



SECURING LANDS, SUSTAINING LIVES

# LOGGING IN CONGO'S RAINFORESTS: A 'CARBON BOMB' ABOUT TO BE PRIMED BY THE GOVERNMENT OF NORWAY?

A CALL FOR URGENT ACTION

**BRIEFING**  
**JUNE 2017**



*Logging in DR Congo has relied on felling old growth forests. It has often been illegal, reckless, wasteful, damaging to the environment and of little value to poor people or the national economy as a whole.*

Photo credit: Karl Ammann

# SUMMARY

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The government of Norway, through its 'Central African Forests Initiative' (CAFI), is considering providing financial support to a programme being developed by the French Development Agency (AFD) to greatly expand large-scale commercial logging in the rainforests of the Democratic Republic of Congo (DRC).

Analysis carried out by the Rainforest Foundation UK (RFUK) indicates that, as well as releasing ~0.6 billion tonnes (Gt) of carbon dioxide from the direct impact of logging activities, the likely new logging areas would substantially overlap areas of high carbon peatlands, placing an additional 2.8 Gt of carbon – or roughly 10.4 Gt of carbon dioxide – at increased risk of release to the atmosphere if these critical ecosystems are degraded and destroyed. This is equivalent to nearly 200 years of Norway's current national annual greenhouse gas emissions<sup>1</sup>.

**THE GOVERNMENT OF NORWAY SHOULD IMMEDIATELY COMMIT TO NOT FUNDING THIS FRENCH GOVERNMENT PROJECT.**

**INSTEAD OF CREATING SUCH A HUGE NEW CLIMATE RISK, THE GOVERNMENT OF NORWAY SHOULD WORK WITH THE CONGOLESE AUTHORITIES TO CANCEL AND DISMANTLE THE ~5 MILLION HECTARES OF LARGE-SCALE LOGGING CONCESSIONS IN DRC WHICH ARE CURRENTLY ILLEGAL.**



Photo credit: Filip Verbelen

*Local people have seen their long-standing customary land rights completely disregarded when new logging areas are allocated to timber companies. 'Social clauses' between the loggers and local people usually offer desultory payments and other benefits, and are often disregarded anyway.*

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<sup>1</sup> Statistics Norway <https://www.ssb.no/en/klimagassn>

# BACKGROUND

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The future of large areas of the world's second biggest tropical rainforest will be determined in 2017, when the Norwegian government decides whether to fund a French Development Agency (AFD) plan, one of whose objectives is to support and expand industrial logging in the forests of the Democratic Republic of Congo. According to AFD's programme – called the *"Sustainable Forest Management Programme"* (PGDF) – the area of DRC allocated to industrial logging concessions could triple to 30 million hectares (or a quarter of the country's forests) and the amount of industrially exploited wood could increase by a factor of 15. The proposed programme would provide financial support to industrial logging companies active in DRC.

The programme is being considered for USD18 million funding under the Central African Forests Initiative (CAFI) which is financed by the Norwegian Ministry for Climate and Forests (with a \$6 million contribution by the government of France). The project forms part of Norway's support, through CAFI, for the so-called DRC *'Reducing Emissions from Deforestation and Degradation (REDD+) Investment Plan'*, though as this briefing shows, the likely impacts of this specific project will be to greatly increase emissions, not reduce them.

The proposed programme has attracted much concern and criticism<sup>2</sup>, as it would involve the lifting of a governmental moratorium on the allocation of new logging concessions in DRC which has been in place since 2002. There were many violations of the moratorium between 2002 and 2008, and there also have been some by recent DRC forest ministers. However, the policy has remained mostly intact since 2009 and has served to restrain the expansion of an activity which has brought minimal economic benefits to the country, often caused conflict with local communities, and is widely perceived to be a nexus of corruption and illegality. An expansion of industrial logging in DRC would also potentially serve to greatly reduce the area of forest available for community forestry, which has recently been permitted by DRC law, and could potentially benefit many thousands of poor, rural communities.

In addition to concerns about the socio-economic impact of industrial logging, there are many concerns about its environmental impact. These have been widely documented elsewhere<sup>3</sup> and are

not repeated in this briefing. However, the potential climate impacts of a lifting of the moratorium have mostly been overlooked. In particular, there has been inadequate consideration of the potential damage to Congolese peatlands, which have been described as *"among the most carbon-dense ecosystems on Earth"*<sup>4</sup>. Damage to or destruction of these peatlands could cause enormous releases of carbon dioxide to the atmosphere.

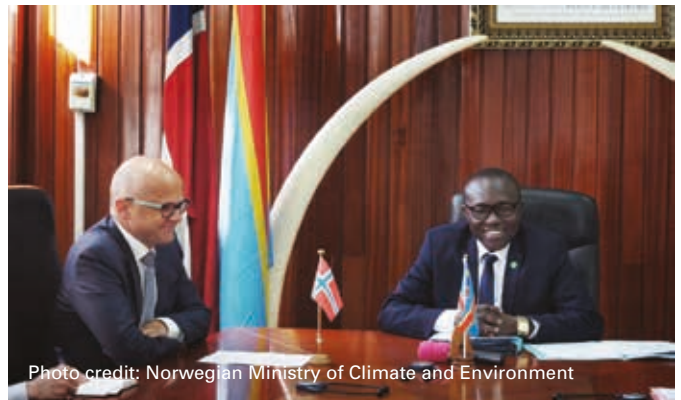


Photo credit: Norwegian Ministry of Climate and Environment

*Norway's Climate and Environment Minister Vidar Helgesen, left, met with his counterpart in DRC in August 2016. A few weeks after the meeting, minister Robert Bopololo Mbongeza secretly issued two illegal logging concessions covering 4,000 square kilometres. These have still not been cancelled. Helgesen remains convinced that "good logging" is possible in DRC.*

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<sup>2</sup> See for example, Global Witness et al. 'AFD's "Sustainable Forest Management Programme" (Lot No. 4) a threat to DRC's forests', undated.

<sup>3</sup> Ndoye, O., & Tieguhong, J. C. (2004). Forest resources and rural livelihoods: the conflict between timber and non-timber forest products in the Congo Basin. *Scandinavian Journal of Forest Research*, 19(S4), 36-44;

<sup>4</sup> Dargie, G. C., Lewis, S. L., Lawson, I. T., Mitchard, E. T., Page, S. E., Bocko, Y. E., & Ifo, S. A. (2017). Age, extent and carbon storage of the central Congo Basin peatland complex. *Nature*.

# POTENTIAL CARBON RELEASES FROM NEW LOGGING CONCESSIONS

Commercial logging in rainforests causes the immediate emission of carbon dioxide due to destruction of above-ground biomass, including collateral damage to vegetation, logging wastes, and complete clearance of forest for logging roads and trails and log collecting yards. This loss has been estimated to be approximately 30 tonnes of CO<sub>2</sub>/hectare<sup>5</sup>. On this basis, an additional 20 million hectares of logging concessions would directly cause the release of around 600 million tonnes of CO<sub>2</sub> over the lifetime of the logging concessions. This is equivalent to around 12 years of Norway's own annual national greenhouse gas emissions.

However, a potentially much graver threat is the possible damage to, or even the destruction of, peat deposits lying beneath large areas of Congo's forest. According to recent studies, these store an average 2,186 tonnes of carbon per hectare<sup>6</sup> (see Figure 1)

**FIGURE 1: LOCATION OF THE CONGO BASIN CUVETTE CENTRALE WETLANDS, AND PEATLAND PROBABILITY MAP<sup>7</sup>**

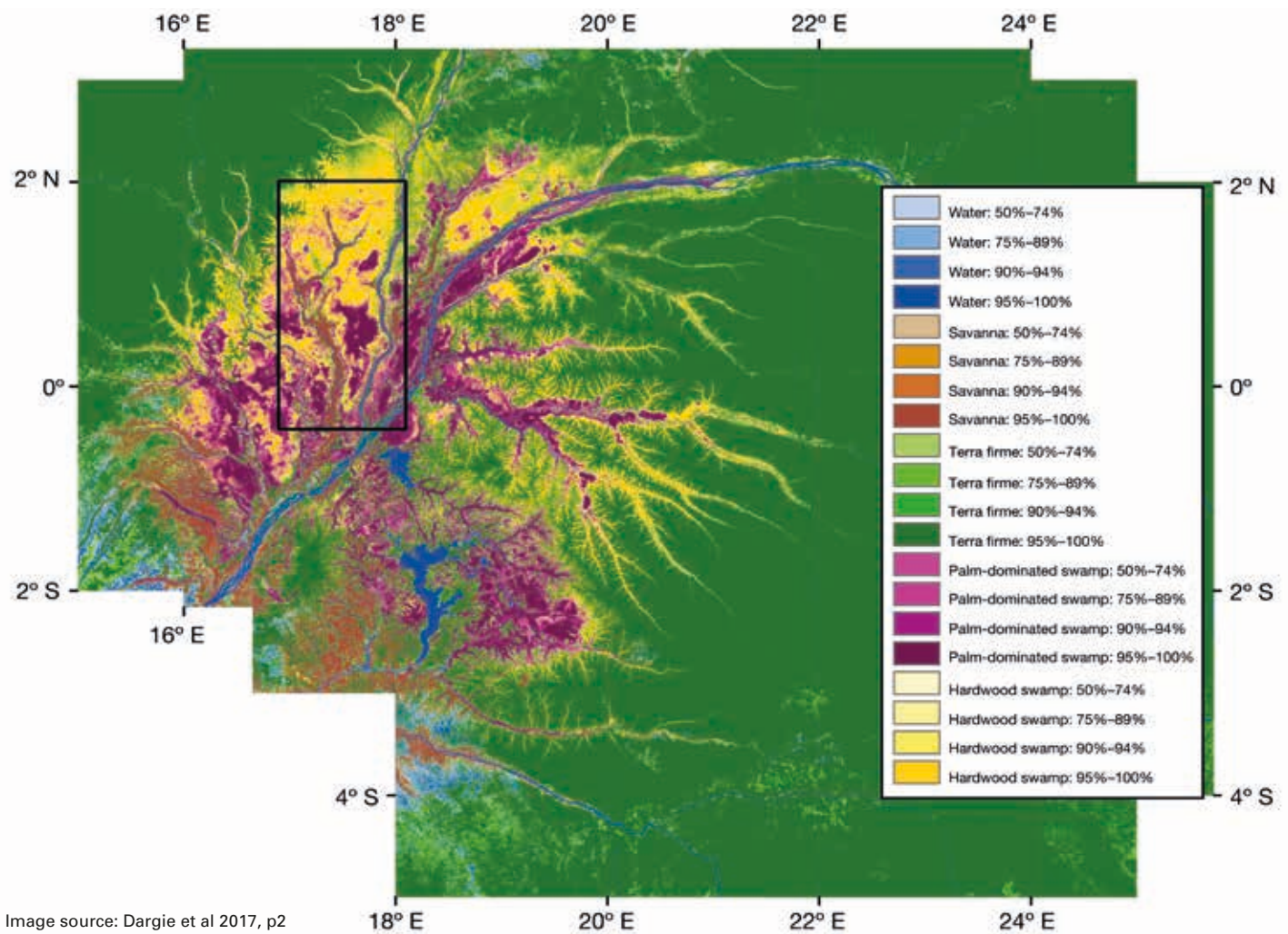


Image source: Dargie et al 2017, p2

<sup>5</sup> Carving up the Congo, Greenpeace 2007

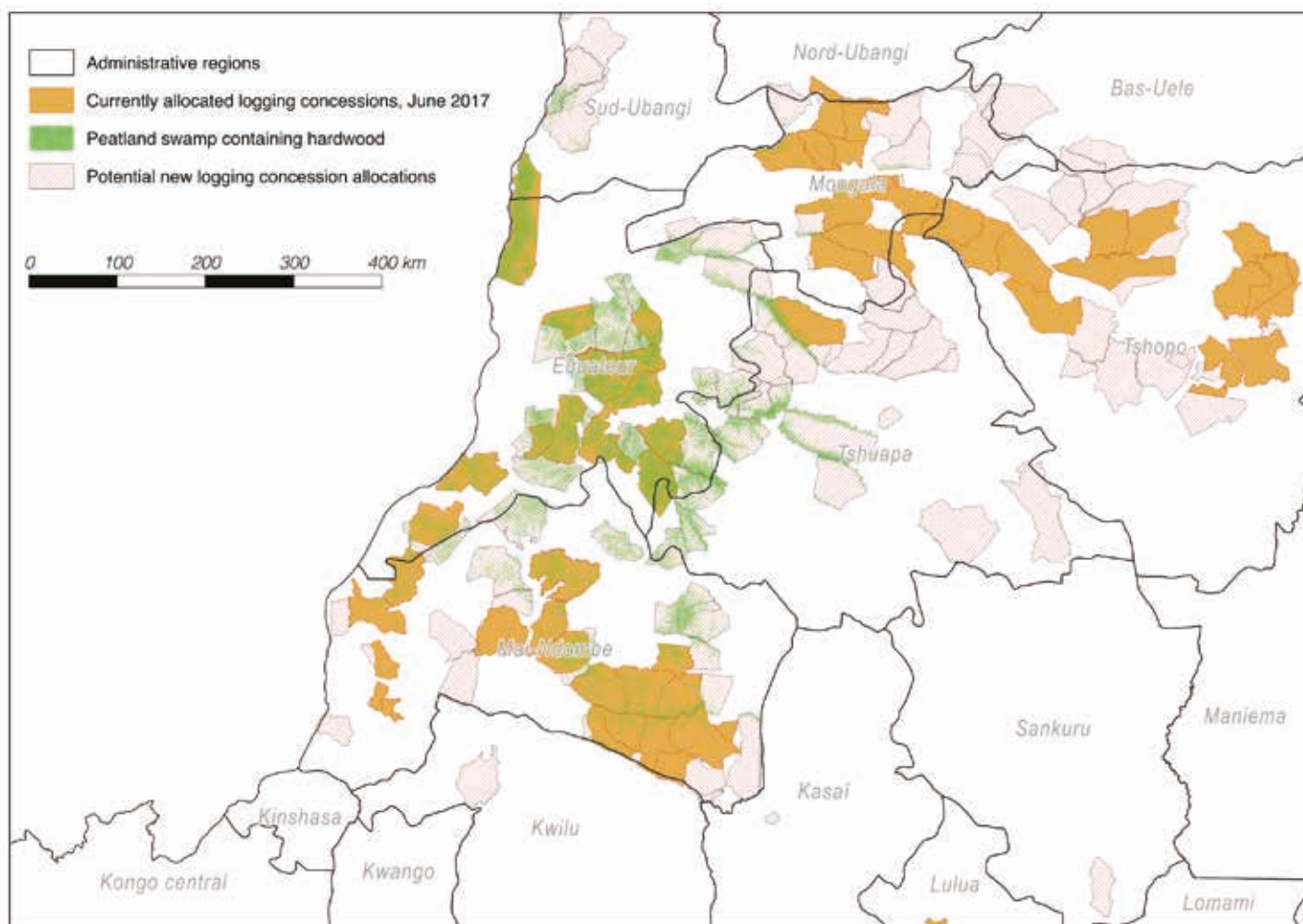
<sup>7</sup> Dargie et al, op cit

<sup>6</sup> Dargie et al, op cit

GIS analysis conducted by RFUK indicates that of the identifiable likely new areas for logging concessions in DRC, totalling roughly 14.5 million hectares, approximately 1.3 million hectares lie on these peat deposits (see Figure 1, and methodology for this assessment in Annex 1). Based on the evidence from selective logging in peat swamp forests in Indonesia<sup>8</sup>, an additional ~36 tonnes of CO<sub>2</sub> per hectare per year from below-ground carbon stores could be released from each hectare of peat

swamp logged, thus potentially adding ~40Mt CO<sub>2</sub> to the above-ground biomass carbon emissions. However, within these 1.3 million hectares of new areas for logging concessions that include peat deposits, we estimate there to be 2.8 billion tonnes of carbon stored in the peat, equating to approximately 10.4 billion tonnes of potential CO<sub>2</sub> emissions, should the peat swamps become heavily degraded or destroyed entirely<sup>9</sup>.

**FIGURE 2: POTENTIAL ‘NEW’ LOGGING CONCESSIONS AND PEAT SWAMP FOREST IN DRC**



<sup>8</sup> Mochamed Ali, David Taylor, and Kazuyuki Inubushi (2006), Effects of Environmental Variations on CO<sub>2</sub> efflux from a tropical peatland in Eastern Sumatra, *Wetlands*, Vol. 26, No. 2, June 2006, pp. 612–618

<sup>9</sup> In theory, logging in swampy areas is prohibited in DRC, under Article 64 of Arrete 084, which states that prohibited activities include “The felling of trees in sensitive protected and / or swamp areas, except for the felling required by the installation of drainage” (original French: “ l’abattage des arbres situés dans des zones sensibles

protégées et/ ou marécageuses, à l’exception de abattages requis par l’implantation du réseau de vidange.” MECNDD, Arrete Ministeriel No 84/CAB/MIN/ECN-DD/CJ/00/RBM/2016, 29 October 2016. However, the arrete does not define what constitutes a swamp for the purpose of this legislation. Moreover, the degree of official scrutiny of logging operations within concessions is highly questionable, and as pointed out in this briefing, proper sanctioning of even gross and clear illegalities is not occurring.

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This figure is conservative, as it includes only areas assessed as being 'peat swamp hardwood' forest types. It excludes the even greater areas which consist of 'palm dominated swamp forest'; this is because it is assumed that they would be of little interest to logging companies and would remain unlogged, even though such ecosystems would be included within the boundaries of logging concessions. It is possible that the remaining 5.5 million hectares of proposed new concessions, whose likely location is entirely unknown, would also include areas of peat swamp forest.

Figures for the release of carbon from peat or other soils under selective logging regimes are not available. However, even the relatively low-intensity logging typical of the Congo Basin does cause some outright deforestation. For example, clearance for roads, trails and log yards typically account for around 2 – 3 per cent of the total concession area. In addition, an estimated 8 – 9 per cent of concessions can become 'forest edge' habitat due to the fragmenting effect of logging roads. All such areas would potentially experience soil degradation, and hence potentially carbon losses from peat deposits.



*Half of the logging concessions in the DRC are now illegal.*

Large-scale fire is not as yet a common occurrence in Congolese logging concessions, though one in the Forest Stewardship Council (FSC) certified concession of ‘Industrie Forestière d’Ouesso’, in Republic of Congo, destroyed around 15,000 hectares of forest in early 2016. The effects of climate change, the intensification of desiccating El Niño events, forest fragmentation, and increasing agricultural incursion into intact forest landscapes in the Congo may see such events become more frequent.

The larger, longer-term threat would be clearance or drainage of the forest following selective logging. Promoters of commercial logging typically claim that it ascribes a value to the forest, guarantees continued forest cover, is a sustainable land use, and is the only alternative to either strict nature conservation or outright forest clearance. Norway’s Minister for Climate and the Environment, Vidar Helgesen – whose department would be responsible for funding the French government proposal – has stated that he supports commercial logging in DRC’s rainforests, “if logging is actually operated in a careful manner in which selected individual trees are harvested and operates in a manner that benefits the local population and the national good.”<sup>10</sup>.

However, as repeated studies<sup>11</sup> have shown, whatever the theoretical benefits of logging, the reality is usually different. The World Bank’s own Congo Basin forestry experts have acknowledged that:

**“ INDUSTRIAL TIMBER PRODUCTION HAS A POOR TRACK RECORD IN AFRICA. OVER THE PAST SIXTY YEARS, THERE IS LITTLE EVIDENCE THAT IT HAS LIFTED RURAL POPULATIONS OUT OF POVERTY OR CONTRIBUTED IN OTHER MEANINGFUL AND SUSTAINABLE WAYS TO LOCAL AND NATIONAL DEVELOPMENT ”**<sup>12</sup>

- World Bank, 2007



Photo credit: Filip Verbelen

<sup>10</sup> Original Norwegian: “såfremt hogsten faktisk drives på en skånsom måte, der utvalgte enkelttrær høstes og virksomheten drives på en måte som kommer lokalbefolkning og nasjonen til gode”; Arve, Bartnes. “Her Lover Han Norge å Rydde Opp I Korruptsjonen. Nå Er Han Selv Anklaget for Regnskog-juks.” Dagbladet. 19 Feb. 2017. Web. 31 May 2017.; Lang, Chris. Norway’s plans for Congo Rainforests come under fire. REDD Monitor. 23 Feb. 2017. Web 31 May 2017.; Krever streng kontroll med regnskogstøtte. Norwegian government. 20 Feb. 2017. Web. 31 May 2017.

<sup>11</sup> Curran, L. M., Trigg, S. N., McDonald, A. K., Astiani, D., Hardiono, Y. M., Siregar, P., ... & Kasischke, E. (2004). Lowland forest loss in protected areas of Indonesian Borneo. Science, 303(5660), 1000-1003.; Laurance, W. F. (2007). Forest destruction in tropical

Asia. Current Science, 93(11), 1544-1550.; Gaveau, D. L., Sloan, S., Molidena, E., Yaen, H., Sheil, D., Abram, N. K.,...& Meijaard, E. (2014). Four decades of forest persistence, clearance and logging on Borneo. PloS one, 9(7); Laurance, W. F., Vasconcelos, H. L., & Lovejoy, T. E. (2000). Forest loss and fragmentation in the Amazon: implications for wildlife conservation. Oryx, 34(1), 39-45.

<sup>12</sup> Debroux et al, (2007) Forests in post-conflict Democratic Republic of Congo; Analysis of a Priority Agenda, World Bank 2007 [http://www.cifor.org/publications/pdf\\_files/Books/BCIFOR0701.pdf](http://www.cifor.org/publications/pdf_files/Books/BCIFOR0701.pdf)



In Indonesia, from 2000 to 2010, an estimated 1.6 Mha of deforestation occurred within logging concessions, resulting in emissions of roughly 1-2 GtCO<sub>2</sub><sup>13</sup>. Many palm oil and other industrial plantation concessions in south-east Asia were once logging concessions. *'Sustainable forest management'* in Central and West Africa has typically followed a similar trajectory, as commercial timber concessions have proven to be unsustainable, invariably giving way to conversion to non-forest uses<sup>14</sup>.

Thus there are reasons to foresee that expanded logging in DRC's peat forest areas will cause carbon emissions beyond those of just the above-ground biomass losses, even if these are hard to calculate with any precision. In the worst-case scenario, where logging was followed by conversion to other uses, and assuming that the peat deposits within the possible new concessions in DRC contain the average amount of carbon, an estimated 2.8 Gt of carbon could be at risk of being lost to the atmosphere (~10.4 Gt CO<sub>2</sub>), in addition to the loss of carbon from above-ground biomass.

**THE GOVERNMENT OF NORWAY SHOULD IMMEDIATELY COMMIT TO NOT FUNDING THIS FRENCH GOVERNMENT PROJECT.**

## AN ALTERNATIVE APPROACH

RFUK believes that the Norwegian government would be gravely misguided in supporting the AFD programme, which would cause substantial known climate impacts, and create risks of much greater carbon emissions in the future. Instead, it should concentrate on working with the DRC government to bring the existing Congolese logging operators under control.

In particular, around half of the country's currently allocated logging concessions are now in breach of the law, and should be shut down and returned to the State. According to a 2005 Presidential Decree:

*"The forest concession contract is signed by the Minister in charge of forests and the concessionaire for a period of twenty-five years renewable. It will be automatically terminated if, within 4 years of its signature, the concession does not have a management plan duly approved by the Administration in charge of Forests"*<sup>15</sup> (emphasis added).

- Government of DRC law, 05/116, October 2005



<sup>13</sup>Abood, S. A., Lee, J. S. H., Burivalova, Z., Garcia-Ulloa, J. and Koh, L. P. (2015). Relative Contributions of the Logging, Fiber, Oil Palm, and Mining Industries to Forest Loss in Indonesia. *Conservation Letters*, 8: 58–67. doi:10.1111/conl.12103

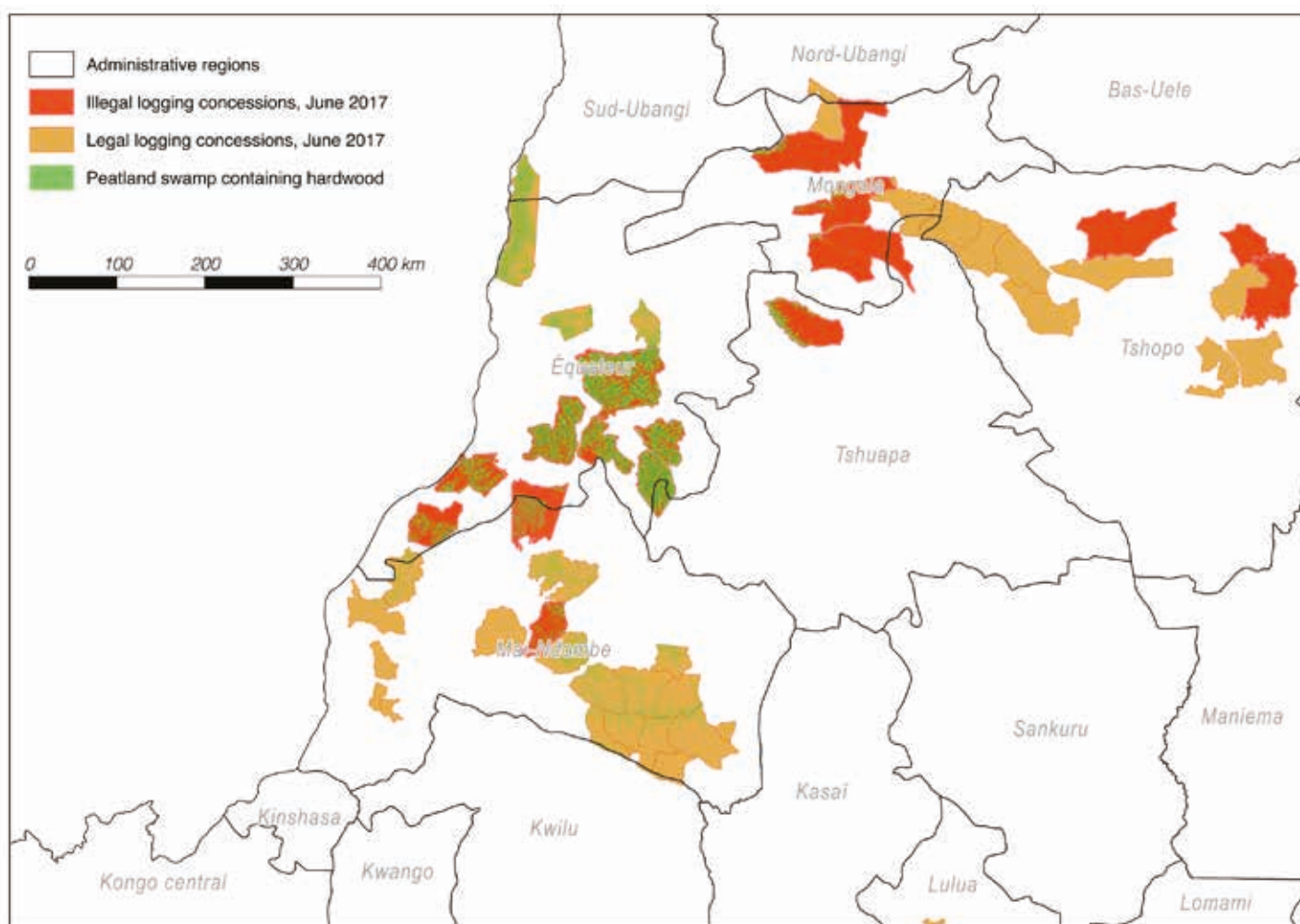
<sup>14</sup>Laurance, W. F., Alonso, A., Lee, M., & Campbell, P. (2006). Challenges for forest conservation in Gabon, Central Africa. *Futures*, 38(4), 454-470.; Zhuravleva, I. et al. (2013). Satellite-based primary forest degradation assessment in the DRC, 2000–2010. *Environmental Research Letters*, 8(2), 024034.

<sup>15</sup>Original French: "Le contrat de concession forestière est signé par le Ministre en charge des Forêts et le concessionnaire pour une durée de vingt-cinq ans renouvelable. Il sera automatiquement résilié si, dans les 4 ans qui suivent sa signature, la concession ne dispose pas d'un plan d'aménagement dûment approuvé par l'Administration en charge des Forêts." *Journal Officiel de la République Démocratique du Congo Cabinet du Président de la République*, Kinshasa 25/10/05 <http://www.leganet.cd/Legislation/JO/2005/JO.25.10.2005.2.pdf>

A subsequent legal decree extended this four-year period for approval of a management plan by an additional year, on request to the government, but the 4+1 year period for obtaining approval of a management plan is clear and absolute. According to our analysis (based on information produced by the DRC government in March this year<sup>16</sup>) at least 29 of the existing 57 concessions have exceeded the 5-year legal deadline and should therefore be cancelled and returned to the State<sup>17</sup>.

Our analysis shows that the definitely illegal concessions cover around 5 Mha, including ~650,000 hectares which is on peat swamp land (see Figure 2, and Annex 1 for methodology for determining extent of illegal concessions). This means illegal concessions occur on peatland that stores 1.4 billion tonnes of carbon, with potential CO<sub>2</sub> emissions estimated at 5.5 billion tonnes.

### FIGURE 3: EXISTING CONCESSIONS – LEGAL AND ILLEGAL – AND OVERLAPS WITH PEAT SWAMP FOREST



<sup>16</sup>MEDD, Etat d'avancement du processus d'aménagement des titres forestiers en Mars 2017, <http://www.medd.gouv.cd/v2/images/jdownloads/AGEDUFOR/Carte-Amenagement-Titres-Forestiers-201703.pdf>

<sup>17</sup>Uncertainty over the illegality of a few concessions arises because of lack of clarity over the date of signing of concession agreements, and thus the expiry of the 5-year 'grace' period, as well as some legal uncertainty as to whether companies are compliant with the law simply by submitting a management plan, or actually having it approved.



*Congo's people need an alternative - such as community forestry - that could bring them better development than predatory large-scale logging.*

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Under its current funding agreement to the DRC government's REDD+ Investment Plan, the government of Norway endorsed extended impunity for these already illegal concessions by stating that:

*"Concessions without approved, or at least formally and transparently submitted, management plans according to the conditions and deadlines set by the law and regulations in force, will be returned to the State by 1st January 2019 at the latest"<sup>18</sup> (emphasis added).*

The basis of this seemingly arbitrary and legally irrelevant deadline is not known. However, the Norwegian government should instead insist that the Congolese Forest Law is fully respected and that the now invalid concessions are cancelled immediately and returned to the State.

According to the DRC government's own information from 2015, the companies holding these concessions accounted for only around 12 per cent of the total reported timber output from all concessions, though they represent half of the logging area. Several of the companies were reported as producing no timber whatsoever, and it is possible that most or even all of the illegal concessions are in fact now inactive<sup>19</sup>.

Support from international donors such as Norway could be critical in ensuring that any disruptions likely to arise from such concession cancellations – especially the loss of any employment, and some loss of services and infrastructure maintenance – is carefully managed and balanced with the necessary local development/re-employment programmes (potentially including the development of community forest concessions), in order to avoid hardship to local logging-dependent people.

**THE GOVERNMENT OF NORWAY SHOULD WORK WITH THE CONGOLESE AUTHORITIES TO CANCEL AND DISMANTLE THE ~5 MILLION HECTARES OF LARGE-SCALE LOGGING CONCESSIONS WHICH ARE CURRENTLY ILLEGAL.**

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<sup>18</sup>Letter of Intent For the Establishment of a Partnership Between The Government of the Democratic Republic of the Congo (DRC) and The Central African Forest initiative (CAFI) On the Implementation of the National REDD+1 Framework Strategy and Investment Plan of the DRC, <http://www.cafi.org/content/cafi/en/home/partner-countries/democratic-republic-of-the-congo/the-letter-of-intent-between-cafi-and-the-drc.html>

<sup>19</sup>Fonds National REDD+ de la RDC; Vers une mobilisation de la finance climat pour le développement durable de la RDC Document de programme au Fonds National REDD+ Lot n°4 – Programme de Gestion durable des forêts Version 2017-03-27

# ANNEX 1: HOW THE PEAT SWAMP AND POTENTIAL CARBON EMISSIONS FIGURES HAVE BEEN CALCULATED

## 1 THE 'LIKELY NEW CONCESSIONS'

This is based on the maps of former logging titles which were cancelled following a legality review in 2008-09. Many of these had never actually been operational and were largely issued between 2002 and 2005 on an illegal and 'speculative' basis<sup>20</sup>. It seems likely that these already defined areas – in which there are already vested interests and pressure to re-open for logging – would be amongst the first to be reissued as concessions after any lifting of the moratorium, especially those which were declared 'legal' in the concession review, but were nevertheless returned to the State by their holders<sup>21</sup>.

In practice, there were technical difficulties in extracting these former logging titles from the World Resources Institute (WRI) 2009 dataset. The boundaries of a number of the concessions which were legally recognised and 're-issued' after 2009 have changed, meaning that the subtraction of these from earlier datasets to create the dataset for the 'potential new concessions' was problematic. In many cases, the geometries of the 'potential new concessions' thus had to be manually reconstructed. Fragments of geometries which remained after the subtraction process were deleted. The 2013 WRI dataset for current concessions also still showed as current 16 titles which had been declared as 'legal' but were nevertheless returned to the State by their owners, and have not been legally reallocated since. These concessions were therefore removed from the dataset and added to the 'potential new concessions' dataset.

Hence the map of potential new concessions has a good conceptual basis, and is a reasonable approximation of where roughly two-thirds of 20 million hectares of new concessions would be located. The boundaries of these potential new concessions shown in Figure 1 are indicative: they would likely change when or if any new concessions were actually defined and allocated (as the re-issued concessions were after 2009).

## 2 THE OVERLAP OF LIKELY NEW CONCESSIONS WITH AREAS OF PEAT SWAMP

For this analysis, we calculated areas that were at least 50 per cent likely to indicate swamp peatlands containing hardwood (according to Dargie et al. 2017) within the concession areas likely to be allocated if the DRC logging moratorium is lifted, as explained above. This involved extracting pixels from the Cuvette Centrale dataset publically available from the African Tropical Rainforest Observation Network (AfriTRON). Then we clipped these pixels to the extent of the concessions, and vectorised the raster data to calculate the area. We justify the 0.50 probability cut point because the large-scale shallow interfluvial basins that contain peat deposits contain extracted pixels closely in this probability. The overlap between the two is found to represent 1,127,257.42 hectares.

<sup>20</sup>Some of these logging areas have been reissued, in defiance of a 2002 national moratorium on the issuing of new concessions, in the last two years, though should be subject to cancellation once again. See for example [http://www.greenpeace.org/africa/en/Press-Centre-Hub/Greenpeace-welcomes-the-announcement-of-the-DRC--Minister-of-Environment-to-cancel-illegal-concessions--but-says-more-needs-to-be-](http://www.greenpeace.org/africa/en/Press-Centre-Hub/Greenpeace-welcomes-the-announcement-of-the-DRC--Minister-of-Environment-to-cancel-illegal-concessions--but-says-more-needs-to-be)

<http://www.greenpeace.org/africa/Global/africa/Forests/Publications/EN%20briefer%20new%20moratorium%20breaches%20final%202022017.pdf>

<sup>21</sup>Republique democratique du Congo, Ministère de l'Environnement, Conservation de la Nature et Tourisme, Note Technique a l'attention de son excellence Monsieur le Premier Ministre, N° 2056/CAB/MIN/ECN-T/05/11/BNME/2014, Kinshasa, 26/8/14

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### 3 HOW THE EXTENT OF ILLEGALITY OF EXISTING CONCESSIONS HAS BEEN ASSESSED

There are a number of difficulties in accurately assessing data related to current DRC logging activities. Not the least, as mentioned above, because there appear to have been many changes in the concession boundaries subsequent to 2009, not all of which have been reflected in the publicly available data (i.e. shapefiles) on the concessions. New information provided by the Congolese government – especially a map dated March 2017<sup>22</sup> – shows significant discrepancies with concession locations compared to previous maps. As explained in footnote 15, there are also uncertainties over dates on which some concession agreements were signed, and some legally grey areas relating to re-assignment of concessions and obligations related to concession documentation. There is therefore some margin for discrepancies, even if the general picture is clear.

The March 2017 map showing the ‘state of progress in the management of logging concessions’ was cross-checked with the information available on the date that logging contracts were signed (also derived principally from Congolese government documentation). Concessions for which contracts were signed more than five years ago, but have no approved management plan, are considered to be illegal, and there are 29 of these. The concessions found to be in clear breach of the requirements to have an approved management plan are identified in Figure 3 in red.



Photo credit: Kate Eshelby

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<sup>22</sup>MEDD, Etat d'avancement du processus d'aménagement des titres forestiers en Mars 2017, <http://www.medd.gouv.cd/v2/images/jdownloads/AGEDUFOR/Carte-Amenagement-Titres-Forestiers-201703.pdf>

# 4 SOURCE OF PARAMETERS FOR QUANTITATIVE ESTIMATIONS

CONSTANT USED IN OUR ANALYSIS	FIGURE AND CONTEXT	SOURCE
Per hectare carbon stored in metric tons in peat deposits in the Cuvette Centrale ecosystem	2186 Mg per hectare	Dargie, G. C., Lewis, S. L., Lawson, I. T., Mitchard, E. T., Page, S. E., Bocko, Y. E., & Ifo, S. A. (2017). Age, extent and carbon storage of the central Congo Basin peatland complex. <i>Nature</i> .
Carbon conversion coefficient (The authors are aware that this type of conversion between C and CO <sub>2</sub> requires multi-variable data collection and monitoring. We wish to provide an estimate using best available data.)	C:CO <sub>2</sub> =1:3.67	IPCC Working Group III: Mitigation <a href="http://www.ipcc.ch/ipccreports/tar/wg3/index.php?idp=477">http://www.ipcc.ch/ipccreports/tar/wg3/index.php?idp=477</a>
Estimates of emissions through selective logging	30.5 tons per hectare; this figure was derived through the case study of the K7 Forest holding in Equateur Province, DRC using estimations for logging infrastructure impacts on C, forest fragmentation impact on C, and Timber extraction impact on C.	Carving up the Congo, Greenpeace 2007



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