



Planet Tracker

# FINANCIAL ACCOUNTING IN THE AGRICULTURE SECTOR

From Natural Capital to Accounting to Valuation  
– Commentary on IAS 41 Agriculture



## ABOUT PLANET TRACKER

Planet Tracker is a non-profit financial think tank aligning capital markets with planetary limits. It was launched in 2018 by the Investor Watch Group whose founders, Mark Campanale and Nick Robins, created the Carbon Tracker Initiative.

Planet Tracker was created to investigate the risk of market failure related to ecological limits. This investigation is for the investor community where other ecological limits, in contrast to climate change, are poorly understood and even more poorly communicated, and not aligned with investor capital.

## FOOD AND LAND USE TRACKER

Food and Land Use Tracker investigates the natural capital impact that equity funds have in financing publicly traded food and agriculture companies.

Our aim is to align capital markets with the sustainable management of global food systems and agriculture resources.

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## INTRODUCTION

When last measured in 2018, the World Bank concluded that agriculture companies contributed \$3.34 trillion<sup>i</sup> to the global economy – 3.9% of global GDP.<sup>ii</sup> Production related activity within the sector has contributed to around 13% of carbon dioxide (CO<sub>2</sub>), 44% of methane (CH<sub>4</sub>) and 81% of nitrous oxide (N<sub>2</sub>O) of total emissions from human activities globally.<sup>iii</sup> By either measurement, agricultural companies are important to both the global economy and our planet.

For companies within this sector, natural capital related assets are key drivers of financial performance and value. Natural capital represents the means to production for agricultural companies who use these assets to generate profit for their investors. The International Accounting Standards Board (IASB)<sup>iv,v</sup> mandates that companies in over 140 countries and jurisdictions globally report the fair value of their natural capital in their audited quarterly and annual regulatory filings under IAS 41: Agriculture. IAS 41 is the reporting trigger that describes when and how companies report on the fair value of their natural capital.<sup>vi</sup>

How companies apply IAS 41<sup>1</sup> and related standards matters for how market participants evaluate the natural capital risk associated with agricultural companies. Natural capital risk such as forest loss, soil depletion, water purity and sustainability and biodiversity loss impact the value of the biological assets owned by corporations. However, the stakes are larger given that the production processes of these firms can also impact the environment. Reliable financial reporting of biological assets also allows market participants to evaluate corporate actions and their impact on the stability of international food systems and how these food systems impact our planet.

Overall, accurate and consistent application of accounting standards allows market participants to evaluate not only whether a company is presenting accurate information to the market, but also whether a company is incorporating natural capital risks into their reporting. The impact of misleading financial reporting of biological assets – wittingly or unwittingly – reverberates within capital markets and beyond. When companies provide false or misleading information, market participants may not only misevaluate the value or level of performance of biological assets for the corporation, but they may also misinterpret the impact the corporation has on the environment.

Our review of financial remeasurements and restatements relating to the fair value of natural capital from a sample of companies from across the sector, between 2013 and 2019, suggests that dramatic write downs of natural capital related assets may reveal material weaknesses in firms' application of IAS 41. These material weaknesses in turn result in the delisting of issuer firms and cancellations of divestitures. Equally important, these remeasurements can lead to a dramatic new understanding of the companies' prior management of their natural capital and the risk related to that capital.

We conclude with a warning for analysts working within the sector. Market participants active in the agriculture sector need to be aware that natural capital impacts financial accounting reporting and financial analysis. Analysts should assess natural capital risks in their financial analyses by evaluating how companies in the sector record the value and liabilities relating to their biological

<sup>1</sup> The International Accounting Standards Committee (IASC) was established in June 1973 and issued international accounting standards (IAS) rules until the International Accounting Standards Board (IASB) replaced the IASC in 2001 with the remit to harmonize accounting rules globally. Since 2001, as IASB issues new rules they are called International Financial Reporting Standards (IFRS). Thus, IAS and IFRS rules are harmonized.



assets – “a living animal or plant”<sup>vii</sup> – as required under IAS 41. To do this, analysts must have accurate and consistent financial accounting data that incorporates natural capital risks.

Finally, analysts need to understand that when IAS 41 misstatements occur, these misstatements can result in the consequential misapplication of other accounting rules including IFRS<sup>2</sup> 5: Non-current Assets Held for Sale and Discontinued Operations, IFRS 9: Financial Instruments, IFRS 13: Fair Value Measurement, IFRS 16: Lease Disclosures and Leases and others.

## How Natural Capital Accounting Impacts Markets

Natural capital serves as a critical input to agricultural companies’ production and supply chains. Companies in the agriculture sector rely upon natural capital to maintain their growth and yield production curves. For example, agricultural producers rely on functioning soils and hydrological systems, healthy biotic environments and pollinators and many other natural capital factors to increase the value of their assets, to improve their cash flows, to grow their businesses and finally to compete against their peers in the marketplace. As such, how a company manages the natural capital risk of its biological assets impacts both the profitability and value of these assets.

By examining agriculture production through a financial accounting lens, it is possible to understand more clearly how companies use their biological assets. The audited and unaudited financial information provided by agricultural firms yields a variety of useful information relating to biological assets that helps analysts and portfolio managers better understand the benefits and costs of production and how they are addressing natural capital constraints.

### IAS 41: The Reporting Trigger for Natural Capital

Proper accounting for natural capital begins with IAS 41, which prescribes the accounting treatment and mandatory disclosures related to agricultural activity.<sup>viii,ix</sup> For example, IAS 41<sup>x</sup> describes the conditions required for assets to be classified as biological assets or agricultural produce. A biological asset is a “living plant or animal” and agricultural produce is “the harvested produce of the entity’s biological assets”. Under IAS 41, companies reassess the fair value of their biological assets at the end of each reporting period.<sup>xi</sup> Agricultural produce is measured at fair value less cost to sell at the point of the harvest.<sup>xii</sup>

The standard also specifies how these assets should be valued. Specifically, IAS 41 requires companies to assess the fair value of their natural capital overtime, including reassessing this capital for gains and losses.<sup>xiii</sup> IAS 41’s guiding principle is that the increase in value associated with capital assets should be recognised as the asset grows and not solely at the date of harvest or sale.<sup>xiv</sup> In determining value of the future agriculture crops, agriculture companies can outsource this estimation of the value to external experts who apply a three-level approach to estimating the fair value of these agriculture assets:

<sup>2</sup> International Financial Reporting Standards (IFRS) is a set of accounting standards developed by an independent, not-for-profit organization called the International Accounting Standards Board (IASB).



- **Level 1 assets<sup>xv</sup>** are those valued according to readily observable market prices. These assets require a liquid market with multiple and consistent pricing sources, such as stocks, bonds, or any assets that have a regular “mark-to-market”<sup>3</sup> mechanism for setting a fair market value. Level 1 assets “mark-to-market” values must be easily observable, have transparent prices and therefore are a reliable, fair market value.

- **Level 2 assets** lack a liquid market with multiple and consistent pricing but can be given a fair value based on quoted prices in inactive markets, such as interest rate swaps or securities that are not actively traded including loans, municipal bonds, currency swaps, loans and derivatives.

- **Level 3 assets** are not actively traded and are the least “mark-to-market” of the three levels, where assets are priced based on expert opinion, estimates, mathematical models and unobservable inputs. Level 3 uses a process called “mark-to-management” to value assets. Examples of level 3 assets include complex derivatives, mortgage-backed securities, distressed debt, land, private equity shares and many assets valued under IAS 41.

Companies that employ a Level 3 approach to agriculture asset valuation typically value their natural capital using discounted cash flow (DCF) models. DCF modelling estimates the fair value of natural capital by reference to the expected future cash flows generated from the use of this capital. Applying DCF modelling lets companies account for direct costs, such as maintenance, harvesting, overhead and transportation. However, these additional considerations can introduce uncertainty into concluded valuations if they are based on unreliable assumptions. The risk can be greater for agricultural firms who also need to incorporate assumptions relating to the impact of weather and environmental changes, such as global warming, into their forecasts.

Overall, information provided under IAS 41 can increase transparency by requiring companies to provide:

- A description of biological assets the firm transforms and of the nature of activities involving the biological assets [41.41].
- A reconciliation of changes in the carrying amount of biological assets [41.50].
- The method and relevant assumptions used to determine fair value<sup>xvii</sup> in the footnote to the financial statement [41.47].

This increase in information under IAS 41 has been shown by academics to be value enhancing on average for market participants. For example, peer reviewed research by Goncalves et al. concludes:

***“The results confirm that recognized biological assets are value relevant at fair value but are more value relevant in firms with higher levels of disclosure.”<sup>xviii</sup>***

<sup>3</sup>“Mark-to-market” or fair value accounting occurs when an asset or liability is valued at “fair value”, which refers to the current market price in a liquid market, current market price in an illiquid market based on similar assets and liabilities, or based on another assessed “fair” value, in this case often determined by a consultant.



Separately, Audrey Wen-Hsin Hsu et al. conclude:

***“ We find that price informativeness for IAS 41 adopters increases following IAS 41 adoption.”***<sup>xix</sup>

In other words, “price informativeness” – the relationship between stock returns and changes in earnings – improves as companies provide more accurate biological asset and agricultural produce information as this information becomes more closely related to changes in earnings which positively impact stock returns.

## Why IAS 41 Matters

IAS 41 is important to market participants and environmentalists alike because it allows them insight into a company’s usage of its natural capital and the impact of this use on the environment.

For example, IAS 41 can inform both analysts and environmentalists if a company is valuing its biological assets and agricultural produce accurately given the natural capital risks faced. Specifically, IAS 41 requires companies to reassess the fair value of these assets given changes in its natural capital risks.

***“These risks include climatic, disease and other natural risks... If an event occurs that gives rise to a material item of income or expense, the nature and amount of that item are disclosed in accordance with IAS 1 Presentation of Financial Statements.”***<sup>xx</sup>

Consider a hypothetical Indonesian palm oil producer that owns bearer plants – the oil palm trees, not the palm oil fruit. Further assume that this producer was impacted by a wild fire that happened in 2015 when 2.6 million hectares of bearer plants were burnt in a forest fire in Indonesia.<sup>xxi</sup> For this hypothetical firm, IAS 41 provides a mechanism by which market participants can learn about the impact of this fire on the hypothetical firm’s overall value and its production efficiency.

According to the standard, the fair value of these biological assets will need to be reassessed following the fire to account for its impact on lost bearer plants and any changed productivity expected from existing bearer plants reported under property, plant and equipment (PPE) following IAS 16: Property, Plant and Equipment.<sup>xxii,xxiii,xxiv</sup> Examples of other natural capital risk that may need to be considered in assessing fair value of natural capital include risk related to forest loss, pollinator loss, soil depletion and biodiversity loss. If the bearer plants were leased to the company, then the company’s disclosures related to IFRS 16: Leases may need to be reassessed. Alternatively, if the bearer plants were being held for sale, disclosures related to IFRS 5: Non-Current Assets Held for Sale and Disposition may need to be reassessed as well.

Market participants can be misled by a firm’s reporting because each of these accounting standards impacts the accounting ratios commonly used by market participants to analyse corporate performance and value. For example, leverage ratios, which measure a company’s borrowing, are impacted by misreporting of biological assets because they rely on balance sheet information. When a company misreports under IAS 41 or IAS 5, for example as with Zonoco discussed below, the firm’s leverage ratio can be misleading causing market participants to misestimate the financial risk of the company. Turnover ratios, which measure the amount of assets or liabilities that a company replaces in sales, are also impacted by misreporting of biological assets. Turnover ratios are commonly used to measure how efficiently a company uses its assets. When a company



misreports under IAS 41 or IFRS 16, market participants can be misled about how efficiently a corporation transforms its biological assets into revenue and profit. Performance ratios are similarly impacted from IAS 41, IAS 5 and IFRS 16 misreporting.

## Natural Capital Reporting Meets the Real World

*Some firms appear to embrace the role that transparent financial reporting can have for market participants.*

### Stora Enso Moves to More Transparency within its Forest Division

Some agricultural companies have explicitly recognized the role that accurate and reliable reporting of biological assets plays in allowing market participants to openly evaluate the value and performance of these assets. For example, Stora Enso, a large Finnish silviculture and packaging conglomerate, restructured its organization to carve out its Forest Division in 2019. The Forest Division included Stora's forest assets in Sweden and Finland along with its forestry related operations in Russia, Sweden and Baltic countries.

Stora justified its restructuring as a way to improve its transparency surrounding the division and its reporting of biological assets under IASB 41. This division includes Stora's forest assets in Sweden and in Finland, along with other regional operations, while its operations and mills outside of the region will report separately.<sup>xxv</sup> As of Q4 2019, 89% of Stora Enso's biological assets were mostly split between Sweden and Finland.<sup>xxvi</sup> These biological assets on these forest lands at 1,402,000 ha are valued at EUR 4.2 billion.<sup>xxvii</sup>

Alongside this restructuring, Stora decided that starting 1 January 2020, it would characterize its changes in fair valuation of its biological assets into either non-operational fair value changes or operational fair value changes, thereby augmenting the information provided in its Level 1, 2 and 3 reporting. Non-operational changes in the fair value of biological assets reflect changes in modelling assumptions required to assess the value of these assets. Operational changes in fair value result from unforeseen changes in the actual harvesting levels compared to the harvesting plan.

Both changes, the move to division level reporting and the increase in information reported relating to changes in the valuation of biological assets, are predicted by economic theory to be value enhancing for both shareholders and corporate decision makers. These changes are predicted by economic theory to allow market participants to better evaluate the value and performance of Stora Enso's forestry related activities given that the results of this division will no longer be combined with other non-forestry related operations at Stora Enso.

*Other firms have fallen prey to misreporting scandals relating to their biological assets.*

### Zonco Group Delisted Because of Lack of Transparency

Zonco Group was one of China's largest publicly traded seafood companies as measured by total sales.<sup>xxviii</sup> In 2018, Zonco had agreed to sell its Dalian New China Seafood Products and Chugoku





Japan businesses to Asia Fishing Port Holdings Co., a Chinese company. Its Dalian business bought and processed mackerel, squid, shrimp, crabs and molluscs and had refrigeration facilities. Its Chugoku Japan business also processes seafood and it is also involved in trading consumer goods and medical equipment.

Zoneco had experienced a massive scallop die-off that had resulted in a \$91 million write-off in Q1 2018.<sup>xxxix</sup> Zoneco blamed this loss on “climatic and oceanic conditions, which caused the scallops to “starve to death.”<sup>xxx</sup>

However, this was not the first or last scallop write-off for Zoneco. In fact, market participants noted their suspicions given a similar disappearance in 2014.<sup>xxxi</sup> In 2014, Zoneco reported a \$130 million write-off of its scallop stocks.<sup>xxxii</sup> According to Zoneco, “The greater volatility of water temperature... is the major reason for the losses.”<sup>xxxiii</sup> Market participants questioned whether Zoneco had used this excuse to cover for financial fraud given that other producers in the area were not affected.<sup>xxxiv</sup> One participant noted that the extreme climate change described by Zoneco “could have been predicted...the key is the financial credibility of the firm.”<sup>xxxv</sup>

“The climate change has had a great impact on fisheries and marine farming, but such a massive loss is very unusual.” Ma Wenfeng, Beijing Orient Agri Business Consultant reported.

Then, just a year later after its Q1 2018 write-off, Zoneco noted that another 80% of scallops had died, book value of \$43 million, and that average yields per hectare were forecast to have dropped 86%.<sup>xxxvi</sup> At the time, Zoneco was reportedly producing 50,000 tonnes of scallops annually, with little more than 100,000 tonnes traded globally by all parties in 2018, with “China accounting for one third of both imports and exports”.<sup>xxxvii</sup> In a special announcement by the Board of Directors of Zoneco (called Zhangzidao in Mandarin) on 12 November 2019, the board reported that the book value of its consumable biological assets had fallen 99%:

“Provision for inventory impairment and write-off ...it is temporarily impossible to determine the specific amount of inventory depreciation reserves and write-offs for this ...scallop death. As of the end of October 2019, the company had a book value of 160 million yuan of consumable biological assets at the end of 2017. The book value of consumable biological assets at the end of 2018 was 1.6 million yuan.”<sup>xxxviii</sup>

Zoneco’s sale of its Dalian New China Seafood Products and Chugoku Japan businesses was ultimately cancelled because the accountants for the deal – Ping An Securities – could not provide an opinion on whether Zoneco’s financial results represented “realistic performance” after and including the massive scallop die-off.

Ping An Securities went on to report that it was:

**“Impossible to assess the impact of the inventory and costs related to write-downs of biological assets at the Zoneco group of companies”<sup>xxxix</sup>**

Following an investigation by the Chinese Regulatory Securities Commission, CEO Wu Hougang was banned for life from Chinese securities markets and ordered to pay fines for accounting fraud and misstatements from 2014 to 2017. This 17-month investigation was initiated directly in response to the Q1 2018 scallop die-off accounting concerns.<sup>xl</sup>

Zoneco is not the only company being investigated for accounting fraud. Dalian Tianbao Green Foods, Dahu Aquaculture and Shandong Ocean Oriental Sci-Tech are also under investigation for





alleged accounting misstatements due to unexplained losses for related and unrelated businesses by the Chinese Regulatory Securities Commission.<sup>xli</sup>

### Takeaway

Zoneco's continual write-down of its scallop stock calls into question the reliability of its application of IAS 41 in prior years. While write-downs are required under IAS 41 to mark biological assets to market, write-downs caused by factors such as climate change are not likely to result in significant year to year variation.

## Noble Group Write-Downs Reveal Impact of Deforestation

In Q2 2017, Noble Group interim report noted a \$60 million “non-cash impairment to non-current assets” on its two palm oil assets held for sale.<sup>xliii</sup> These palm oil assets had been retained by Noble Group as part of its divestiture of NAL Group. Per the divestiture, Noble Group retained the palm business in exchange for a promissory note of \$64,449,000 to NAL Group. The promissory note carried a contingent value right under which Noble would remit the proceeds of the sale of its palm business, less certain expenses, to the NAL Group.

These palm oil assets were first reported as “held for sale” in 2014 at a reported fair value of \$224 million.<sup>xliii</sup> Noble Group continued to own this asset at the end of 2016, recording a fair value of \$228 million in its audited 2016 financial statements.<sup>xliv</sup> Of this \$228 million in asset held for sale, \$197 million (almost 90%) of the \$228 million was the fair market value of property, plant and equipment (PPE) related to palm assets.

At the end of 2017, Noble Group recorded the fair value of this PPE related palm assets as \$62 million, a decrease of \$135 million from the \$197 million reported at the end of 2016. Noble Group's Q2 interim impairment of \$60 million explains less than one half of the total impairment experienced between 2016 and 2017. Noble Group's annual statement does not explain the additional \$75 million in impairment to its palm oil related PPE.

The impairment occurred after Noble Group's creditor HSBC, the Roundtable on Sustainable Palm Oil (RSPO) and others requested that Noble Group review its valuation of its concessions in West Papua, Indonesia. Of interest to market participants was the fact that Noble Group had stated that one of the plantations – PT Pusaka Agro Lestari, certified to RSPO, was only 11% forested as opposed to actually being 90% forested.<sup>xlv</sup>

As a condition of this RSPO certification was the requirement that Noble Group adhere to the RSPO's application of the High Conservation Values, an indirect measure of natural capital, where Noble Group misstated the forested percent in its concession,<sup>xlvi,xlvii,xlviii</sup> contradicting Noble Group's own stated intention from its 2016 Annual Report.<sup>xlix</sup>

Since costs of production increase if an area is forested due to forest clearance costs, market participants wanted to know if the \$228 million reported had factored in the additional costs associated with the increase in forested habitat.



These and other accounting irregularities led to Noble Group's shares being suspended from trading in November 2018 from the Singapore Stock Exchange.<sup>i</sup> Ultimately, Noble Group would declare it was defaulting on debt obligations and undergo an extensive restructuring process that led to the creation of Noble Group Holdings Ltd. Noble Group finally sold its two palm oil concessions for \$67 million in 2019.<sup>ii</sup>

Finally, Kommunal Landspensjonskasse (KLP), Norway's largest pension fund company with \$73 billion in assets under management, understood these natural capital risks posed by Noble Group's misstated Property, Plant and Equipment and High Conservation Value reporting in 2015, when KLP divested 100% from Noble Group selling their estimated \$659,274 position.<sup>iii</sup>

### Takeaway

Noble Group's impairment charge of its palm oil related assets calls into question the reliability of its application of IAS 41 in prior years. While write downs are required under IAS 41 to mark biological assets to market, impairment charges caused by factors such as the amount of forest to be cleared are measurable ex ante.

## Conclusion

Market participants in the agriculture sector need to be aware that natural capital impacts financial accounting reporting which in turn impacts financial analysis. Analysts should include an assessment of natural capital risks in their financial reports. To do this, analysts must have accurate and consistent financial accounting data that incorporates the impact of natural capital risks on fair values reported under IAS 41.

Our review of past accounting-related scandals involving the reporting of biological assets indicates that corporations face dire consequences when they fail to report accurately. Scandals involving the misreporting of biological assets have resulted in delisting of publicly traded companies and cancellations of planned acquisitions. To avoid these risks, analysts need to ask:

- Are companies reporting their upstream natural capital risks – biodiversity integrity, terrestrial and marine productivity, agricultural production risk and groundwater withdrawals – accurately, consistently and in a comparable manner?
- How are companies including natural capital risks in their forecast revenue costs, EBITDA and net income?
- Are companies valuing their natural capital risks accurately on their balance sheet?
- How are natural capital risks impacting downstream financial ratios?

If accounting statements are inaccurate, analysts will struggle to assess companies for their investment performance, much less their natural capital impacts as, for many companies, their agriculture production is directly linked to natural capital as a driver of forest loss, soil depletion, water risks and biodiversity loss. Companies must therefore employ consistent approaches to financial accounting so that the values they are reporting are consistent, accurate and comparable across any agriculture sector globally. False signals of financial performance can lead companies to pursue unprofitable investments in their production process which can have devastating impacts on natural capital.



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## Appendix: Examples of "Agricultural Produce" Subject to IAS 41

Alfalfa	Coconut	Light Lamb	Red Oak
Almond	Coffee	Lime	Rice
Ancho Pepper	Cotton	Maize	Rubber
Apple	Cottonseed	Mango	Rye
Apricot	Curry Powder	Merino Lamb	Safflower
Avocado	Dates	Milk	Salmon (farmed)
Banana	Durian	Millet	Salt
Barley	Durum wheat	Milling Wheat	Scallops (farmed)
Beets	Egg	Mung bean	Sesame
Bitter gourd	Feeder Steer	Mushrooms	Soft Red Winter Wheat
Black Pepper	Fenugreek	Mustard	Soft White Wheat
Broccoli	Flank	Oats	Sorghum
Broilers	Garlic	Oil Palm Fruit	Soybean
Buckwheat	Ginger	Oil Palm Kernel	Spinach
Cardamom	Grapes	Onion	Sunflower
Carob	Guava	Orange	Tamarind
Cashew	Ham Rump	Pea	Tangerine
Cassava	Hard Red Winter Wheat	Peanut	Tea Leaf (not cured tea)
Cauliflower	Hardwood Roundwood	Pears	Tomato
Celery	Heavy Steer	Peas	Triticale
Chard	Hen	Pig	Turmeric
Cherry	Kiwi	Piglet	Walnut
Chickpeas	Lady's Finger	Pineapple	Watermelons
Chilli	Latex	Pistachio	White Pepper
Chive	Lean Cattle	Pomegranate	Whiteleg Shrimp (farmed)
Cinnamon	Lean Hogs	Potato	Wool
Cloves	Lemon	Rambutan	Young Cattle
Cocoa	Lentils	Rapeseed	



## References

- i World Bank national accounts data, and OECD National Accounts data files (2018). Agriculture, forestry, and fishing, value added (current US\$). Agriculture (code is NV.AGR.TOTL.CD) corresponds to ISIC divisions 1-5 and includes forestry, hunting, and fishing, as well as cultivation of crops and livestock production. Value added is the net output of a sector after adding up all outputs and subtracting intermediate inputs. It is calculated without making deductions for depreciation of fabricated assets or depletion and degradation of natural resources. The origin of value added is determined by the International Standard Industrial Classification (ISIC), revision 3. Data are in current U.S. dollars.
- ii World Development Indicators database, World Bank, (23 December 2019). According to the World Bank, global GDP in 2018 was \$85.91 trillion dollars with \$3.34 trillion dollars attributed to the agriculture sector equal to 3.9% of global GDP in 2018.
- iii IPCC (2019). *Climate Change and Land: an IPCC special report on climate change, desertification, land degradation, sustainable land management, food security, and greenhouse gas fluxes in terrestrial ecosystems*. Paragraph A.3. Agriculture, Forestry and Other Land Use (AFOLU) activities accounted for around 13% of CO<sub>2</sub>, 44% of methane (CH<sub>4</sub>), and 81% of nitrous oxide (N<sub>2</sub>O) emissions from human activities globally during 2007-2016, representing 23% (12.0 ± 2.9 GtCO<sub>2</sub>eq yr<sup>-1</sup>) of total net anthropogenic emissions of GhGs (medium confidence). This assessment only includes CO<sub>2</sub>, CH<sub>4</sub> and N<sub>2</sub>O. The natural response of land to human-induced environmental change caused a net sink of around 11.2 GtCO<sub>2</sub> yr<sup>-1</sup> during 2007–2016 (equivalent to 29% of total CO<sub>2</sub> emissions) (medium confidence); the persistence of the sink is uncertain due to climate change (high confidence). If emissions associated with pre- and post-production activities in the global food system are included, the emissions are estimated to be 21% to 37% of total net anthropogenic GhG emissions (medium confidence). {2.3, Table 2.2, 5.4}. Global food system in this report is defined as 'all the elements (environment, people, inputs, processes, infrastructures, institutions, etc.) and activities that relate to the production, processing, distribution, preparation and consumption of food, and the output of these activities, including socioeconomic and environmental outcomes at the global level'. These emissions data are not directly comparable to the national inventories prepared according to the 2006 IPCC Guidelines for National Greenhouse Gas Inventories.
- iv Marsh and Fischer, *Journal of Business & Economics Research* (2013). *Accounting for agricultural products: US versus IFRS gaap*. P. 84. "The main difference between US agricultural reporting and IAS 41 is reporting the fair value for agricultural assets and products as inventory. US GAAP allows the option to disclose their property, plant and equipment assets, biological assets included, at fair value. However, once elected, the entity may not revert to historical cost values. Historical costs are widely used because of the difficulty of determining a fair value of biological assets, as many do not have a liquid market, or may be valued lower than the historical cost. Neither US GAAP or Non-GAAP guidance allows appreciation valuation for agricultural products. This contrasts to IAS 41 that requires the use of fair value reporting for purchased as well as produced biological assets. The use of fair value reporting has invoked a mixed response from the users of agricultural financial statements."
- v The International Accounting Standards Board (IASB) is organised under an independent foundation named the IFRS Foundation responsible for developing a single set of high-quality global accounting standards, known as IFRS Standards, applied globally. IFRS refers to international financial reporting standards. Their mission is to develop standards that bring transparency, accountability and efficiency to financial markets around the world. IFRS is mandated in more than 140 countries. Notes: Standards published before December 2000 are known as International Accounting Standards (IAS) with standards published afterwards known as International Financial Reporting Standards (IFRS).  
The U.S. Securities Exchange Commission recognizes Financial Accounting Standards Board (FASB), an independent, private-sector, not-for-profit organization as the designated authoritative accounting standard setter for U.S. public companies. FASB develops and issues financial accounting standards that follow Generally Accepted Accounting Principles (GAAP) to promote financial reporting that provides useful information to investors and other users.
- vi IFRS Foundation. *International Accounting Standard 41: Agriculture*. Paragraph 3. IAS 41 is "applied to agricultural produce, which is the harvested produce of the entity's biological assets, at the point of harvest. Harvest means is the detachment of produce from a biological asset or the cessation of a biological asset's life processes. Thereafter, IAS 2 Inventories or another applicable Standard is applied. Accordingly, this Standard does not deal with the processing of agricultural produce after harvest; for example, the processing of grapes into wine by a vintner who has grown the grapes. While such processing may be a logical and natural extension of agricultural activity, and the events taking place may bear some similarity to biological transformation, such processing is not included within the definition of agricultural activity in this Standard." (IFRS Foundation. *International Accounting Standard 41: Agriculture*). IAS 2: Inventories covers inventories, the movement and storage of agriculture assets, is not addressed here. Accordingly, IAS 41 does not deal with the processing of agricultural produce after harvest; for example, the processing of grapes into wine by a vintner who has grown the grapes. While such processing may be a logical and natural extension of agricultural activity, and the events taking place may bear some similarity to biological transformation, such processing is not included within the definition of agricultural activity in this Standard. Products that are the result of processing after harvest that are excluded from IAS 41, and instead, are included in IAS 2 Inventories, include: yarn, carpet, logs, lumber, cheese, sausages, cured hams, thread, clothing, sugar, cured tobacco, tea, wine, processed fruit, palm oil (crude palm oil; refined, bleached, deodorized palm oil; etc.), rubber products, etc.



- vii IFRS Foundation. *International Accounting Standard 41: Agriculture. Paragraph 1.* IAS 41 does not apply to bearer plants related to agricultural activity (see IAS 16). However, IAS 41 does apply to the produce on those bearer plants. Some plants, for example, tea bushes, grape vines, oil palms and rubber trees, usually meet the definition of a bearer plant and are within the scope of IAS 16. However, the produce growing on bearer plants, for example, tea leaves, grapes, oil palm fruit and latex, is within the scope of IAS 41. A bearer plant is a living plant that:
- is used in the production or supply of agricultural produce
  - is expected to bear produce for more than one period and
  - has a remote likelihood of being sold as agricultural produce, except for incidental scrap sales.
- viii IFRS Foundation. *International Accounting Standard 41: Agriculture. Introduction.*
- ix Agricultural activity covers a diverse range of activities; for example, raising livestock, forestry, annual or perennial cropping, cultivating orchards and plantations, floriculture and aquaculture (including fish farming).
- x IFRS Foundation. *International Accounting Standard 41: Agriculture. Paragraph 3.* IAS 41 is “applied to agricultural produce, which is the harvested produce of the entity’s biological assets, at the point of harvest. Harvest means is the detachment of produce from a biological asset or the cessation of a biological asset’s life processes. Thereafter, IAS 2 Inventories or another applicable Standard is applied. Accordingly, this Standard does not deal with the processing of agricultural produce after harvest; for example, the processing of grapes into wine by a vintner who has grown the grapes. While such processing may be a logical and natural extension of agricultural activity, and the events taking place may bear some similarity to biological transformation, such processing is not included within the definition of agricultural activity in this Standard.” (*IFRS Foundation. International Accounting Standard 41: Agriculture*). IAS 2: Inventories covers inventories, the movement and storage of agriculture assets, is not addressed here. Accordingly, IAS 41 does not deal with the processing of agricultural produce after harvest; for example, the processing of grapes into wine by a vintner who has grown the grapes. While such processing may be a logical and natural extension of agricultural activity, and the events taking place may bear some similarity to biological transformation, such processing is not included within the definition of agricultural activity in this Standard. Products that are the result of processing after harvest that are excluded from IAS 41, and instead, are included in IAS 2 Inventories, include: yarn, carpet, logs, lumber, cheese, sausages, cured hams, thread, clothing, sugar, cured tobacco, tea, wine, processed fruit, palm oil (crude palm oil; refined, bleached, deodorized palm oil; etc.), rubber products, etc.
- xi IFRS Foundation. *International Accounting Standard 41: Agriculture. Paragraph 12.*
- xii IFRS Foundation. *International Accounting Standard 41: Agriculture. Paragraph 13.*
- xiii Financial Accounting Standards Board (2009). *Accounting Standard Codification Section 905 Agriculture.* In the US, however, Accounting Standard Codification (ASC) 905 takes the conservative approach by mandating the lower of costs or market approach. Although ASC 905 is beyond the scope of this analysis, it’s worth noting that it closely aligns with paragraph 30 of IAS 41, which requires historical cost recognition less depreciation and impairments. Furthermore, paragraph 30 explicitly notes that “there’s a presumption that fair value can be measured reliably.”
- xiv PwC (2009). *A Practical Guide to Accounting for Agricultural Assets.*
- xv Assets are ranked by their difficulty in valuation: Level 1, Level 2, and Level 3. Each level is distinguished by how simply assets be valued accurately and efficiently.
- Level 1**  
Level 1 assets are those valued according to readily observable market prices. These assets require a liquid market with multiple and consistent pricing sources.
- Level 2**  
Level 2 assets lack a liquid market with multiple and consistent pricing but can be given a fair value based on quoted prices in inactive markets.
- Level 3**  
Level 3 is the least marked to market of the three levels, where assets are priced based on estimates, mathematical models and unobservable inputs, often based on assumptions from the market participants themselves. Level 3 assets are not actively traded.  
Estimating Level 3 asset prices is called “mark to management”.
- xvi IFRS Foundation. *International Accounting Standard 41: Agriculture. Paragraph 8.* Carrying amount is the amount at which an asset is recognised in the statement of financial position.
- xvii IFRS Foundation. *International Accounting Standard 41: Agriculture. Paragraph 8.* Fair value is the price that would be received to sell an asset or paid to transfer a liability in an orderly transaction between market participants at the measurement date. (See IFRS 13 Fair Value Measurement.)
- xviii Goncalves et al, *Journal of International Accounting, Auditing, and Taxation Vol. 29 (2017). Value relevance of biological assets under IFRS.* P. 128.
- xix Hsu and Heibatolloah, *Asia-Pacific Journal of Accounting and Economics, Vol. 26 (2018). IAS 41 and stock price informativeness.* P. 1.
- xx IFRS Foundation. *International Accounting Standard 41: Agriculture. Paragraph 53.*





- xxi Rusmana, Bloomberg (19 September 2019). *Why It's Another Bad Year for Indonesia Forest Fires*.
- xxii IFRS Foundation. *International Accounting Standard 41: Agriculture* and IAS 41 Agriculture (June 2017). Biological assets growing on bearer plants. In June 2017, IASB confirmed that palm oil fruit are covered under IAS 41 while oil palm trees - are covered under IAS 16.
- xxiii IFRS Foundation. *International Accounting Standard 41: Agriculture*. Paragraph 2B.
- xxiv IFRS Foundation. *IAS 16: Property, Plant and Equipment*. IAS 16 establishes principles for recognising property, plant and equipment as assets, measuring their carrying amounts, and measuring the depreciation charges and impairment losses to be recognised in relation to them. Property, plant and equipment are tangible items that:
- are held for use in the production or supply of goods or services, for rental to others, or for administrative purposes; and
  - are expected to be used during more than one period.
- Property, plant and equipment includes bearer plants related to agricultural activity.
- The cost of an item of property, plant and equipment is recognised as an asset if, and only if:
- it is probable that future economic benefits associated with the item will flow to the entity; and
  - the cost of the item can be measured reliably.
- An item of property, plant and equipment is initially measured at its cost. Cost includes:
- its purchase price, including import duties and non-refundable purchase taxes, after deducting trade discounts and rebates;
  - any costs directly attributable to bringing the asset to the location and condition necessary for it to be capable of operating in the manner intended by management; and
  - the estimated costs of dismantling and removing the item and restoring the site on which it is located, unless those costs relate to inventories produced during that period.
- xxv Stora Enso (19 March 2020). *Stora Enso QJY Investor News*.
- xxvi Stora Enso (14 February 2020). *Stora Enso investor kit: strategy and market environment, and financial performance*. P. 12 and P. 17. Total hectares are 1,695,000 for this calculation of which 1,408,000 ha are in Sweden (83%), 255,000 ha are in Finland (15%), 27,000 ha are in Estonia (1.6%) and 5,000 ha are in Romania (0.3%).
- xxvii Stora Enso (14 February 2020). *Stora Enso investor kit: strategy and market environment, and financial performance*. P. 123.
- xxviii Harkell, UnderCurrentNews (21 June 2019). *Four Chinese seafood firms being investigated by financial authorities*.
- xxix Harkell, UnderCurrentNews (19 November 2018). *Zonoco faces potential 'collapse' of scallop fishery in Yellow Sea*.
- xxx Harkell, UnderCurrentNews (30 March 2018). *Zonoco ships scallops to China from Japan after own loss*.
- xxxi Harkell, UnderCurrentNews (30 March 2018). *Zonoco ships scallops to China from Japan after own loss*.
- xxxii Undercurrent News (3 November 2014). *Investors suspicious over Zhangzidao's claim of \$130m loss to natural disaster*.
- xxxiii Undercurrent News (3 November 2014). *Investors suspicious over Zhangzidao's claim of \$130m loss to natural disaster*.
- xxxiv Undercurrent News (3 November 2014). *Investors suspicious over Zhangzidao's claim of \$130m loss to natural disaster*.
- xxxv Undercurrent News (3 November 2014). *Investors suspicious over Zhangzidao's claim of \$130m loss to natural disaster*.
- xxxvi Cang, Bloomberg (12 November 2019). *A Big Chunk of World's Scallops Just Died in Mysterious Circumstances*. Yield drop calculated as 1 - (3.5/25.6), with unit kilograms per mu (about 1/6 of an acre) for January to October 2019.
- xxxvii Cang, Bloomberg (12 November 2019). *A Big Chunk of World's Scallops Just Died in Mysterious Circumstances*.
- xxxviii Zhangzidao (Zonoco) (12 November 2019). Stock code: 002069 *Stock abbreviation: Zhangzidao Announcement number: 2019—67 Zhangzidao Group Co., Ltd. "Announcement on the risk warning for the spot sampling of the bottom-seeded scallops in autumn 2019"*. Book value calculation 1.6 million yuan divided by 160 million yuan of consumable biological assets at the end of 2017.
- xxxix Harkell, UnderCurrentNews (3 October 2019). *China's Zonoco drops asset sale amid fraud concerns*.
- xl Harkell, UnderCurrentNews (11 July 2019). *Zonoco's chairman banned from Chinese securities markets for 'serious' financial violations*.
- xli Harkell, UnderCurrentNews (21 June 2019). *Four Chinese seafood firms being investigated by financial authorities*.
- xlii Noble Group (10 August 2017). *Interim Results*.
- xliii Noble Group (2014). *Annual Report*. P. 118, Note 18.
- xliv Noble Group (2017). *Annual Report*. P. 139 E2: *Subsidiaries Classified as Held for Sale (i) Palm* and P. 153 F3: *Other new and Revised Accounting Standards*.



Idem: P. 139.

"As part of the disposal of CAL Group in 2014, the Group retained the palm business in exchange for a promissory note of US\$64,449,000 issued to CAL Group. The promissory note carries a contingent value right, under which the Group shall remit to the CAL Group, the proceeds of the sale of palm business, less any taxes, expenses and other costs of sale, received by the Group from a third party, and the CAL Group shall return the promissory note. As at 31 December 2017, the Group is in discussion with potential buyers on the sale of the palm business. Based on the potential value, the Group assessed the value of promissory note to be zero.

The major classes of assets and liabilities for the business held for sale as at 31 December 2017 and 2016 are stated at the lower of cost and recoverable amount and were as follows:"

Idem: P. 139.

	2017 USD '000	2016 USD '000
Property, Plant and Equipment	\$62,027	\$197,034
Intangible Assets	\$9,461	\$9,461
Agricultural Assets	\$368	\$349
Cash and Cash Equivalents	\$799	\$540
Prepayments, Deposits and Other Receivables	\$18,805	\$17,092
Inventories	\$2,675	\$3,781
Assets in Subsidiaries as Held for Sale	\$94,135	\$228,257

Idem: P. 153

"Impact of other new and revised international financial reporting standards (continued) (c) Amendments to IFRS 12 Disclosure of Interests in Other Entities: Clarification of the scope of disclosure requirements in IFRS 12 from Annual Improvements Cycle – 2014-2016.

The amendments clarify that the disclosure requirements in IFRS 12, other than those in paragraphs B10–B16, apply to an entity's interest in a subsidiary, a joint venture or an associate (or a portion of its interest in a joint venture or an associate) that is classified (or included in a disposal group that is classified) as held for sale.

As at 31 December 2017 the Group classified its interest in Palm, NAC and TTY, wholly-owned subsidiaries, as held for sale (see Note E2), but these amendments did not affect the Group's financial statements."

- xliv Levicharova, Moulin, and Thoumi, CFA, FRM, Chain Reaction Research (August 2016). *Noble Group: Cost of capital and deforestation risks underpriced?* P. 4.
- xlvi Chain Reaction Research (7 June 2017). *The Chain: Noble Group's Deforestation Risks Further Sinks the Ship*.
- xlvii There are six recognized forms of High conservation values forests:
- HCV1. Forest areas containing globally, regionally or nationally significant concentrations of biodiversity values (e.g. endemism, endangered species, refugia).
  - HCV2. Forest areas containing globally, regionally or nationally significant large landscape level forests, contained within, or containing the management unit, where viable populations of most if not all naturally occurring species exist in natural patterns of distribution and abundance.
  - HCV3. Forest areas that are in or contain rare, threatened or endangered ecosystems.
  - HCV4. Forest areas that provide basic services of nature in critical situations (e.g. watershed protection, erosion control).
  - HCV5. Forest areas fundamental to meeting basic needs of local communities (e.g. subsistence, health).
  - HCV6. Forest areas critical to local communities' traditional cultural identity (areas of cultural, ecological, economic or religious significance identified in cooperation with such local communities).
- xlviiii Chain Reaction Research (7 June 2017). *The Chain: Noble Group's Deforestation Risks Further Sinks the Ship*. Figure 1: Noble Group's PT HIP deforestation, Papua, Indonesia, 2016-Current. Source: Aidenvironment.
- xlx Noble Group (2016). *Annual Report*. P. 17. "Since 2013, permanent conservation departments at both plantations have been responsible for implementing our integrated conservation master plan. We have published our sustainability criteria to illustrate our approach across critical areas, such as undertaking free, prior and informed consent, assess social and environmental impacts, conservation of forest and high conservation values areas, maintain high carbon stocks areas, no planting on peat and a zero burning policy."
- i Tan, The Business Times (176 January 2020). *GX RegCo seeks tougher standards for audits and property valuations: Public consultation launched; regulator is also reviewing practices on business valuations*.
- ii Market Screener (24 May 2019). *Noble: Sale of Palm Oil Plantation Assets*.
- lii KLP (1 June 2015). *Decision to exclude from investment 1 June 2015*. As of 31 December 2014, KLP and the KLP Funds held shares in Noble Group worth approx. NOK. 6,720,000 based on the share price and exchange rate in effect on 9 February 2015. At an exchange rate 9 April 2020 of 1 USD = 10.1930 NOK, this equals about \$659,274. See also



Chain Reaction Research (7 June 2017). *The Chain: Noble Group's Deforestation Risks Further Sinks the Ship. Decision to exclude from investment 1 June 2015. P. 2.*

"Neither of the two HCV assessments provides well-founded answers to the question of whether intact forest will be converted into plantations... both concessions are located in areas of unusually rich and unique biodiversity... in KLP's opinion, an unacceptable risk that Noble Group's current and future conversion of rainforest to oil palm plantations in these two concessions will cause severe environmental damage."

- liii IFRS Foundation. *International Accounting Standard 41: Agriculture*. Paragraph 4.

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