalimantan's land through mass burning that would have occurred a few years before its rehabilitation under REDD would be mistakenly assigned to the current time frame in which REDD is operating in the region. This lag in cause and effect in relation to biodiversity destruction is referred to as the extinction debt. If biodiversity loss analyses and predictions did not account for this lag, REDD's efforts would be underestimated insofar as species loss would occur during the same time frame of such efforts, although the loss would have been caused by destructive human activities carried out earlier, such as mass clearing and burning.

4.2.2 Angermeier and Karr's (1994) biological integrity approach combined with Phillips et al.*'s (2002) classification model.* A detailed breakdown of biodiversity information in the form of scientific knowledge has been incorporated into Angermeier and Karr's (1994) biological integrity approach. Their method considers the bio-geographic, evolutionary and ecosystem processes, such as those relating to energy flows, in addition to biological elements (Faith, 2008). In their model, biological integrity has been defined to reflect both the biotic elements and the processes that generate and maintain those elements, whereas diversity only describes the elements (Angermeier and Karr, 1994).

Angermeier and Karr have organised the biotic elements into a hierarchical order, to classify biological diversity as follows:

(1) *Taxonomic*. Including biota, kingdom, division, class, order, family, genus, and species.

(2) *Genetic*. Including genome, chromosome set, chromosome, gene, and allele.

(3) *Ecological*. Including biosphere, biome, landscape, ecosystem or community and population.

Angermeier and Karr's model is combined by the author with that of Phillips *et al.* (2002) to focus on the rehabilitation of trees in Kalimantan. In Kalimantan, trees play an integral part in supporting critical biological processes and biodiversity including birds and mammals. Their rehabilitation and regrowth is therefore vital in order to save the island's remaining biodiversity.

Phillips *et al.*'s (2002) classification model groups the tree species in Kalimantan based on common characteristics such as response to light or competition. This model is important in so far as it links the data collected from monitoring systems with the efforts to rehabilitate land in Kalimantan under the KFCP. According to the authors, this model is playing a significant role in forest management and planning in Kalimantan under REDD. Yet AusAid's annual reports provide no information on the types of seedlings that are being planted in community nurseries, the percentage of survival of these seedlings, or the different stages of growth of the plants since KFCP's implementation.

A thorough understanding of the diversification of Kalimantan's tree species is vital, particularly for the success of REDD's goal of rehabilitating Kalimantan's damaged forest land by planting seedlings. The seedlings need to survive and grow to maturity, and the mature trees need to live for the normal life span in order to generate carbon capture. A combined approach utilizing both Angermeier and Karr's biological integrity approach and Phillips *et al.*'s (2002) classification model is applied to provide an overall framework for Kalimantan's biodiversity reporting, as shown in Table II. This model needs practical application that is focused on rehabilitating Kalimantan's trees.

Hierarchy	Elements (representative of biodiversity)		Process	Indicators (in respect of each process)
Taxonomic	Species For example, trees in Kalimantan with similar characteristics such as response to light and wind (Phillips *et al.*, 2002)		Range expansion or contraction caused by forest clearing in Kalimantan	Range size, size of populations, isolating mechanisms[a]. Isolation can also occur as a result of human interference, which can create distances between members of the species and therefore would prevent the continuation of the species
	Name (reference)	Characteristics		
	Fast-growing	Large trees, light demanding, very fast growing		
	Shorea			
	Dipterocarpus	Large trees, shade tolerant, slow growing		
	Other large dipterocarps	Large trees, shade tolerant, fast growing		
	Anthocephalus	Small trees, fast growing, highly disturbed forest		
	Macaranga	Small trees, light demanding, very fast growing		
	Gap small trees	Small trees, recruit in light areas		
	Shade small trees	Small trees, recruit in shady areas		
Genetic	Gene		Simplification: more evolved species may be replaced by species with simpler genetic make-up; "selective skewing" (Thompson and Kennedy, 1996)	Number of alleles[b] may be reduced, resulting in fewer diversified species in Kalimantan
Ecological	Population		Colonization or extinction	Dispersal behaviour: Result of clearing of tropical rainforests in Kalimantan; relocation of species to a different habitat. It also needs to consider the impact on species existence under changed habitat conditions
Ecological	Assemblage[c]		Energy flow[d]	Number of trophic links[e], long-term survival of the orang-utans, "hungry" villagers killing hundreds (Shears, 2011)

Notes: [a]An isolating mechanism is a characteristic of two species that stops them from inter-breeding (Ridley, 2004); [b]An allele is one member of a pair of a genes located on a specific position on a specific chromosome that determines distinct traits that can be passed on from a parent to an offspring (Bailey, 2012); [c]Assemblage is a biotic community living together in a certain space within their environment as a loose unit (World Institute for Conservation and Environment, 2012); [d]Energy enters the biological system as light energy, is transformed into chemical energy through photosynthesis and respiration, and is ultimately converted into heat (Wessells and Hopson, 1988); [e]Trophic links are feeding relationships or food chains (McGraw Hill Science and Technology, 2012)

Table II.
Angermeier and Karr's (1994) biological integrity framework and Phillips *et al.*'s (2002) classification model applied to Kalimantan

4.2.3 Jones's (1996, 2003) natural inventory reporting models. Jones's (1996, 2003) reporting models offer a framework for reporting on the critical non-renewable natural capital (originally defined by Gray, 1992; Gray *et al.*, 1993, cited in Jones, 1996) that is under threat of extinction. Jones's framework considers detailed information on protected flora and fauna by species, protected species by number and type, and total population of each of the critical natural capital species in a region.

Sustainable natural capital is also mentioned in Jones's models; and in the context of Kalimantan, sustainable natural capital would include timber and palm oil plantations that mature and are a source of revenue for palm oil and timber businesses. This renewable capital should be planned for and utilized in a manner that does not further impact the critical biodiversity of primary tropical forests in Kalimantan. An example of such forest management for Kalimantan would include leaving patches of forest among the plantations, as suggested by Koh *et al.* (2011). If responsible forest management is undertaken, palm oil plantations can be classified as sustainable agriculture from a biodiversity conservation perspective. Conversely, as a mono-agriculture practice, palm oil plantations are not capable of supporting multiple biodiversity as a tropical native forest is able to in Kalimantan.

Jones's model includes the following six levels of hierarchical classification of natural capital:

(1) *Level 1*. Categorization by habitat type and natural capital status.

(2) *Level 2*. Inventory of protected flora and fauna by species and total population, covering all habitats (if all habitats are critical). For example, since Kalimantan is classified as a biodiversity hotspot (Mittermeier *et al.*, 1998), all species are classified as critical and reporting needs to be undertaken under levels 3 and 4.

(3) *Level 3*. Inventory of critical habitats including flora and fauna by species.

(4) *Level 4*. Inventory of critical habitats including flora and fauna by total population.

(5) *Level 5*. General inventory of flora and fauna by species.

(6) *Level 6*. General inventory of flora and fauna by total population (Jones, 1996, p. 291).

Jones's natural inventory model (1996) is applied to the KFCP area using the information provided in the KFCP design document and by incorporating more detailed information as derived from the International Union for Conservation of Nature and Natural Resources (2012) website and other scientific literature as follows.

Level 1: the KFCP site, as a habitat that was previously able to sustain biodiversity, has now changed significantly. This change has been a result of the destructive human footprint in Kalimantan. This has involved the conversion of tropical forest land into rice fields in the recent past and palm oil plantations currently, followed by abandonment of the barren and cleared land due to failed agricultural practices. At present, the 120,000 hectares of land mass under the KFCP project is sub-divided into 70,000 hectares of logged-over forest and 50,000 hectares of cleared forest. In spite of this habitat destruction, the site (which is located on a peat dome consisting of peat that is over 3 metres in depth) is classified as a tropical peat swamp forest that is still home to endemic (localised) flora and fauna (Australia-Indonesia Partnership, 2009).

Level 2: the limited amount of information presented in the KFCP design document briefly covers the critical natural capital of the KFCP site by a short description as follows: protected fauna including the orang-utans, and flora including scrubs, sedges and ferns (Australia-Indonesia Partnership, 2009).

The initial KFCP design document provides no detailed information on the specific critical natural capital by species or population, or on the general (sustainable) inventory of the KFCP site's flora and fauna, although this document has been the primary reporting framework underpinning the subsequent AusAid annual reports. None of these annual reports shed any light on the impacts of REDD's rehabilitation efforts on specific species by population of critical or general flora and fauna.

One of the criticisms of the KFCP project, which can be linked to the lack of implementation and use of a natural inventory approach, has been the "inability of KFCP to learn from the traditional knowledge of the villagers as to which species (of trees) will grow well in the different soils and conditions of the rehabilitation site" (Forest Peoples Programme, 2011, p. 3). A natural inventory approach (Jones, 1996, 2003) needs to be adopted by the KFCP to enable detailed understanding of the critical (endangered) and general stock of specific flora and fauna, especially trees, in the site area, both before and after the rehabilitation efforts. Examples of the application of levels 2, 3 and 4 of Jones's model are presented in Table III.

Table IV is an example of the application of level 5 of Jones's model. The Table demonstrates the vast difference between the species of trees that are part of a primary peat forest, a secondary forest and damaged peat land after extensive human activities. The types of trees as general inventory of a primary forest that can be planted to rehabilitate Kalimantan's land and to re-instate it to its prior form need to be considered seriously; if any efforts under REDD such as the KFCP can be considered as successful at supporting and encouraging (to survive and flourish) Kalimantan's multiple biodiversity.

At the present time, one of the major problems in Kalimantan is the lack of recognition by prominent stakeholders that its biodiversity is of critical status and that it faces the risk of irreversible loss. Even if the island's species appear on international endangered species lists, they and other at-risk elements of biodiversity will soon be extinct unless the Indonesian authorities recognise them as important and support efforts to protect them from irreversible loss.

To summarise, in terms of the effectiveness of the models of biodiversity protection considered, each one offers crucial considerations in recognising and sustaining Kalimantan's biodiversity. Koh *et al.*'s (2011) change sensitivity model is able to alert stakeholders' attention to the detrimental impacts on biodiversity of rapid forest land change to mono-agriculture palm oil plantations.

A detailed understanding of the biological elements that may offer us, yet to be discovered benefits in the future needs to be promulgated. In this respect, Angermeier and Karr's (1994) biological integrity model provides a comprehensive approach to recognise and capture information on Kalimantan, as a holistic biodiversity system.

Finally, Jones's critical natural capital reporting model is required as a predominant feature of biodiversity reporting on Kalimantan. If critical species and their status can be recognised and presented in detail by the relevant stakeholders, including Kalimantan's regional governments and REDD, other reporting methods such as Koh *et al.*'s (2011) change sensitivity model and Angermeier and Karr's (1994) biological

Levels 2 and 3: threatened species of Kalimantan (Source: MacKinnon *et al.*, 1996)	Level 4: populations of threatened species (this information is derived from the International Union for Conservation of Nature and Natural Resources, 2012 website)	Reporting under REDD's initiatives including the KFCP using Jones's model
Bornean plants: ironwood (*Eusideroxylon zwageri)*, species of *Rafflesia* Mammals: clouded Leopard *Neofelis nebulosa*, bay cat *Felis badia*, marbled cat *F. marmorata* and *F. planiceps* Primates: orang-utan, the proboscis monkey and the Western Tarsier Elephants: *Elephas maximus* and *Bos javanicus* Threatened birds: Malay Peacock pheasant, the great Argus, the helmeted hornbill, Bulwer's pheasant, swiftlets *Collocalia fuciphaga* and *C. maxima*, the black browed jungle babbler, Everett's ground thrush and the bald-headed woodshrike Marine species: Crocodylus porosus and Tomistoma schlegeli), marine and river turtles Swallowtail butterflies (four are endemic to the region). Three out of these four endemic butterflies are threatened due to the loss of forest habitats in Kalimantan (Collins and Morris, 1985; cited in MacKinnon *et al.*, 1996)	Borneo Ironwood (Eusideroxylon zwageri) population: population dwindling since 1955 due to over exploitation and agriculture, regeneration is limited, Indonesia has banned its export (Asian Regional Workshop, 1998) Bornean Flat-headed Frog (Barbourula kalimantanensis), population: exact number not provided, but two specimens have been collected, suggesting small numbers. Population is decreasing due to illegal mining and river pollution from mercury waste (Inger *et al.*, 2004) Bornean Orang-utan (*Pongo pygmaeus*), populations: three different sub-populations: Southwest and Central Kalimantan (*P. p. pygmaeus)*; Northwest Kalimantan and Sarawak (*P. p. wurmbii)*; East Kalimantan (*P. p. morio*), 50% decline of orang-utan population in the past 60 years, decline predicted to continue due to forest loss, poaching and agriculture, number of Bornean orang-utans is fewer than 14% of what it was from around 10,000 years ago until the middle of the 20th century (Ancrenaz *et al.*, 2008)	Borneo's ironwood seedlings are in limited supply and replanting is on a very small scale (Asian Regional Workshop, 1998). REDD's efforts in conserving such vulnerable flora for the purpose of perceived biodiversity value in the species own right and REDD's efforts for conserving general flora that provides support for other critical species – for example, its potential to attract and sustain certain types of birds, its potential to sustain orangutans – needs to be reported (please refer to Table IV) Detailed information for each specific critical species – for example, reporting on the endangered orang-utans, including the number and sub-populations of endangered orang-utans present in the KFCP area. Further sub-classified information by gender, age, mating patterns and mortality details (orang-utans lost to plantations, to fires, as food and to rituals). Survival rates, rescue and relocation costs under REDD could also be provided

Table III.
Examples of the application of levels 2, 3 and 4 of Jones's (1996) natural capital inventory model to Kalimantan's flora and fauna

integrity framework can be used to evaluate the impacts of human activities on biodiversity and its biological processes.

Once these evaluations are presented in the form of detailed and multifaceted biodiversity reporting using numerous reporting models, decisions and actions can be

Habitat	Number of tree species	Source
Peat swamp forest	75-120	Anderson (1963); Siregar and Sambas (2000); in Page and Waldes (2005)
Varying peat depth and the related tree species in the primary forest area (for the KFCP site with peat which is more than 3 metres in depth):		
Up to 6 metres depth (number of species seven) *Palaquium ridleyi, Calophyllum hosei, Mesua sp., Mezzettia parviflora, Combretocarpus Rotundatus, Neoscortechinia kingie, PalaquiumCochlearifolium*	From 6-10 metres depth (number of species four) *Combretocarpus Rotundatus, Sizygium, Tristaniopsis obovata, Shoreateysmanniana*	From 10-13 metres depth (number of species six) *Shorea teysmanniana, Palaquiumleiocarpum, Stemonurussecundiflorus, Mezzettia parviflora, Neoscortechinia kingie, Palaquiumcochlearifolium*
General tree species resulting from human activities: Secondary forests: invasive tree species – for example *Macaranga* spp Seriously degraded sites due to burning and clearing: fragmented forest canopy and ground cover-ferns (for example *Stenochlaena palustris*, *Lygodium* and *Pteris* spp.), grasses (e.g. *Imperata cylindrica*), sedges (*Scleria* and *Cyperus* spp.) and shrubs (e.g. *Melastoma malabathricum*)		

Source: Page and Waldes (2005)

Table IV. Examples of the application of level 5: general inventory for of Jones's (1996) natural capital inventory model to Kalimantan's (KFCP site) flora

undertaken to protect the remaining biodiversity of Kalimantan. Examples of such decisions would include the introduction and implementation of protective legislation for both general biodiversity and specific species that are at high risk of extinction (critical natural capital) in Kalimantan. Kalimantan's businesses can be pressured into implementing crucial changes in agricultural methods that would result in less negative impacts on biological elements and processes, for example agricultural methods that would be less polluting of Kalimantan's water systems and that would strengthen their ability to sustain marine biodiversity, including the endangered crocodiles and marine turtles.

Forest rehabilitation initiatives under REDD would have a greater chance of long-term success through substantial funding from market-based financing mechanisms if REDD project implementers were able to utilize progress assessment models such as Phillips *et al.*'s (2002) approach which concentrates on Kalimantan's trees. Any forest rehabilitation efforts can be considered successful if to some extent they can regenerate and sustain the endemic flora of a region, in this case Kalimantan.

5. Concluding remarks

As Jones (1996, p. 82) has emphasised, there is an urgent need for the "[e]arth's current genetic and eco system diversity [to be] safe guarded, the inviolable, priceless nature of critical [biodiversity] capital [to be] recognised and an overriding imperative to protect and sustain the earth's vital resources both for anthropocentric and non-anthropocentric reasons [to be implemented]". This is particularly so in the case of Kalimantan. The region's biodiversity must be protected as it offers multiple benefits to humankind, including economic benefits for business. The multiple resources contained within Kalimantan's forests are the sole source of income for the

island's local communities. Moreover, Kalimantan's biodiversity contributes towards crucial biological processes.

Preserving Kalimantan's biodiversity through the creation of active financial markets that support the on-going funding of REDD's projects has been discussed in this article. Initiatives under REDD and biodiversity financial markets are crucial for the establishment of an international platform through which to raise much-needed funds for Kalimantan's biodiversity rehabilitation and protection.

Kalimantan's businesses can be encouraged to assume responsibility and accountability in relation to the island's biodiversity through policy development and implementation of strict biodiversity protective legislation (including legislation that promotes forest land conservation and protection and legislation that encourages biodiversity supporting agriculture) by the Indonesian government and the local governments in Kalimantan. Globally, there is an increasing emphasis on governments as "stewards/trustees [and] not absolute owners of wild life assets" (Jones, 1996, p. 284). To allow effective legislation for biodiversity protection in Kalimantan to be implemented, Kalimantan's Ministry of Forestry and local government officials must recognise the importance of Kalimantan's biodiversity and the imminent risk of its irreversible loss unless immediate measures are undertaken for its protection.

Stand-alone and detailed biodiversity reporting, by both AusAid and businesses whose activities impact on Kalimantan's biodiversity, including reporting by businesses further down the supply chain (for example, retailers that sell palm oil products in regions such as the US, Europe and India), is necessary to inform a range of stakeholders, to justify REDD's projects in Kalimantan, and to promote business accountability for biodiversity in the region.

Palm oil agriculture and the world wide use of palm oil products are causing Kalimantan's biodiversity destruction. It is stressed in this article that the impacts of land use changes for the purpose of mono palm oil agriculture be carefully evaluated at an international level by multiple stakeholders including governments and consumers through reports generated by the utilisation of scientific analytical techniques (for example Koh *et al.*'s (2011) change sensitivity analysis model). Long term considerations that depart from short term economic and personal gains need to be adopted in order to carefully consider the future of Kalimantan's biodiversity and the biodiversity of our planet. Multiple stakeholders including businesses in the palm oil supply chain, local governments, NGOs, foreign governments that fund biodiversity conservation projects in Kalimantan and the government of Indonesia can use the three models that have been discussed in this article to provide a multifaceted and holistic biodiversity reporting.

Specifically for the purpose of capturing and reporting the particular types of biodiversity, their roles and functions from diverse perspectives and the impacts of human activities on Kalimantan's biodiversity, the three models discussed in this article are Koh *et al.*'s (2011) change sensitivity analysis model, Angermeier and Karr's (1994) biological integrity approach and Jones's (1996, 2003) natural inventory reporting model. Furthermore, these models are stressed upon in combination to be applied, as it is found that each of these models provides a different and unique perspective towards biodiversity reporting in Kalimantan.

Koh *et al.*'s change sensitivity model is required as an analytical tool to consider the short and long term impacts of palm oil plantations and REDD's rehabilitation efforts

of abandoned land, on Kalimantan's biodiversity. Angermeier and Karr's (1994) biological integrity model is important to consider and shed light on Kalimantan's biodiversity from a holistic perspective. In order to develop the case for conserving Kalimantan's biodiversity, its multiple benefits for human kind including the biological processes that it supports, the livelihoods that it sustains and the profit generation that it provides through tourism and potential benefits that it may provide that have not yet been recognised such as medicinal benefits for human kind, need to be reported on.

Since the danger of losing Kalimantan's biodiversity is unavoidable unless protective measures are taken immediately, Jones's (1996, 2003) natural inventory approach offers an accounting and scientific method of recording and reporting on the critical and general biodiversity inventory of Kalimantan. Majority of Kalimantan's biodiversity can be seen as critical natural capital that faces an eminent risk of irreversible loss due to the Indonesian government's plans for extensive palm oil plantations on Kalimantan's cleared land.

Assigning financial values to Kalimantan's each and every element of biodiversity is not feasible. Their biodiversity values and importance need to be represented in more terms than purely financial. Their importance needs to be represented in non-financial accounting terms that are derived from the biological sciences and adopted as a novel form of reporting in accounting. Humanitarian forms of reporting that call for an ethical and moral understanding and awareness amongst Kalimantan's biodiversity stakeholders is also required, in order to develop biodiversity protection and conservation attitudes for all of Kalimantan's biodiversity.

Biodiversity reporting that is timely, comprehensive and up to date and that offers detailed descriptions of the status of Kalimantan's critical biodiversity needs to be implemented, by REDD especially as REDD and its partners are funding crucial biodiversity conservation projects in the region. The reporting needs to shed light on the impacts of its loss and or its rehabilitation and its role in the region's crucial biological systems and processes (an example of Angermeier and Karr's (1994) biological integrity framework that considers multiple biodiversity factors is presented in Table II). It is also found that effective rehabilitation efforts for Kalimantan's biodiversity encompass successful replanting of particular species of trees (as applied under Phillips *et al.*, 2002; Page and Waldes, 2005, under Jones' model). These trees are considered as valuable biodiversity elements, also due to their ability to sustain other forms of biodiversity.

Any reporting that is undertaken by the Ministry of Forestry in Kalimantan, REDD or a business entity must demonstrate that their decisions, actions, processes and-or products are biodiversity friendly, and that they are undertaking measures to help conserve Kalimantan's biodiversity. Ideally, a certain proportion of Kalimantan's land should be reclassified through legislation from productive to protected, and there should be a re-emergence of community stewardship for biodiversity and the forest, and implementation of a win-win paradigm which ends illegal trade and destructive business practices and benefits the environment and local communities.

Accountants can play a critical role in this process – as part of multiple cross-disciplinary teams (Perrin, 1993, cited in Jones, 1996), for example, with members of REDD or Ministry of Forestry employees, working on the planning, management and implementation of REDD's projects; as biodiversity protection planning and

budgeting management accountants in Kalimantan's local government; as community representatives or members of civil society; or as assurance providers for detailed biodiversity reports provided by different entities.

It is vital that stand-alone, verified biodiversity reporting be provided by international funding bodies such as AusAid; international business entities, such as corporations involved in Kalimantan's palm oil and palm oil-based product supply chains; and organisations such as REDD, whose primary objective is biodiversity protection. This is needed to create the critical connection between Kalimantan's biodiversity and its economic backing, so that financial and non-financial decisions can be made and implemented that ensure the survival of this precious biodiversity. And to enable such verified biodiversity reporting, the importance of multiple and multi-faceted biodiversity reporting models cannot be underestimated.

Notes

1. The details of the GRI framework can be found in Biodiversity: A GRI Reporting Resource (2007).
2. The Indonesian website is: www.indofire.org
3. Extinction debt describes the future extinction of species due to past events (Kuussaari *et al.* 2009).

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