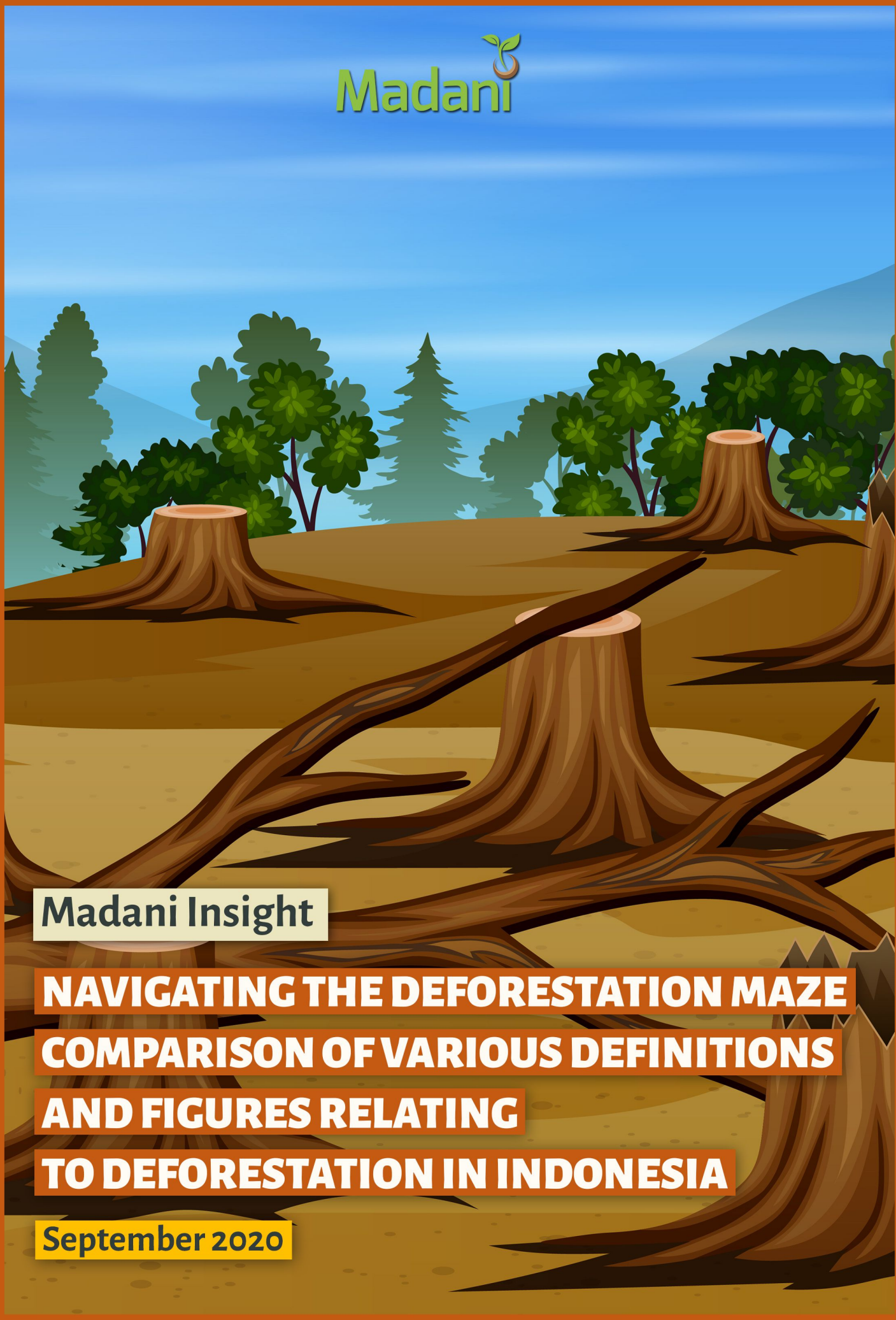
Madani



Madani Insight

NAVIGATING THE DEFORESTATION MAZE
COMPARISON OF VARIOUS DEFINITIONS AND FIGURES RELATING TO DEFORESTATION IN INDONESIA

September 2020

NAVIGATING THE DEFORESTATION MAZE

COMPARISON OF VARIOUS DEFINITIONS AND FIGURES RELATING TO DEFORESTATION IN INDONESIA

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EXECUTIVE SUMMARY

In this paper, Madani compares the definitions of forest, deforestation, degradation, methodologies of calculating deforestation, and finally, deforestation figures from the following institutions: the Food and Agriculture Organization (FAO), the Ministry of Environment and Forestry (MoEF), and several Civil Society Organizations (CSO) while highlighting points of contentions among these institutions.

In defining forests, one of the main points of contention is the minimum limit of tree cover to be called forest, namely between 10 to 30%.

Another point of contention is the categorization of timber plantation as forest. CSOs in this study argue that timber plantation should not be included in the forest land class/category because they are monoculture and more akin to a plantation rather than biodiverse forest. CSOs fear that the inclusion of timber plantations to forest land class will conceal destruction of natural forests to make way to timber plantations, especially Industrial Timber Plantation, which is one of the main drivers of the natural forests' loss in Indonesia.

Another point of contention is the dichotomy of natural forests into primary and secondary forests, in which the protection of secondary forests is weaker than primary natural forests. CSOs in this study are pushing for indiscriminate protection of natural forests without dichotomizing them into primary and secondary natural forests, especially in the context of halting new permits permanently.

The next point of contention highlighted in this study pertains to different definitions of primary forest used by the MoEF (Ministry of Environment and Forestry) and GFW (Global Forest Watch). GFW uses a broader definition for primary forests with deforestation values close to the overall value of natural forest deforestation coming from the MoEF.

When defining deforestation, some CSOs oppose the use of 'net deforestation' that has been used and highlighted by the government of Indonesia in their official public communications. Aside from the fact that the loss of forests in one area cannot be replaced by forest replanting in other areas due to the functions they serve, CSOs fear that this definition will conceal the destruction of natural forests converted into timber plantations, especially Industrial Timber plantations.

Related to deforestation figures, the number of natural forest loss between 2006-2018 published by the MoEF is much lower than the number published by FWI (Forest Watch Indonesia). The MoEF data show a declining trend in terms of gross deforestation and the loss of natural forest in the period of 2006-2018. In contrast, FWI data show an increasing trend in the rate of natural forest loss in the same period.

For 3 periods (2011-2012, 2012-2013, and 2013-2014), the rate of natural forest loss published by the MoEF was close to the primary forest loss figures published by GFW. Both data sets from MoEF and GFW show a declining trend in terms of natural forest loss during the 2006-2018 period. However, while MoEF shows a declining trend in terms of gross deforestation in 2006-2018, the Tree Cover Loss data from GFW shows an opposing trend in the 2006-2018 period, keeping in mind that the definition of 'Tree Cover Loss' and 'deforestation' are not interchangeable.

When cross-examining spatial and statistical data published by MoEF, Madani's analysis confirmed the MoEF's data consistency in terms of gross deforestation. However, the consistency of natural forest loss and net deforestation data could not be confirmed due to limited access of natural forest loss and reforestation data.

Lastly, there are unanswered questions about the different definition of natural forest loss used by the MoEF in the Deforestation Book and in constructing FREL for REDD+. The study found that the rates of natural forest loss used in FREL construction are higher than the ones cited in the Deforestation Book for the following periods: 2006-2009, 2009-2011, and 2011-2012 where data were available.

To navigate the deforestation maze, different institutions that possess and produce different data and conclusions regarding the number and trends of deforestation need to sit together and publicly expose their methodology and sources to provide clearer information for the public regarding the current status and condition of Indonesia's forests and to put more objectivity in assessing Indonesia's success in reducing deforestation.

INTRODUCTION

Since Indonesia announced its voluntary commitment to reduce domestic emissions by 26% to 41% in 2009, Indonesia's forests have been put under the world's spotlights. Reducing emissions from deforestation and forest degradation is the backbone of Indonesia's efforts to achieve its emissions reduction commitments. These efforts are part of a global scheme in which developed countries provide funding incentives to developing countries with large swath of tropical forests, which is known as REDD+ (Reducing Emissions from Deforestation and Forest Degradation).

After Indonesia ratified the Paris Agreement in 2016, reducing domestic emissions has become a legal obligation for Indonesia. Indonesia's climate commitments are included in the first Nationally Determined Contribution (NDC) document where Indonesia pledged to reduce its emissions by 29% to 41% from the Business as Usual scenario by 2030. REDD+ is still a big part of Indonesia's efforts to achieve its climate commitments in the NDC.

Historically, Indonesia has experienced terrible forest destruction in the early periods of its development. With improvement in the governance sectors, Indonesia has launched various corrective actions to lower the rate of Indonesia's forests destruction. However, Indonesia's deforestation figures are still debatable in various circles, which originated from differences in the definition of forests and deforestation as well as varying data sources and ways to calculate deforestation. The absence of single official data that can be used as a reference, which can be publicly analyzed and checked has been complicating the efforts to reach consensus in this matter.

As a civil society organization with a mission to bridge knowledge and information to improve Indonesia's natural resources governance, Madani traced and the main definitions of forests, deforestation, degradation, and methods of calculating deforestation and analyzed the main points of contentions in the following matrix and charts.

The attempt is preliminary and requires continuous improvement along with updates on existing deforestation data. It is our hope that institutions with mutual concerns for deforestation that possess different data and produce different conclusions would sit together and discuss their methodologies, data sources, and conclusions to provide clearer information for the public regarding the current status and condition of Indonesia's forests and to put more objectivity in assessing Indonesia's success in reducing deforestation.

I. COMPARISON OF FOREST DEFINITIONS

FAO	MoEF-Forestry Law	MoEF-Deforestation Book	KLHK-REDD+	FWI	Greenpeace	WRI/GFW	Auriga	Madani	Points of Contentions
Forest is: ***Tree cover with high canopy*** / trees able to reach these thresholds in situ, does not include land that is predominantly under agricultural or urban land use. Trees higher than 5 m Canopy cover of more than 10% Land area more than 0.5 Ha Corridor width more than 20 m	**Forest is:** ***An integrated ecosystem*** in the form of land area with biological natural resources dominated by trees that has natural association with its environment that cannot be separated between one another. Land coverage with an area of at least **0.25 ha**, overgrown with wood vegetation (trees) of various types and ages with canopy cover at least 30%. **(P.14/2004 - formal definition)**	**Forest is** ***Land cover conditions*** in the form of primary dryland forests, secondary dry land forests, primary swamp forests, secondary swamp forests, primary mangrove forests, secondary mangrove forests, and **timber plantations** **Natural forest** is a natural land cover condition in the form of primary dry land forest, secondary dry land forest, primary swamp forest, secondary swamp forest, primary	**Forest is:** ***Land cover*** with an area of at least **6.25 ha,** overgrown with wood vegetation (trees) of various types and ages with canopy covers of at least **30%.** The minimum size for forest is **6.25 Ha** (for the practicality of remote sensing = **working definition)**	**Forest is:** Natural forests only, consisting mainly of native trees that were never planted by humans. Plantations and Industrial Timber plantations are not forests. Deforestation: All forms of change of land cover conditions, from natural forests to non-natural forests due to natural conditions and or deforestation, both legal and illegal within a certain period, both temporary and permanent.	**Forest is:** Trees-dominated ecosystem (with 10% of minimum canopy cover), including primary forests where most of its composition, structure, and dynamics are still in their natural state, and secondary forests where its composition, structure, and dynamics are a mixture of humans and nature Natural forest is forest consisting of primary and	**Forest is:** Various definitions exist for the term "forest," and GFW does not aim to provide a consensus definition. Data sets hosted on GFW may define "forest" differently or pertain to different types of forest (primary, secondary, tree plantations, etc.). In our general writing, including the GFW blog, "forest" refers to a landscape with a high density of trees and value for biodiversity, carbon storage,	**Forest is:** Natural forest only Auriga compiles a land class classification that differs to the 23 land classes published by the MoEF	**Forest is**: Natural forest cover without dichotomy between primary or secondary, inside or outside the forest zone, inside or outside the concession permit.	• The main points of contention in defining forest is the minimum limit of canopy cover and the inclusion of timber plantations as one of the forest land categories. • The FAO and Greenpeace adopt a minimum canopy cover of 10% while the MoEF adopts a minimum canopy cover of at least 30% for a and to be called forest. • Most CSOs in this study argue that timber plantations/plantation forests are not forests. They should be called wood plantation due to its monoculture nature • Another point of contention is dichotomy of natural forest into primary and secondary forests where secondary forests receive weaker protection. Most CSOs argue that stronger protection is necessary for both primary and

FAO	MoEF-Forestry Law	MoEF-Deforestation Book	KLHK-REDD+	FWI	Greenpeace	WRI/GFW	Auriga	Madani	Points of Contentions
		mangrove forest, secondary mangrove forest **Timber Plantation/Plantation Forest** is the cover of forest as a result of human cultivation, including all timber plantations both in the area of IUPHHK-HT (industrial timber plantation) and the result of replanting inside forest zone / replanting in non-forest zone – which has an orderly planting pattern in a flat area, while for corrugated areas, the visible color image will be different to the surrounding environment			secondary forests and other natural regeneration forests where tree species and their mixtures are mostly native. Timber plantations is a forest that is mostly consisting of trees that have been formed through deliberate planting and/or seeding. References: 6 classes of land covers according to the MoEF (primary and secondary forests from the	and human use.[1] **Tree Cover** Where found on the GFW website, "tree cover" refers to the biophysical presence of trees, which may be part of natural forests or tree plantations. The inclusion of all types of tree plantations in the "tree cover" definition notably distinguishes the term from some definitions of "forest." Accordingly, "tree cover" and "forest" should not be used interchangeably.[2] **Primary Forest Definition** According to GFW,			secondary forests. • GFW/WRI is using the term of primary forest with a broader definition than the definition used by the MoEF. The size of GFW's primary forest is close to the size of both primary and secondary forests of the MoEF. • To identify forest cover, Greenpeace is using HCSA or the High Carbon Stock Approach.

[1] https://www.globalforestwatch.org/howto/faqs/faq-how-does-gfw-define-key-terms.html

[2] Ibid.

FAO	MoEF-Forestry Law	MoEF-Deforestation Book	KLHK-REDD+	FWI	Greenpeace	WRI/GFW	Auriga	Madani	Points of Contentions
					MoEF each year) Primary Humid Tropical Forest from The University of Maryland in 2001 Forest cover identification through Landsat & Sentinel imaging (according to the HCSA/High Carbon Stock Approach methodology**)**	Primary forest is a forest that has reached its climax growth (mature) with ecological integrity that is still not altered by humans.[3]			

[3] https://blog.globalforestwatch.org/data-and-research/primary-forests-definition-and-protection

II. COMPARISON OF DEFORESTATION DEFINITIONS

FAO	MoEF- Deforestation Book	MoEF- REDD+	FWI	Greenpeace	WRI/GFW	Auriga	Madani	Points of Contentions
Deforestation is: Deforestation is the conversion of forest to **another land use** or the long-term reduction of tree canopy cover below the 10% threshold.[4]	**Deforestation is:** Change in land cover condition, from forest land cover class (forest land) to non-forest category land cover class (non-forest land) The loss of timber plantation is also calculated as deforestation **Gross Deforestation is** change in land cover condition, from forest category/land cover class to non-forest category land cover class without consideration of	**Deforestation is:** Change in natural forest (primary and secondary) into other land cover classes that occurred once in one region **(FREL, 2016)** This definition does not consider the loss/growth of timber plantations. It is assumed that,	**Deforestation is:** All forms of land cover changes from natural forests to non-forests zone, caused by natural conditions or deforestation, whether legal or illegal, within a certain period, temporary or permanent.	**Deforestation is:** Conversion of forest into non-forest, directly caused by human References: Deforestation data and map from the MoEF Global Forest Change data and map from the University of Maryland Analysis of Land	**Deforestation is:** Definitions of "deforestation" are generally based on the definition of the term "forest." Various definitions of forest exist and GFW does not aim to provide a consensus view. GFW does not provide a single definition for "deforestation."	**Deforestation is:** N/A	**Deforestation is:** Loss of natural forests, both primary and secondary, inside and outside the forest zone, and inside and outside permits/ concessions Change of cover from natural forest to non-forest	The term **Net deforestation** used by the MoEF in its public communications is met with contentions, because: • According to CSOs, timber plantations should not be categorized as forest land class. • The loss of forest in one place cannot be replaced by planting forest in another location because the forest is the main source of livelihood for local community and is therefore irreplaceable. • The loss of natural forests cannot be replaced with timber plantations because the functions of the ecosystem are irreplaceable. • There are concerns that this definition will conceal the loss of natural forests converted into timber plantations because natural forests and timber plantations are both considered as forest land class.

[4] Note that to determine whether the removal of trees from an area is a deforestation it is necessary to predict the future development for the area. If new forest trees are established in the relatively near future, the land is classified as forest throughout the regeneration period (and this regrowth is named "reforestation"). If, on the other hand, a sufficient density of trees is not established in the relatively near future, or if land is converted to other land use, the area should be considered deforested. Note also that the time frame is central to the forest change definitions and that the length of the threshold period, defaulted to ten years, should be used consistently when applying the terms, to avoid overlaps or gaps in the reporting. Thus "long-term" refers to ten years or more, and "temporary" refers to shorter than ten years. Note that local climatological conditions, land use contexts or the purpose of the analysis may justify that a longer threshold period is used. Deforestation implies the long-term or permanent loss of forest cover. Such a loss can only be caused and maintained through a continued man-induced or natural perturbation. Deforestation includes, for example, areas of forest converted to agriculture (including agroforestry), pasture, water reservoirs and urban areas. The term specifically excludes areas where the trees have been removed, due, for example, to harvesting or logging, and where the forest is expected to regenerate naturally or with the aid of silvicultural measures within the long-term. Unless followed by clearing of the remaining logged-over forest for the introduction of alternative land-uses, and the maintenance of the clearings through continued disturbance, forests commonly regenerate, although often to a different, secondary condition. In areas of shifting agriculture, forest, forest fallow and agricultural lands appear in a dynamic pattern where deforestation and the return of forest occur frequently in small patches. To simplify reporting of such areas, the net change over a larger area is typically used. Deforestation also includes areas where overutilization or changing environmental conditions, influence the forest to an extent that it cannot (currently) sustain a tree cover above the 10% threshold, for example burnt-over areas where severe ground conditions or recurring fires for the long-term prevents the return of forest formations, or areas that after clearcutting cannot regenerate because of frost, competing vegetation, or other natural conditions. See http://www.fao.org/3/ad665e/ad665e04.htm

	reforestation. **Gross Deforestation of Natural Forest is** change in land cover condition from natural forest cover class to non-natural forest category. Gross Deforestation of Natural Forest is used to separate changes in land cover conditions, from forest land cover class into non-forest land cover class, that is not caused by the harvesting of timber plantation **Reforestation is** a change in land cover condition, from a non-forest category land cover class to forest category/ land cover class including re-growth of timber plantation. **Natural forest reforestation** refers to natural/ unplanted forest regrowth **Net deforestation is** change/reduction of forested land cover area in a	prior to the change of land class cover, land clearing was conducted on natural forests and the deforested area is considered as lost/ gross deforestation) **Gross deforestation** is a permanent change in the **cover of natural forest** without considering regrowth or establishment of timber plantation **(P.70/2017) -** *equivalent to the definition of Gross Deforestation of Natural Forests in the Deforestation Book.* **Net deforestation** is permanent change in **forest cover** by considering		Cover Change from Landsat and Sentinel imaging	In general writing, GFW uses "deforestation" to refer to the removal of a significant number of trees from a landscape, typically in the context of human actions rather than natural events such as fires or disease. We generally refer to "gross deforestation" (the total amount of forest loss), rather than "net deforestation" (the total amount of forest loss minus the amount of forest gain), or clearly specify otherwise.[5] ***Tree Cover Loss*** Tree cover loss "Tree cover loss" refers to the removal of trees, which may be within natural forests or tree plantations.			**CSOs Inputs:** • The loss of natural forests should be reported and highlighted in public communications of the MoEF (not only in the Deforestation Book). • The loss of natural forests in permits/concessions area and other drivers of deforestation needs to be published.

[5] https://www.globalforestwatch.org/howto/faqs/faq-how-does-gfw-define-key-terms.html

	certain period, obtained by deducting gross deforestation with reforestation. **Net Deforestation of natural forest** is change/reduction in natural forest category or land cover area in a certain period, obtained from the deduction of gross deforestation of natural forest with the area of natural forest regrowth.	regrowth and/or establishment of timber plantations **(P.70/2017)** **Former REDD+ Regulation** Deforestation is permanent change from forested to non-forested land **resulting from human activity (P.30/2009)** This definition differs from P.70 in a qualifier of "resulting from human activity." This definition is assumed to be no longer valid because it conflicts with P.70.			"Tree cover loss" does not necessarily equate to "deforestation" and can result from a variety of factors, including mechanical harvesting, fire, disease, or storm damage. Different data sets have additional parameters that must be met for the indication or alert of loss to appear on the GFW map University of Maryland (UMD)/Google tree cover loss: Loss is defined as "stand replacement disturbance," or the complete removal or mortality of tree cover canopy (of any canopy cover density) at the Landsat pixel scale (30 × 30 meters). FORMA alerts: Loss alerts are triggered by areas exhibiting a steep, persistent drop in vegetation			

					intensity, indicating a high probability (equal to or greater than 50%) of the occurrence of tree cover loss. It is important to note that this alert-based system is not the same as an area measurement of tree cover loss.			

III. COMPARISON OF DEGRADATION DEFINITIONS

FAO	MoEF-General	MoEF-REDD+	FWI	Greenpeace	WRI/GFW	Auriga	Madani	Points of Contentions
Degradation is: Forest degradation is a reduction of the canopy cover or stocking within a	**Degradation is:** Degradation is a decrease in the quantity of forest cover and carbon stock in a certain period (P.70/2017) **Former regulation:** Degradation is a	**Degradation is:** Change of primary natural forest into secondary natural forest (**FREL 2016)**	**Degradation is:** N/A	**Degradation is:** Forest degradation is a direct human-caused activity that significantly reduces carbon reserves and/or biodiversity Note: In tropical forests, this activity is defined as an activity (e.g.	**Degradation is:** N/A	**Degradation is:** N/A	**Degradation is:** N/A	Whether degradation at some level could be considered as deforestation because it is unlikely to recover. Degradation must be put into consideration because the trend tends to increase, and it is the beginning of deforestation.

forest.[6]	decrease in the quantity of forest cover and carbon stock over a certain period **resulting from human activities** (P30/2009)			logging) that causes greater forest canopy gaps (more than 10%) from the original canopy in 1 square km cell (see also: Asner et al. 2006, PNAS103, 1247-1250). If deforestation is the conversion of forest into non-forest, degradation is a decrease in the quality of forest and forest ecosystems, e.g. due to selective logging, road construction. Forest degradation often leads to full-scale deforestation because degraded forests are easier to convert into farmland and more prone to fire.				

[6] For the purpose of having a harmonized set of forest and forest change definitions, that also is measurable with conventional techniques, forest degradation is assumed to be indicated by the reduction of canopy cover and/or stocking of the forest through logging, fire, windfelling or other events, provided that the canopy cover stays above 10% (cf. definition of forest). In a more general sense, forest degradation is the long-term reduction of the overall potential supply of benefits from the forest, which includes wood, biodiversity and any other product or service.

IV. COMPARISON OF DEFORESTATION CALCULATION METHODOLOGIES

	FAO	MoEF-Deforestation Book	MoEF-REDD+	FWI	Greenpeace	WRI/GFW	Auriga	Madani	Points of Contention
Data Source	Optical sensors providing systematic observations at the regional/global level and at coarse (≥1 km) spatial resolution includes the NOAA advanced very high-resolution radiometer (AVHRR) and SPOT VEGETATION. At finer (10–30 m) spatial resolution, Landsat sensor (currently the Enhanced Thematic Mapper Plus or ETM+) and SPOT sensor (currently the high resolution visible infrared or HRVIR) data can be combined to provide regional and even continental level	The data used in the calculation of deforestation is digital data available at the Directorate of Forest Resource Inventory and Monitoring, Directorate General of Forest Planology and Environmental Planning at a scale of 1:250.000. The data includes: 1. Digital Data of Indonesian Topographic Map at 1:250.000 scale, Geospatial Information Agency 2. Digital data on land cover, resulting from the interpretation of LDCM (The Landsat Data Continuity Mission) 8 OLI, the Directorate of Forest Resource Inventory and	Same source, plus activity data and emission factors	N/A	References: Maps and data from MoEF, such as (gross) deforestation map and the (gross) deforestation book, as well as the Land Cover map Map of Primary Humid Tropical Forest 2001 and Map of Global Forest Change 2000-2019	N/A	N/A	Madani refers to the official data from MoEF. The data that can be clarified is only gross deforestation because the reforestation data is not available every year and not in a format that is available for analysis. Source: MapService of MoEF	Before 2011, the Ministry of Forestry used a lower quality image and the numbers were less accurate. After 2011, the Ministry of Forestry has been using more accurate imagery and conduct recalculation. However, the publication of the Deforestation Book is only for 2006-2009 period and the data of previous periods are not available.

	FAO	MoEF-Deforestation Book	MoEF-REDD+	FWI	Greenpeace	WRI/GFW	Auriga	Madani	Points of Contention
	observations. The Terra-1 Moderate Resolution Imaging Spectroradiometer (MODIS) and ADEOS II Global Land Imager (GLI) represent a new generation of medium (250–500 m) spatial resolution sensors and an important bridge between those observing at fine and coarse spatial resolutions.[7]	Monitoring, Directorate General of Forest Planology and Environmental Planning 3. Digital data of forest area, the product of One Map Policy as of November 27, 2018, Directorate of Forest Zone Gazettement and Zoning, Directorate General of Forest Planology and Environmental Planning Image: Before 2011 LANDSAT 8 After 2011 LANDSAT 8 SENTINEL SPOT							

[7] Food and Agriculture Organization of the United Nations, "Manual on Deforestation, Degradation, and Fragmentation Using Remote Sensing and GIS", Forestry Department, MAR-SFM Working Paper 5 / 2007

	FAO	MoEF-Deforestation Book	MoEF-REDD+	FWI	Greenpeace	WRI/GFW	Auriga	Madani	Points of Contention
Calculation Method	*Change detection methods are grouped into seven categories: (1) algebra, (2) transformation, (3) classification, (4) advanced models, (5) Geographical Information System (GIS) approaches, (6) visual analysis, and (7) other approaches. (Ibid)*	Using the definition of deforestation based on Planology version, namely, deducting the number of Gross Deforestation by the number of Reforestation	Using the Gross Definition or only the loss of natural forest	N/A	Deforestation map from the MoEF calculated by using the projection of MoEF Map GFC 2000-2019 Map that overlaps with PHTF 2001	N/A	N/A	Madani cross-examined the MoEF spatial data that related to deforestation and statistical data from the Deforestation Book as well as data published by KLHK through press releases, webinars etc. Madani found repeated deforestation data figures from the MoEF	See the deforestation section above In the MoEF Deforestation Book, calculating method for period before 2011 and after 2012 is different. However, it is not stated explicitly
Period	Forest Resource Assessment (FRA) is conducted annually	Before 2011, deforestation was calculated once every couple of years 1990-1996 1996-2000 2000-2003 2003-2006	REDD+ Baseline = 1990-2012 = 920 thousand ha/year As for RBP Norway, the baseline is lower (10 years, between 2006-2016)		MoEF = 2003-2019 UMdD= 2002-2019			2006-2018 because the used deforestation term is including the loss of timber plantation	

	FAO	MoEF-Deforestation Book	MoEF-REDD+	FWI	Greenpeace	WRI/GFW	Auriga	Madani	Points of Contention
		2006-2009 2009-2011 After 2011, deforestation is calculated annually 2011-2012 2012-2013 2013-2014 2014-2015 2015-2016 2016-2017 2017-2018 2018-2019 (only press release, without the statistics yet) Calculated from mid-year to the next mid-year							

V. COMPARISON OF DEFORESTATION FIGURES

	MoEF						FWI	GP	WRI/GFW	Auriga	Madani	Points of Contention
Period	**Net Deforestation (Ha)***	**Gross Deforestation (Ha)**	**FREL** **REDD+** ***Gross Deforestation of Natural Forest*** **(Ha)**	**Gross Deforestation of Primary Forest** **(Ha)**	**Gross Deforestation** **Secondary Forest** **(Ha)**	**Gross Deforestation of Timber Plantation** **(Ha)**						
							Total natural forest = 82,832,498 ha (2017)					
2018-2019	460,000	465,500	N/A	N/A	N/A	N/A	2000: 2 million ha/year 2000-2009: 1.5 million ha/year 2009-2013: 1.1 million	0.47 Million (the MoEF Book) 324,757.88 (UMD)	323,646 ha (*primary forest loss*) 1,176,884 (*Tree Cover Loss*)	724,000 ha	N/A	The MoEF Press Release only mentioned the rate of secondary forest loss, not the rate of primary forest loss. No explanation whether the number represents gross/net secondary forests loss. The statistic is not

	MoEF						FWI	GP	WRI/GFW	Auriga	Madani	Points of Contention
							ha/year 2013-2017: 1.47 million ha/year					published yet (2018-19 Deforestation Book)[8]
2017-2018	440,000	490,000	423,200	72,100**	351,100**	70,100**		0.49 Million (the MoEF Book)	339,888 ha (*primary forest loss*) 1,218,733 ha (*Tree Cover Loss*)		493.979.38 ha (gross)	
2016-2017	480,000	660,000	632,800	44,200**	588,600**	30,500**		0.66 Million (the MoEF Book)	373,255 ha (*primary forest loss*) 1,300,719 ha (*Tree Cover Loss*)		662.921,22 ha (gross)	
2015-2016	630,000	819,700	776,500	78,100**	698,400**	43,200**		0.82 Million (the MoEF Book)	928,660 ha (*primary forest*		819.884,31 ha (gross)	

[8] http://ppid.menlhk.go.id/siaran_pers/browse/2435

									loss) 2,422,072 ha (*Tree Cover Loss*)			
2014-2015	1,090,000	1,220,000	749,900	55,600**	694,300**	473,600**		1.22 Million (the MoEF Book)	666,642 ha (*primary forest loss*) 1,746,471 ha (*Tree Cover Loss*)		1,208,124,38 ha (bruto)	
2013-2014	400,000	568,000	331,736	24,573**	307,163**	236,262**		0.57 Million (the MoEF Book)	736,798 ha (*primary forest loss*) 1,894,361 ha (*Tree Cover Loss*)		560.758 ha (gross)	
2012-2013	730,000	954,000	864,800	43,400**	821,400**	89,200**		0.95 Million (the MoEF Book)	472,991 ha (*primary forest loss*) 1,139,299 ha (*Tree Cover Loss*)		956.092 ha (gross)	

	Net Deforestation **(Ha)**	**Gross Deforestation** **(Ha)**	**Baseline FREL REDD+ 2016**	**Gross Deforestation of Primary Forest** **(Ha)**	**Gross Deforestation** **Secondary Forest** **(Ha)**	**Gross Deforestation** **Timber plantation** **(Ha)**						
2011-2012	610,000 Note: In the 2017-18 Deforestation Book, it was said that the deforestation figures of 2011-2012 and above have included the reforestation figures (Net)	730,000	786,052 ***	24,400	604,400	99,000		0.73 Million (the MoEF Book) 0.79 million (FREL)	855,534 ha (*primary forest loss*) 2,260,261 ha (*Tree Cover Loss*)		728.666 ha (gross)	In the 2011-12 Deforestation Book, the gross/net term was not explicitly mentioned. This raises the question of whether the figure refers to net or gross deforestation. In the 2017-2018 statistics, it is stated that the figures before 2011 have not included the reforestation figures. It means, before 2011, the published numbers are gross figures.
2009-2011	No reforestation data	450,000	550,520 ***	17,200	376,300	57,100		0.9 Million (the MoEF Book) 1.1 million (FREL)	2011 613,906 ha (*primary forest loss*)		486.204 ha (gross)	Definition of deforestation = The calculation in 2005/2006 was carried out on the condition of forested land cover while in the 2009/2010, the

									1,543,629 ha (*Tree Cover Loss*) 2010 540,976 ha (*primary forest loss*) 1,279,332 ha (*Tree Cover Loss*)			same location has changed into Non-Forested cover = there is a question of whether the figure is gross or net Annual Average, not accumulation
2006-2009	No Reforestation data	830,000	913,820 ***	401,100	351,500	79,600		2.5 million (the MoEF Book) 2.7 million (FREL)	2009 683,828 ha (*primary forest loss*) (1,944,963 ha) (*Tree Cover Loss*) 2008 469,407 ha		833.238 ha (gross)	Ibid.

									(*primary forest loss*) 1,396,251 ha (*Tree Cover Loss*) 2007 525,993 ha (*primary forest loss*) 1,387,625 ha (*Tree Cover Loss*)			
2003-2006	No reforestation data	1,170,000	842,636 ***	N/A	N/A	N/A		3.5 million (calculation from MoEF Map) 2.5 million (FREL)	2006 468,432 ha (*primary forest loss*) 1,433,150 ha (*Tree Cover Loss*)		-	The Deforestation Book is not available in appgis, the data is not traceable.

									2005 478,406 ha (*primary forest loss*) 1,182,422 ha (*Tree Cover Loss*) 2004 479,453 ha (*primary forest loss*) 1,289,043 ha (*Tree Cover Loss*)			
2000-2003	N/A	1,080,000	444,362 ***	N/A	N/A	N/A		1.3 million (FREL)	2003 248,436 ha (*primary forest loss*) 544,810 ha		-	The Deforestation Book is not available in appgis, the data is not traceable.

									(*Tree Cover Loss*) 2002 271,745 ha 855,276 (*Tree Cover Loss*) 2001 744,088 (*Tree Cover Loss*)			
1996-2000	N/A	3,510,000	2,255,196***	N/A	N/A	N/A		9 million (FREL)			-	The Deforestation Book is not available in appgis, the data is not traceable.
1990-1996	N/a	1,870,000	638,162***	N/A	N/A	N/A		3.8 million (FREL)			-	The Deforestation Book is not available in appgis, the data is not traceable.

* Presentation of Belinda Margono in the Webinar “Hutanku Akan Hilang” (Annual Rate)
** The Deforestation Book of MoEF
*** FREL for REDD+ Documents, 2016 (Annual Rate)

VI. DEFINITION FROM MOEF AND FAO

No	Institution	Forest Definition	Deforestation Definition	Method of Deforestation Calculation	Findings	Source / Reference	Notes
1.	**FAO**	**Forest is:** Tree cover with high canopy / trees able to reach these thresholds in situ, does not include land that is predominantly under agricultural or urban land use. Trees higher than 5 m Canopy cover of more than 10% Area covering more than 0,5 Ha Corridor width more than 20 m	**Deforestation is:** Deforestation is the conversion of forest to **another land use** or the long-term reduction (more than 10 years) of tree canopy cover below the 10% threshold.	Vary, according to the reporting countries	Vary, according to definition and methodology of reporting countries	FAO Forest Resource Assessment (FRA), cited from the presentation of Adam Gerrand (FAO REDD+ Forestry Officer), in Proceeding Workshop "Forest and Deforestation in Indonesia" held by the MoEF in January 29th, 2018	**Forest definition of FAO is different to the definition used by the Government of Indonesia –** Minimum baseline for canopy cover used by FAO is lower (10%) than the minimum baseline used by the Government of Indonesia (30%) Reason: 30% is more suitable for tropical countries
2.	**MoEF**	**Forest is:** Integrated ecosystems in the form of land coverage containing biological natural resources dominated by trees in the natural association of the environment and inseparable between one another**. (Law no. 41/1999 & P.70/2017)** Land cover with an area of at least	**Deforestation according to Deforestation Book:** Change in land cover conditions, from forest category land cover class (forested) to non-forest category land cover class (non-forested) This means, the loss of Timber plantation is also calculated as deforestation	The deforestation figures issued by the MoEF to the public are based on **forest definitions and deforestation according to Planology,** particularly for Net Deforestation, i.e. Gross Deforestation figure minus the Reforestation figure		Law no. 41 of 1999 on Forestry The Regulation of The Minister of Environment and Forestry no. 70/2017 The Regulation of The Minister of Forestry no. 14/2004 The Regulation of The Minister of Forestry no. 30/2009 The 2017-2018 MoEF Book of Deforestation	**The definition of forest used by the Government of Indonesia is different from FAO.** FAO is using 10% as minimum threshold of canopy cover while Indonesia uses 30% for minimum threshold. **If using the definition of FAO, the area of forest in Indonesia will be larger than current number because the area that categorized as forests would increase.** **There is dualism in the definition of forest submitted by the**

No	Institution	Forest Definition	Deforestation Definition	Method of Deforestation Calculation	Findings	Source / Reference	Notes
		0.25 ha, overgrown with wood vegetation (trees) of various types and ages with canopy covers of such expanse of land is at least **30%**. **(P.14/2014 - formal definition)** In FREL document for REDD+, minimum size of forest zone is **6.25 Ha** (due to practicality reason in mapping process) **According to Planology:** **Forest** is Land cover conditions in the form of primary dryland forests, secondary dry land forests, primary swamp forests, secondary swamp forests, primary mangrove forests, secondary mangrove forests, and **Timber plantations** **Natural forest** is a natural land cover condition in the form of primary dry land forest, secondary dry land forest, primary swamp forest, secondary swamp forest, primary mangrove forest, secondary mangrove forest **Timber plantations** is the cover of forest zone as a result of human cultivation, including the entire timber plantation, both in the area of IUPHHK-HT and the result of replanting inside forest zone /	**Gross Deforestation is** change in land cover conditions, from forest category land cover class (forested) to non-forest category land cover class (non-forested) without considering the ongoing reforestation. **Gross Deforestation of Natural Forest is** Indonesia the change in land cover conditions from nature (only) forest cover class to the non-forest category cover class (non-forested). Gross Deforestation of Natural Forests is used to separate changes in land cover conditions, from forest land cover class into non-forest land cover class, that were not caused by the harvesting of Timber plantation **Reforestation is** a change in land cover conditions, from a non-forest category land cover class (non-forested) to forest category land cover class (forested) - including the re-growth of timber plantation. **Natural Forest reforestation** refers to natural/unplanted			Forest Reference Emission Level (FREL) Documents for REDD+ SNI 8033-2014 - Method for calculating forest cover change based on results of visual interpretation of optical satellite remote sensing image" SNI 7645-2010 - "Land Cover Classification"	**Indonesian government to the UNFCCC.** The forest definitions presented in the National Communication and Biennial Update Report (BUR) include timber plantations because the focus is **GHG emissions reporting.** Meanwhile, in the FREL document, timber plantations are excluded in the calculation. Therefore, the calculation is limited to deforestation and degradation of natural forest.

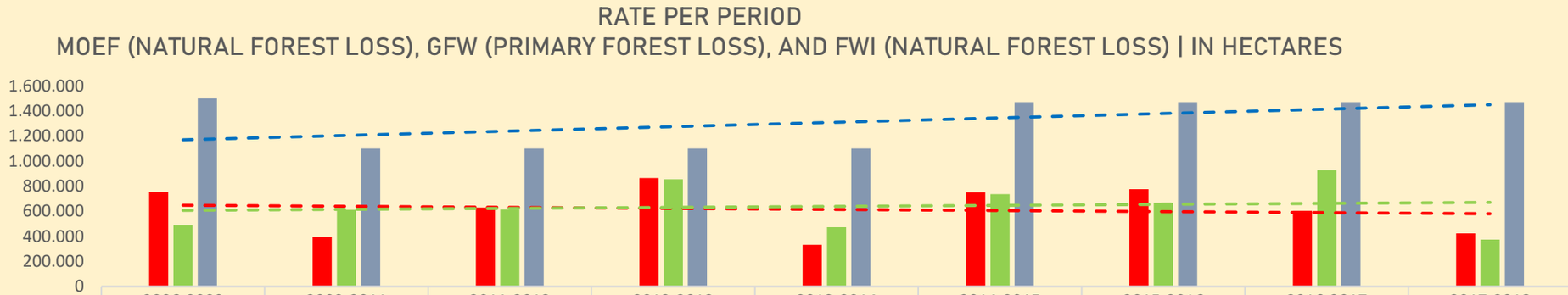
No	Institution	Forest Definition	Deforestation Definition	Method of Deforestation Calculation	Findings	Source / Reference	Notes
		replanting in non-forest zone - has an orderly planting pattern in a flat area, while for corrugated areas, the visible color image will be different to the surrounding environment	growth **Net deforestation is** change/reduction of forested category land cover area in a certain period, obtained by deducting gross deforestation area with reforestation area **Net Deforestation of Natural Forest** is change/reduction in natural forested category of land cover area in a certain period, obtained from the deduction of gross deforestation of natural forest with the area of Natural Forest Reforestation **According to REDD+ Regulation** Deforestation is permanent change from forested zone to non-forested zone **(P.70/2017)** **Gross deforestation** is a permanent change in the **cover of natural forest** without considering regrowth or establishment of timber plantation **(P.70/2017) -** equivalent to the definition of Gross Deforestation of Natural Forests in Deforestation Book. **Net deforestation** is permanent change in **forest cover** by				

No	Institution	Forest Definition	Deforestation Definition	Method of Deforestation Calculation	Findings	Source / Reference	Notes
			considering regrowth and/or establishment of Timber plantations **(P.70/2017)** Deforestation is permanent change from forested zone to non-forested zone **resulting from human activity (P.30/2009)** This definition differs from P.70 in a qualifier of "resulting from human activity." **Deforestation is** change in natural forest (primary and secondary) into other land cover classes that occurred once in one region **(FREL, 2016)** This definition is not considering the loss/growth of Timber plantations. It is assumed that, prior to the change of land class cover, land clearing was conducted on nature forests and the deforested area is considered as lost/ gross deforestation) **Degradation** Degradation is Change of primary natural forest into secondary				

No	Institution	Forest Definition	Deforestation Definition	Method of Deforestation Calculation	Findings	Source / Reference	Notes
			natural forest. **(FREL 2016)** Degradation is a decrease in the quantity of forest cover and carbon stock in a certain period (P.70/2017) Degradation is a decrease in the quantity of forest cover and carbon stock over a certain period **resulting from human activities** (P30/2009)				

VII. DEFORESTATION FIGURES IN CHARTS

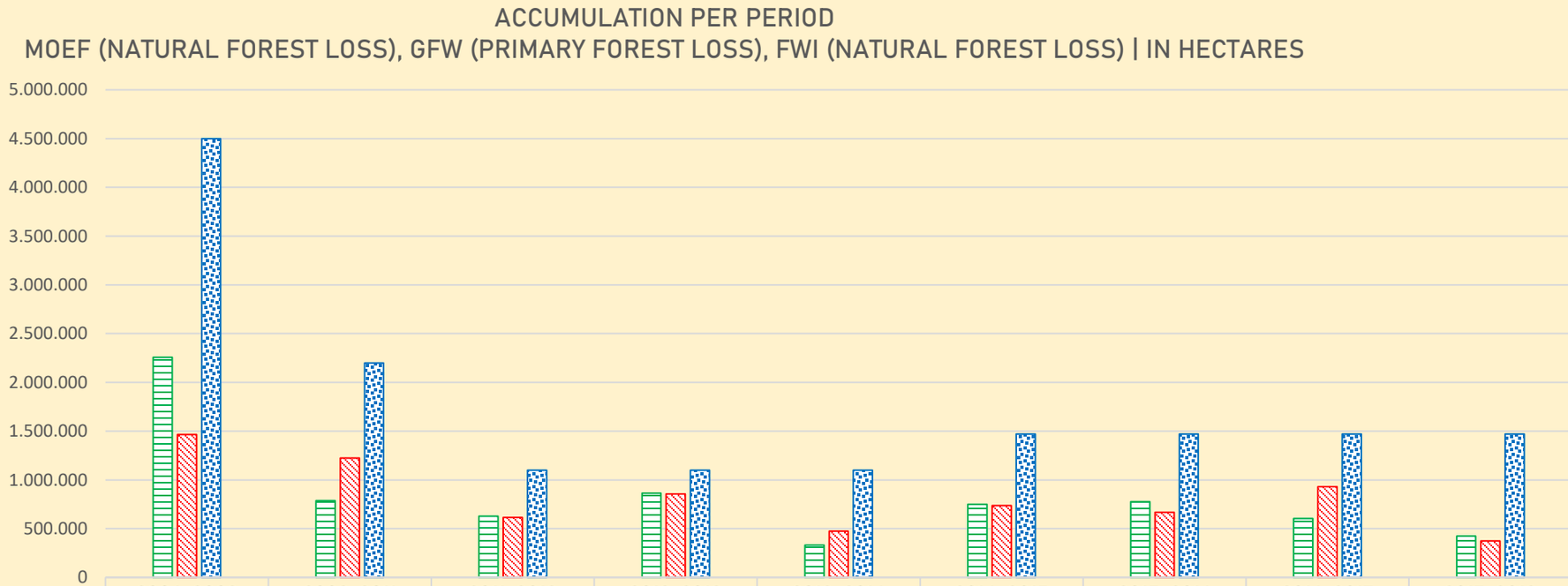
7.1 MOEF'S NATURAL FOREST LOSS VS FWI VS GFW PRIMARY FOREST LOSS (RATE PER PERIOD)



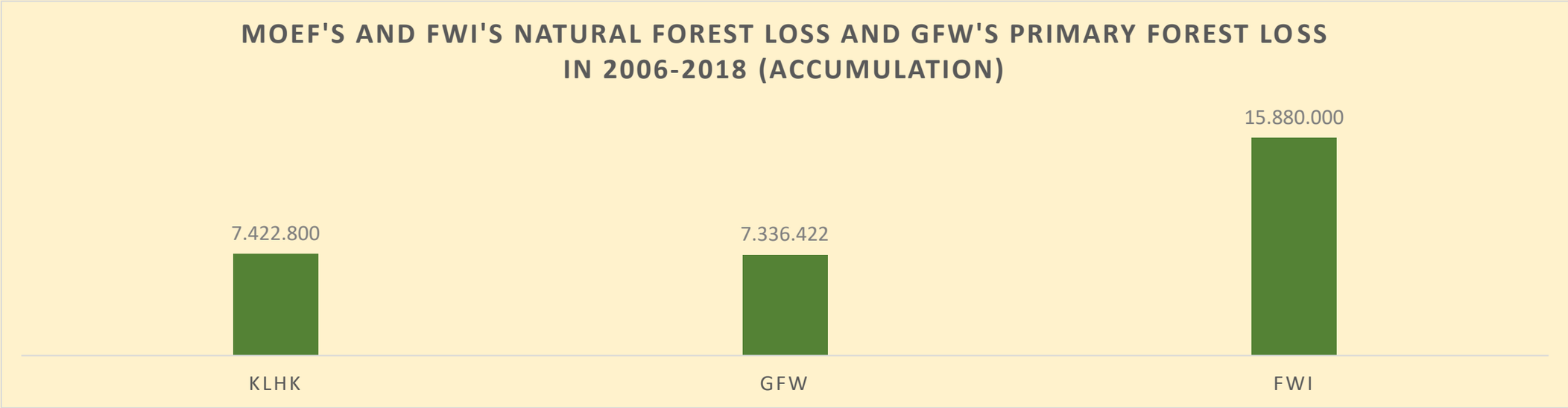
	2006-2009	2009-2011	2011-2012	2012-2013	2013-2014	2014-2015	2015-2016	2016-2017	2017-2018
KLHK (Deforestasi Hutan Alam)	752.567	393.500	628.800	864.900	331.800	749.900	776.600	602.900	423.200
GFW (Primary Forest Loss)	487.944	612.402	613.906	855.534	472.991	736.798	666.642	928.660	373.255
FWI (Hilangnya Hutan Alam)	1.500.000	1.100.000	1.100.000	1.100.000	1.100.000	1.470.000	1.470.000	1.470.000	1.470.000

- MoEF's natural forest loss data from 2006-2009 to 2017-2018 (red color) shows fluctuating numbers each period, but with a declining trendline.
- The figures on GFW's "primary forest loss" (green color) are close to MoEF's figures of natural forest loss, which, per definition, includes the loss of primary and secondary natural forests.
- In 3 periods, the 2011-2012, 2012-2013, and 2014-2015, the figures of natural forest loss of the MoEF were very close to the figures of GFW's primary forest loss figures. However, the other 6 periods show quite large difference in numbers.
- GFW primary forest loss data fluctuates from period to period, but with a declining trendline as also shown in MoEF's natural forest loss trend.
- Compared to MoEF's natural forest loss and GFW's primary forest loss figures, FWI's natural forest loss figures are consistently higher with an opposing trend (increasing).

7.2 MOEF'S NATURAL FOREST LOSS VS FWI VS GFW PRIMARY FOREST LOSS (ACCUMULATION PER PERIOD)

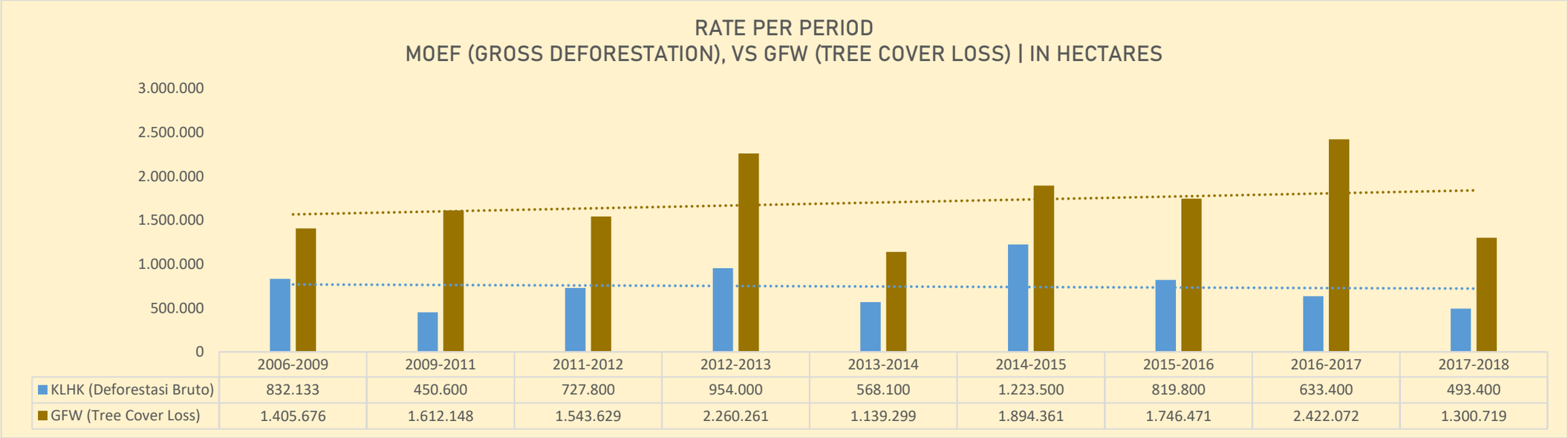


	2006-2009	2009-2011	2011-2012	2012-2013	2013-2014	2014-2015	2015-2016	2016-2017	2017-2018
KLHK (Deforestasi Hutan Alam)	2.257.700	787.000	628.800	864.900	331.800	749.900	776.600	602.900	423.200
GFW (Primary Forest Loss)	1.463.832	1.224.804	613.906	855.534	472.991	736.798	666.642	928.660	373.255
FWI (Hilangnya Hutan Alam)	4.500.000	2.200.000	1.100.000	1.100.000	1.100.000	1.470.000	1.470.000	1.470.000	1.470.000



- Accumulatively, the MoEF's natural forest loss figures from 2006 to 2018 reached 7.4 million hectares.
- In the same period, GFW's primary forest loss figures are slightly lower than the MoEF's natural forest loss figures with 7.3 million hectares.
- FWI natural forest loss figures in the same period are much higher than the MoEF's natural forest loss figures and GFW's primary forest loss figures with 15.8 million hectares.

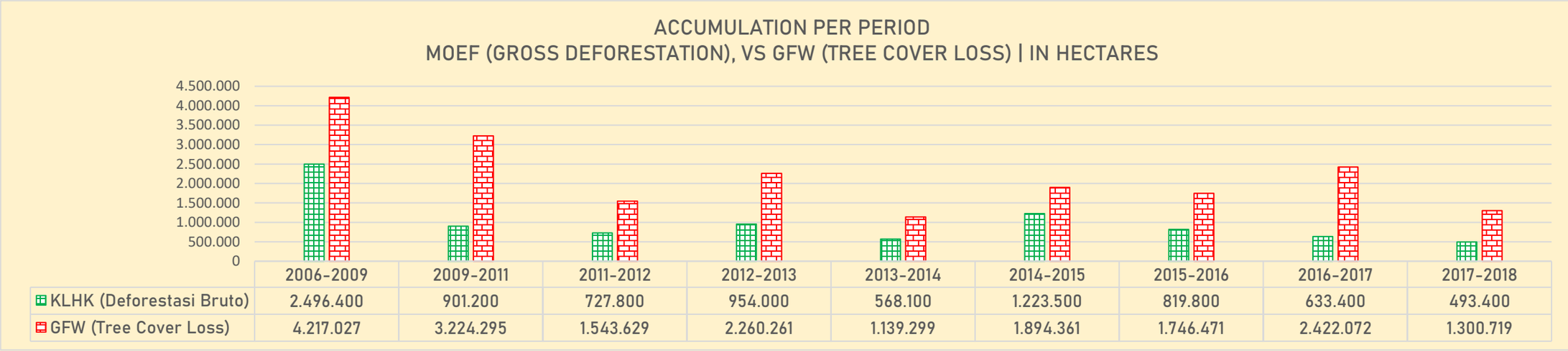
7.3 MOEF'S GROSS DEFORESTATION VS GFW'S TREE COVER LOSS (RATE PER PERIOD)



	2006-2009	2009-2011	2011-2012	2012-2013	2013-2014	2014-2015	2015-2016	2016-2017	2017-2018
KLHK (Deforestasi Bruto)	832.133	450.600	727.800	954.000	568.100	1.223.500	819.800	633.400	493.400
GFW (Tree Cover Loss)	1.405.676	1.612.148	1.543.629	2.260.261	1.139.299	1.894.361	1.746.471	2.422.072	1.300.719

- The definition of gross deforestation from the MoEF includes the loss of natural forests (primary and secondary) and timber plantation loss
- The definition of Tree Cover Lost is different to and is not interchangeable with the definition of deforestation. The definition of Tree Cover Loss refers to the loss of trees, both in natural forests and tree plantations. Therefore, the number is significantly higher.
- The figure of GFW's Tree Cover Loss (purple) shows an increasing trendline in the period of 2006-2018, in contrast with the declining trendline in gross deforestation published by the MoEF (blue).

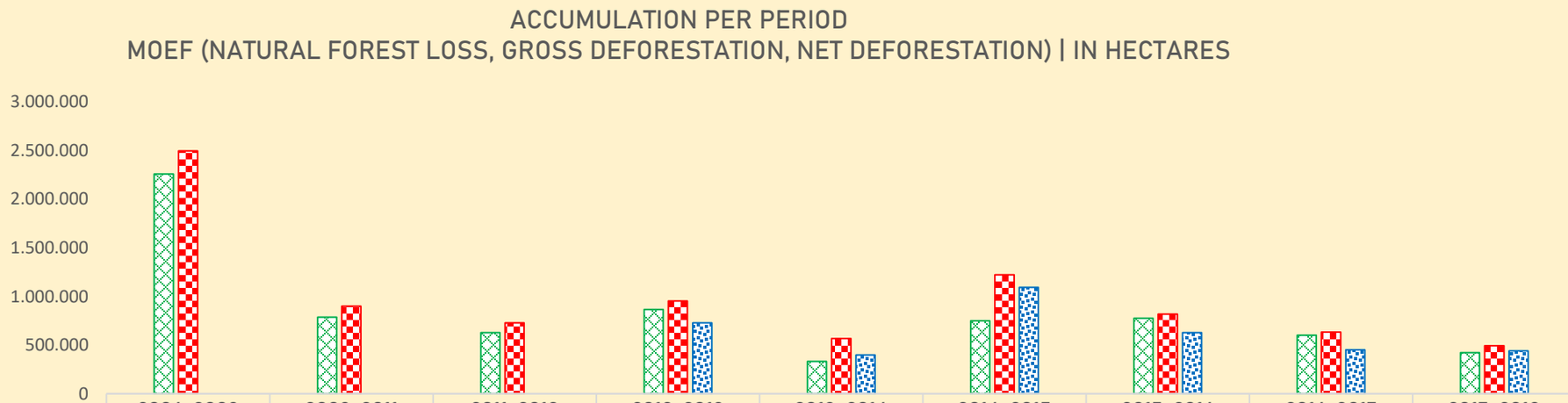
7.4 THE MOEF'S GROSS DEFORESTATION VS GFW'S TREE COVER LOSS (ACCUMULATION PER PERIOD)



	2006-2009	2009-2011	2011-2012	2012-2013	2013-2014	2014-2015	2015-2016	2016-2017	2017-2018
KLHK (Deforestasi Bruto)	2.496.400	901.200	727.800	954.000	568.100	1.223.500	819.800	633.400	493.400
GFW (Tree Cover Loss)	4.217.027	3.224.295	1.543.629	2.260.261	1.139.299	1.894.361	1.746.471	2.422.072	1.300.719

- Accumulatively, MoEF's gross deforestation shows a figure of forest loss with the size of 8.8 million hectares in 2006-2018.
- GFW's Tree Cover Loss figures in the same period reached 19.7 million hectares.
- Noted: Tree Cover Loss definition is not the same and is not interchangeable with deforestation definition. However, this definition includes tree cover loss both in natural forests and plantations.

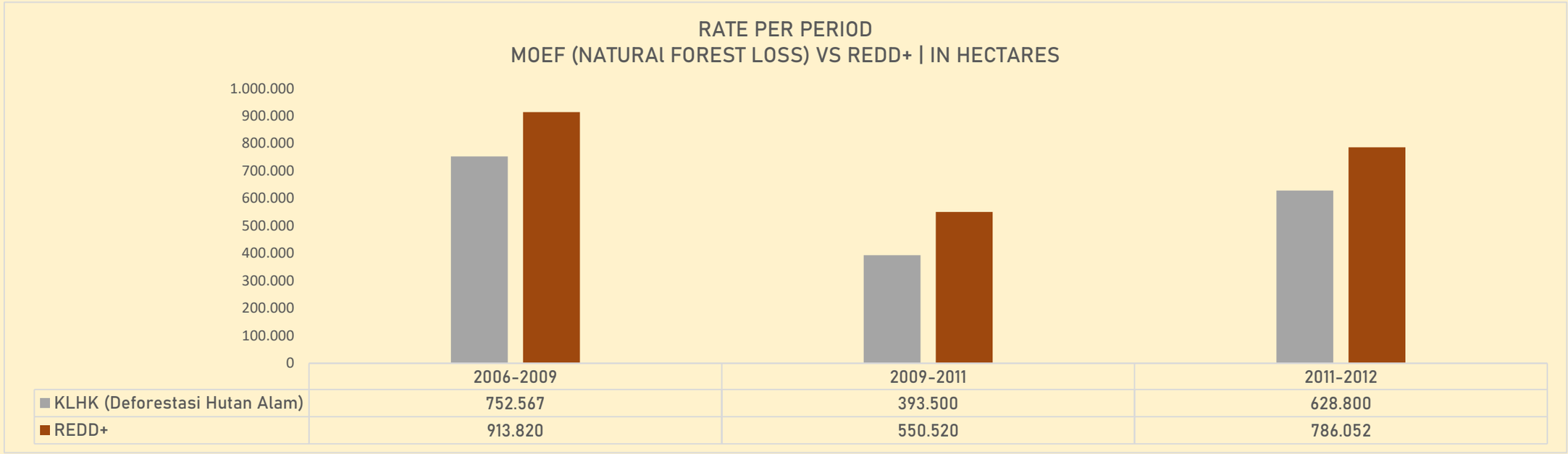
7.5 NATURAL FOREST LOSS VS GROSS DEFORESTATION VS NET DEFORESTATION FROM THE MOEF (ACCUMULATION PER PERIOD)



	2006-2009	2009-2011	2011-2012	2012-2013	2013-2014	2014-2015	2015-2016	2016-2017	2017-2018
KLHK (Deforestasi Hutan Alam)	2.257.700	787.000	628.800	864.900	331.800	749.900	776.600	602.900	423.200
KLHK (Deforestasi Bruto)	2.496.400	901.200	727.800	954.000	568.100	1.223.500	819.800	633.400	493.400
KLHK (Deforestasi Netto)	0	0	0	728.000	397.500	1.092.100	629.200	450.000	439.500

- Accumulatively, the MoEF's figure of natural forest loss from 2006 to 2018 is 7.4 million hectares.
- The MoEF's gross deforestation, which includes the loss of timber plantation, reached 8.8 million hectares.
- From the 2012-2013 period, the published figures are net deforestation, originated from the deduction of deforestation figures by reforestation figures.
- Compared to the figure of gross deforestation or natural forest, the figure of net deforestation is relatively smaller since it has been deducted by the reforestation figure. Net deforestation from 2012 to 2018 is 3.7 million hectares.

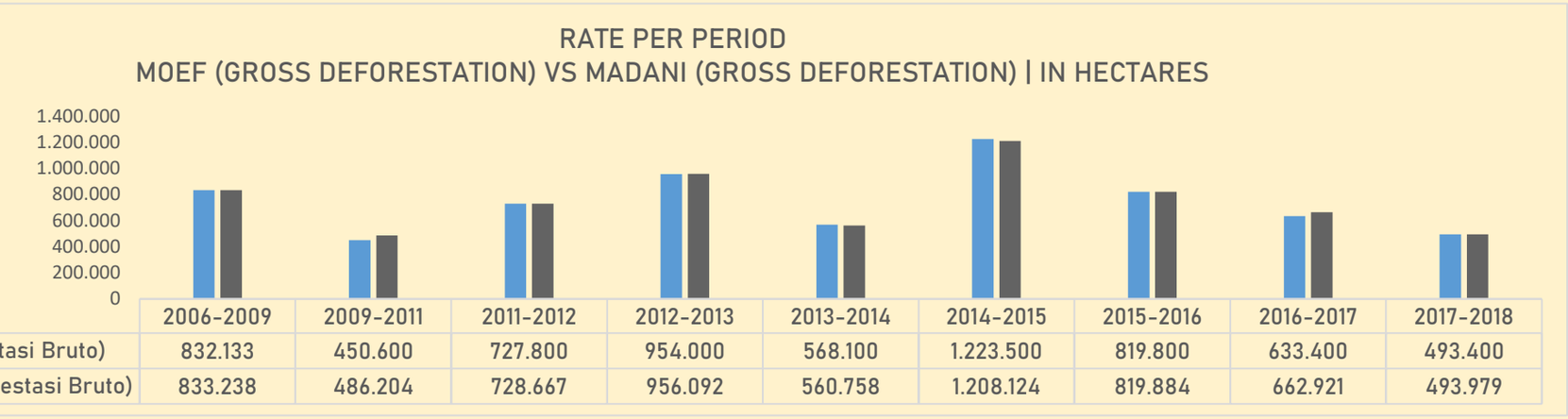
7.6 NATURAL FOREST DEFORESTATION FROM THE MOEF VS VS FREL FOR REDD+ (RATE PER PERIOD)



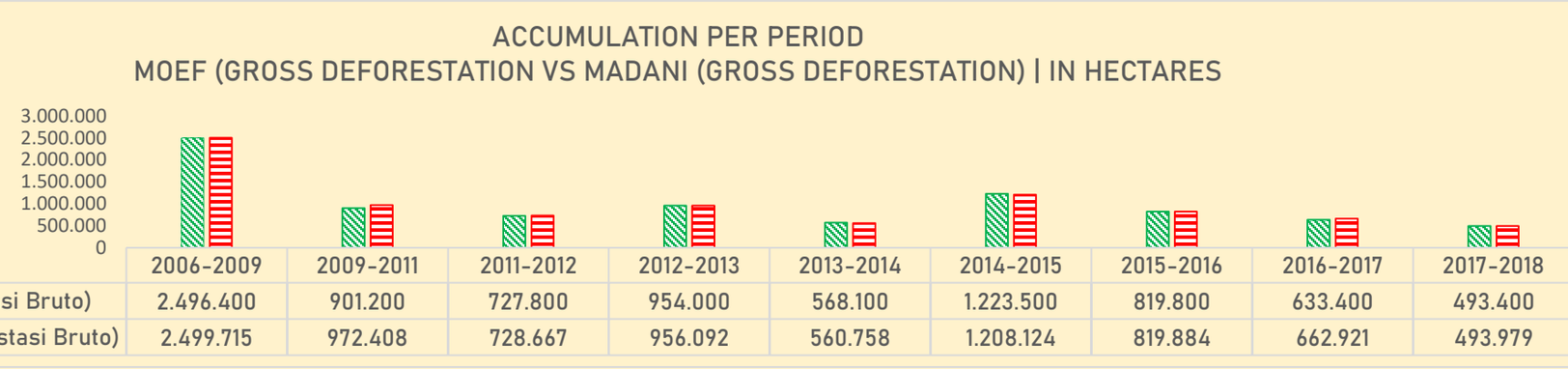
	2006-2009	2009-2011	2011-2012
KLHK (Deforestasi Hutan Alam)	752.567	393.500	628.800
REDD+	913.820	550.520	786.052

- According to its definition, FREL for REDD+ is the average number of annual natural forest loss from 1990 to 2012. The definition used (gross deforestation) is similar to the definition of gross deforestation of natural forest in the Deforestation Book of MoEF.
- However, in three periods where the rate of natural forest loss from both sides were recorded (2006-2009, 2009-2011, and 2011-2012), there were differences in natural forest loss figures as shown by the chart above.
- Compared to the rate of natural forest loss recorded from the MoEF recalculation (Deforestation Book), the rate of natural forest loss in FREL for REDD+ is higher.
- The natural forest loss rate for FREL for REDD+ was said to have been 'modified" (no further explanation regarding this matter).

7.7 CROSS EXAMINATION OF SPATIAL DATA AND GROSS DEFORESTATION STATISTICS



	2006-2009	2009-2011	2011-2012	2012-2013	2013-2014	2014-2015	2015-2016	2016-2017	2017-2018
KLHK (Deforestasi Bruto)	832.133	450.600	727.800	954.000	568.100	1.223.500	819.800	633.400	493.400
MADANI (Deforestasi Bruto)	833.238	486.204	728.667	956.092	560.758	1.208.124	819.884	662.921	493.979



	2006-2009	2009-2011	2011-2012	2012-2013	2013-2014	2014-2015	2015-2016	2016-2017	2017-2018
KLHK (Deforestasi Bruto)	2.496.400	901.200	727.800	954.000	568.100	1.223.500	819.800	633.400	493.400
MADANI (Deforestasi Bruto)	2.499.715	972.408	728.667	956.092	560.758	1.208.124	819.884	662.921	493.979

- Madani confirmed data consistency between MoEF's spatial and statistical data from the MoEF for the category of gross deforestation.
- Cross examinations for natural forest loss and net deforestation cannot be done because natural forest loss and reforestation data are not available.

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Madani

Yayasan Madani Berkelanjutan is a non-profit institution that has bridged relationships between stakeholders (government, private sector, and civil society) to achieve innovative solutions related to forest and land governance.

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