



Compliance theory: Analyzing zero deforestation commitment of government and private sector in South Sumatera Province

Nur Indah Ristiana^a, Herry Purnomo^{ab}, Yulius Hero ^a, Benny Okarda^b, Dyah Puspitaloka^b, Made Sanjaya^b

^a Forest Management Study Program, Graduate School, IPB University, Dramaga, Bogor, 16680, Indonesia

^b Central Information for Forestry Research (CIFOR), Situ Gede, Bogor, 16115, Indonesia

Article Info:

Received: 28 - 08 - 2020

Accepted: 18 - 07 - 2021

Keywords:

Compliance, government, private sector, south Sumatera, zero deforestation commitments

Corresponding Author:

Nur Indah Ristiana

Forest Management Study Program, Graduate School, IPB University;

Tel. +62 87789491501

Email:

nurindah.ristiana@gmail.com

Abstract. *To address deforestation, South Sumatera Government was committed to being the frontrunner in attaining Green Growth 2017. All economic activities related to land use must comply with the regulations. The private sector supports them with some initiatives by several certifications as their commitment toward zero deforestation (ZDC). However, from the land cover data, South Sumatera Province is one of Indonesia's highest forest cover losses, followed by increasing economic activities. This study aims to explain the commitments of the public and private sectors in complying toward zero deforestation. We conducted interviews with relevant agencies and collected data regarding interventions and initiatives. This study used compliance theory to analyze the commitments of both sectors. The results showed that the public and private sectors in South Sumatera had shown their commitment to the type of treaty-induced compliance. The compliance showed how the commitment is integrated into policies, aligned public and private governance arrangements, and an excellent environmental quality change by reduced deforestation rate. This showed that one of the ZDC's objectives is at least halve the rate of loss of natural forests globally by 2020 has been implemented by both. Thus, they strive to end natural forest loss by 2030.*

How to cite (CSE Style 8th Edition):

Ristiana NI, Purnomo H, Hero Y, Okarda B, Puspitaloka D, Sanjaya M. 2021. Compliance theory: Analyzing zero deforestation commitment of government and private sector in South Sumatera Province. *JPSL* 11(4): 638-652. <http://dx.doi.org/10.29244/jpsl.11.4.638-652>.

INTRODUCTION

Deforestation is a major world focus because of its implications for biodiversity loss, culture, and climate change (Nobre *et al.*, 2016). Gibbs *et al.* (2010) identified the key drivers of deforestation, namely globally traded commodities such as palm oil, soybeans, paper and pulp (P&P), and beef. Indonesia is the world's largest palm oil producer and is included in the top 10 P&P producers (Pirad *et al.*, 2018), with a plantation area of 10 million ha (FWI, 2014). In 2005-2010, the expansion of oil palm plantations reached 1.3 million ha (Gunarso *et al.*, 2013) and expanded, of which one third came from the conversion of primary and secondary forests. Estimated forest loss in Indonesia in 1996-2000 was 3.51 million ha/year, 2006-2010 reached 0.69 million ha/year (Margono *et al.*, 2014) then decreased to 0.48 million ha/year in 2016-2017 (MOEF, 2018) and with ongoing threats to forests.

Efforts to tackle deforestation with the adoption of sustainable practices by the public and private sectors through public pledges known as Zero Deforestation Commitments (ZDC). ZDC is a sustainability initiative that signals an intention to eliminate deforestation from its supply chain (Lambin *et al.*, 2018) and fill gaps in

forest governance (Prakash and Potoski, 2007). Support for ZDC emerged as the culmination of the September 2014 The New York Declaration on Forests. One of the NYDF's goals is to halve natural forest loss by 2020 and complete reduction by 2030 (Climate Focus, 2015).

The province of South Sumatera is one of the world's leaders in its commitment to reducing deforestation, restoration, and green growth based on the sustainability of natural resources (Finlayson, 2017), whose commitment was announced in 2017 during the First Asia Bonn Challenge meeting in Palembang. This commitment is in line with the President's commitment to COP-21 through Law No. 16 of 2016 and stated in the Nationally Determined Contribution (NDC) (Directorate General of Climate Change Control, 2017). However, if looked at the land cover and use side, South Sumatera is one of the provinces where the rate of change in forest cover occurs, is relatively high from 1990-2013 in line with the increase in economic activity (Rijal, 2016; Dwiprabowo *et al.*, 2014). South Sumatera has superior commodities in the plantation and forestry sectors, as evidenced by the analysis of declining forest cover changes followed by an increase in primary commodities such as rubber, oil palm, and acacia which continues in all periods (Zulkarnain, 2018).

Researchers are interested in raising this issue by analyzing the perspective of the two sectors through the interventions and initiations that have been carried out and their relationship with the rate of change in forest cover after that. The South Sumatera Provincial Government's intervention in its commitment is stated through several regulations made in line with the objectives of ZDC. All economic activities related to forest cover must comply with predetermined regulations. The private sector supports this commitment with several initiatives through certification that applies sustainability principles as a ZDC.

This study aims to explain the commitment of the government and business actors in the forestry and plantation sectors in South Sumatera in realizing Zero Deforestation. To explain these commitments, it is necessary to identify existing government interventions and private sector initiatives related to ZDCs, understand the dynamics of changes in natural forest cover and land use that occurred prior to the many forest transition activities leading up to the ZDCs, and understand the impact of these commitments on forest and landscape sustainability.

METHOD

Location and Period Study

South Sumatera Province was chosen as the study location because it already commits to zero deforestation, whereas the South Sumatera Regional Government has regulations that support Zero Deforestation Commitments. The private sector of P&P and oil palm commodities has carried out several certifications that apply sustainability principles towards zero deforestation. The location of the study describe in Figure 1.

Data Collection

The data used are primary data and secondary data. Primary data was obtained through interviews with informants who were determined using a purposive sampling technique, namely government employees who were successful in making and/or implementing policies related to ZDC at the provincial level. However, because only a few respondents from the government in the relevant sector, the sample was added with representatives from the district level government. Government employees from relevant offices in OKI Regency represent the implementation of policies related to ZDC at the district/city level. OKI Regency is one of the regencies that have quite high deforestation. Most of the companies involved in several private initiatives are located in Ogan Komering Ilir (OKI) District. OKI Regency can also represent every description of existing land classes. Therefore OKI Regency can be used as a study location to answer several questions related to public and private sector commitments.

While secondary data comes from data owned by relevant agencies such as MOEF, Ministry of Agriculture, BPS (Indonesian Statistic Regency), and certification bodies such as the Timber Legality Assurance System (TLAS) , Indonesian Sustainable Palm Oil (ISPO), Forest Stewardship Council (FSC),

Program for Endorsement of Forest Certification (PEFC), Roundtable on Sustainable Palm Oil (RSPO) and International Sustainability and Carbon Certification (ISCC). This data was then analyzed descriptively by using a literature study.

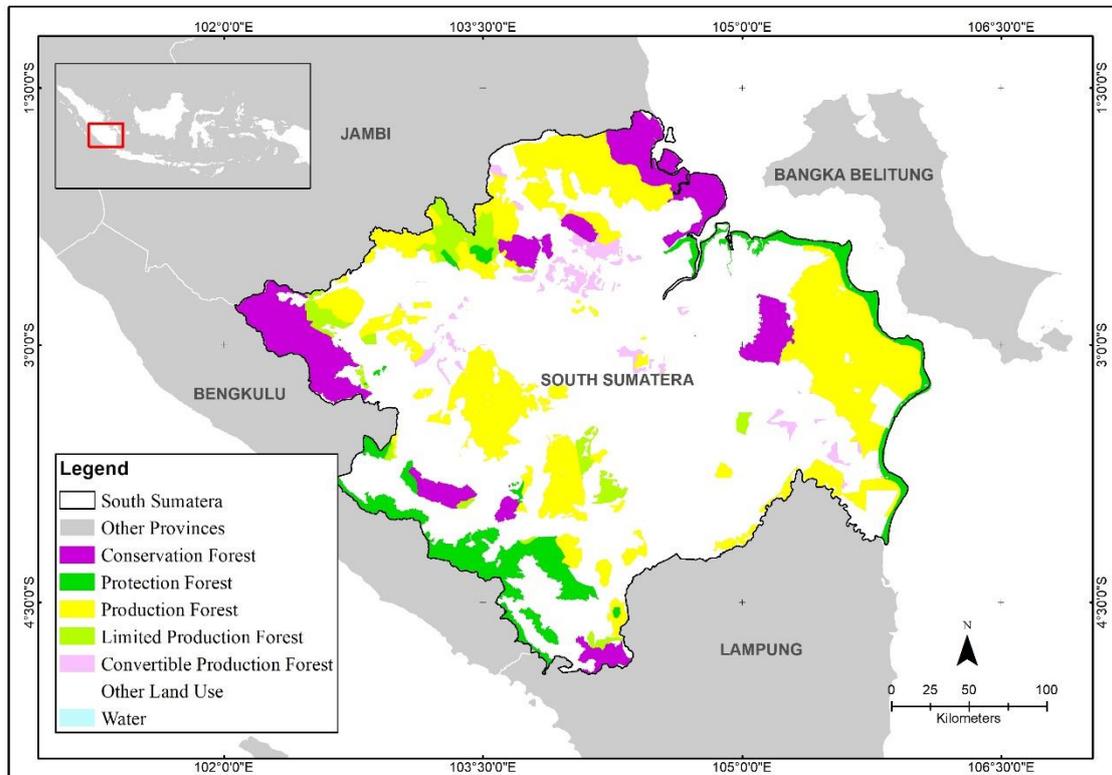


Figure 1 Study area

Data Analysis

The researcher uses qualitative-quantitative research methods to answer the research objectives with analytical techniques: (i) Content Analysis, used to analyze public policies and certification points by identifying the characteristics of the content of regulations formed through text against the ZDC Criteria; (ii) Spatial Analysis is used to answer changes in land cover and use from the lack of forest transitions. The data used to retrieve land cover data from the Ministry of Environment and Forestry consists of 23 classes from 1990 to 2019. The authors combine classes into eight land use land cover classes (Table 1). In understanding the land status, the author analyzes the land cover map, land use with spatial planning, and concession areas referring to SK.454/MenLHK/Setjen/PLA.2/6/2016 and maps of Pulpwood plantations, Ecosystem Restoration, Village Forests, and Community Pulpwood plantations from MOEF (Indonesian Ministry of Environment and Forestry) and Oil Palm Concessions obtained from Global Forest Watch (Table 2); (iii) Comparative Analysis, to compare the data for several periods so that it can find out the changes that occur using the T-test approach. (iv) Commitment analysis using compliance theory is used in explaining commitment because it plays a role in explaining the relationship between changes in actor behavior and commitment (Mitchell, 1993).

There are three indicators to evaluate the attitude of actors in complying with a commitment, namely; (i) outputs: all laws, policies, and regulations that are the implementation of commitments (ii) outcomes: refers to changes in the behavior of the two sectors, (iii) impacts: environmental impacts resulting from commitments (Figure 2).



Figure 2 Mandatory and voluntary certification schemes for timber and oil palm plantations

Table 1 Land cover aggregate class

Aggregate Class	Original Landcover Class
Natural Forest	Primary and secondary dryland forest, primary and secondary swamp forest, primary and secondary mangrove forest
Pulpwood plantation	Plantation Forest
Oil Palm Plantation	Plantation
Shrubs	Bush, swamp bush
Agriculture	Dryland agriculture, dryland agriculture mixed with shrubs, rice fields
Grassland	Grassland
Bareland	Bareland
Other	Settlements, airports/ports, swamps, transmigration, mining

Table 2 Aggregate class status area

Area Status	Grouping
Other Use Area	Not Forest Area
Production forest	Forest Area
Limited production forest	Forest Area
Convertible Production Forest	Forest Area
Protection Forest	Forest Area
Wildlife reserve	Conservation area
Nature Park	Conservation area
Nature Reserve Area/ Nature Conservation Area	Conservation area
National Park	Conservation area

RESULTS AND DISCUSSION

Result

Government Commitment to Zero Deforestation

The government plays a role in making public policy, which is a series of actions formulated by the government that involve interested parties to serve the public interest. South Sumatera has started its commitment in 2015 (Miler *et al.*, 2017) by building a consortium of partnerships for landscape management called the South Sumatera Eco-Region Alliance. This alliance aims to increase collaboration between the government, the private sector, and communities in South Sumatera to reduce deforestation and more sustainable land management. In addition, the alliance also intends to support local livelihoods and address climate impacts in the context of green growth development, which is compiled in a master plan.

Public policies related to the government's commitment to zero deforestation, both central and local governments, have been stated in laws, ministerial regulations, regional regulations, Governor and district heads regulations (Table 3). Of the 24 public policies, there are no regulations that are precisely specific to zero deforestation commitments. However, several articles in the policy indirectly aim at zero deforestation.

Table 3 Public policy on government commitments to zero deforestation

Policy	Linkages
Law Number 16 of 2016 concerning Ratification of the Paris Agreement to The United Nations Framework Convention on Climate Change (Paris Agreement on the United Nations Framework Convention on Climate Change).	President's Commitment to COP-21. The Paris Agreement contains the primary substance, including a policy approach and positive incentives for activities to reduce emissions from deforestation and forest degradation and sustainable forest management, conservation, and enhancement of forest carbon stocks, including through results-based payments.
Minister of Environment and Forestry regulations PermenLHK No. P.70/Menlhk/Setjen/Kum.1/12/2017 concerning Implementation of Reducing Emissions from Deforestation and Forest Degradation, Role of Conservation, Sustainable Management of Forest, Enhancement of Forest Carbon Stocks	The implementation of REDD+ is carried out through efforts to reduce emissions from deforestation and forest degradation, conservation of carbon stocks, sustainable forest management, and increasing forest carbon stocks. In each article, mitigation actions are described in reducing emissions from deforestation.
Regional Regulation No. 1 of 2018 concerning Peat Ecosystem Protection.	Peatland Ecosystem Protection and Management is a systematic and integrated effort to conserve and prevent damage to peat ecosystems. Deforestation can also occur in peat forests, for that the articles in this regional regulation can minimize damage. If damage has occurred, efforts are made to restore the peat ecosystem.
Governor Regulation No. 16 of 2017 concerning Institutional Green Growth Plans (GGP) and Landscape Management Partnerships	Article 2, which explains the institution's purpose to be integrated into sustainable and sustainable natural environmental management, is a commitment to achieve zero deforestation through the GGP initiatives.
Governor Regulation No. 21 of 2017 concerning the Green Growth Master Plan	Provincial opportunities in realizing Economic Growth are in line with Nawacita, NDC, and SDGs in leadership and commitment to national and global communities by facing challenges in aligning the economy with land and forest resources. A landscape approach can see in its entirety so that deforestation can be monitored.
Regional Regulation No. 8 of 2016 concerning forest/land fire control	All existing articles concerning efforts to control forest fires as an effort to reduce forest cover loss.

Policy	Linkages
Regional Regulation No.17 of 2016 concerning Environmental Protection and Management (EPM)	Article 3 explains that the purpose of EPM is to protect the province from pollution or environmental damage. Deforestation is one form of environmental damage which is described in Article 10, namely controlling forest ecosystem damage.
Regional Regulation No. 5 of 2013 concerning Integrated Watershed Management	The type of vegetation in the watershed is forest stands, so watershed management is needed in an effort to commit to zero deforestation. Article 28 discusses the management of watersheds that are restored and whose carrying capacity is maintained, namely vegetation management is carried out in the context of preserving biodiversity, increasing land productivity, ecosystem restoration, rehabilitation and land reclamation, protect and maintain the productivity and integrity of the ecosystem in the watershed in a sustainable manner. This activity is an effort to reduce the rate of deforestation.
South Sumatera Provincial Regulation Number 16 of 2013 concerning the Establishment of the Organization and Work Procedure of the South Sumatera Production Forest Management Unit	Article 6 explains that KPHP (<i>Kesatuan Pengelolaan Hutan Produksi</i>) has a function in implementing production forest management in its territory. This is regulated so that production forests can be managed optimally and sustainably in accordance with their functions under applicable laws and regulations to prevent deforestation.
Governor Regulation No. 34 of 2012 concerning Regional Action Plans for GHG Emission Reduction	GHG Action Plan is a mitigation action in an effort to reduce GHG emissions as outlined in local government work unit (SKPD/ <i>Satuan Kerja Perangkat Daerah</i>) policies, plans, programs, and activities. The GHG Action Plan includes forestry and peatland sectors. Indirectly, the mitigation actions that will be made will affect the reduction in the rate of deforestation as well.
Gubernatorial Regulation No. 23 of 2008 concerning the Organization and Work Procedure of Service Technical Implementation Unit for Forest Fire Control	The division of tasks related to unit related to forest fire control. The goal is that forest fires can be controlled which has implications for decreasing the rate of deforestation due to forest fires.
Gubernatorial Regulation No. 64 of 2008 concerning the Description of Duties and Functions of the Forestry Service	The division of tasks related to the Forestry Service unit with the aim of all forms of forest management at the regional level can support the reduction of forest cover loss.
Regional Regulation of Ogan Komering Ilir Regency No. 2 of 2017 concerning Social and Environmental Responsibility and Community Development Partnership Program	The regulation aims to build commitment and concern for the company to improve community welfare and development in the OKI Regency, which is directed by the OKI development program. It minimizes the possibility of illegal deforestation carried out by companies.
Regional Regulation of Ogan Komering Ilir Regency No. 9 of 20013 concerning Regional Spatial Planning 2013-2033	Policies to realize spatial planning objectives include stabilizing, protecting, and managing Protection Forest areas, nature reserves, and other protected areas. Related articles also regulate policy strategies so that the direction of utilization is clear and supports reducing deforestation rates in the OKI district.
Regional Regulation of Ogan Komering Ilir Regency No. 26 of 2001 concerning Permits for Collecting Timber and Non-Timber in Community Forests, Cerucuk Timber and Hoarding of Timber in Warehouses.	The regulation of retribution for timber and non-timber forestry permits is intended to minimize illegal logging, which is part of an effort to reduce the rate of deforestation.

Policy	Linkages
Regional Regulation of Ogan Komering Ilir Regency No. 19 of 2001 concerning Licensing of Timber and Non-Timber Forest Products Collection Permits in Community Forests	The regulation of retribution for timber and non-timber forestry permits is intended to occur which is part of an effort to reduce the rate of deforestation
Regional Regulation of Ogan Komering Ulu Regency No. 4 of 2013 concerning Environmental Protection and Management	In Article 3 it is stated that environmental protection and management aims to: protect the Regency area from pollution and/or environmental damage. Prohibition of actions that result in environmental pollution and/or destruction. Deforestation is a form of ,ecological destruction. Therefore, this Regional Regulation contains provisions for the prohibition.
Musi Rawas Regency Regulation No. 35 of 2015 concerning Production, Certification, and Distribution of Plantation Seeds in Musi Rawas Regency	This regulation regulates the production and certification of plantation plant seeds which ensures the implementation of a system of providing good development seeds continuously so that the origin of the plant is known, not from something obtained illegally.
Regional Regulation of Musi Banyu Asin Regency No. 3 of 2005 concerning Retribution for Logs, Cerucuk Timber and Non-Wood Originating from Land Outside Forest Areas Within Musi Banyuasin Regency	Ensuring payments for the production of logs, Cerucuk wood, and Non-Timber to private persons or companies with legal entities to take timber and non-timber production from land outside the state forest area to be traded obtained based on utilization permits or collection and collection according to applicable regulations.
Regional Regulation of Musi Rawas Regency No. 10 of 2012 concerning Permits for Collection of Timber and Non-Timber Forest Products	The arrangement of Forest Product Harvesting Rights Permits for cutting/taking timber is only granted to production forest areas and conversion forests or production forest areas to be converted
Musi Rawas District Regulation No. 12 of 2001 concerning Permits for Collecting Forest Products	The arrangement of Forest Product Harvesting Rights Permits for cutting/taking timber is only granted to production forest areas and conversion forests or production forest areas to be converted/converted (in cultivation areas according to Regional Spatial Plan (Rencana Tata Ruang Wilayah/RTRW) and The Agreed Map on Forest Functions (Tata guna Hutan Kesepakatan/ or TGHK).
Regional Regulation of Musi Rawas Regency No. 13 of 2001 concerning Permits for Utilization of Timber, Non-Timber Forest Products on Private Land/People's Forests	The Arrangement of Timber and Non-Timber Forest Products Utilization Permits on Owned Land/People's Forests to minimize illegal logging. Indirectly, it has implications for reducing the rate of deforestation.
Regional Regulation of Musi Rawas Regency No.16 of 2003 concerning Amendments to Regional Regulation of Musi Rawas Regency Number 13 of 2001 concerning Permits for Utilization of Timber, Non-Timber Forest Products on Owned Land/People's Forests	The Arrangement of Timber and Non-Timber Forest Products Utilization Permits on Owned Land/People's Forests to minimize illegal logging. Indirectly, it has implications for reducing the rate of deforestation.
Regional Regulation of Musi Rawas Regency No. 34 of 1997 concerning Retribution for Collection and Hoarding of Forest Products for Trade in the Level II Duties of Musi Rawas	The regional regulation regulates the subject and object of levies from fees to retribution fines. This arrangement aims to prevent illegal logging. Indirectly, it has implications for reducing the rate of deforestation.

Explicitly, the commitment to zero deforestation in South Sumatera Province is seen in the Governor's Regulation No. 21/2017 concerning the Green Growth Master Plan for South Sumatera Province, whose technical implementation is outlined in the Green Growth Master Plan document (Dewi *et al.*, 2017). The results of the content analysis of this Master Plan Document against the ZDC criteria of The New York Declaration on Forests (NYDF) agreement resulted in several points, namely: (i) the Master Plan has mostly met the criteria for commitments to deforestation; (ii) the commitments are not only focused on zero deforestation but broader and integrated in scope; (iii) Integration must be carried out in a balanced way because it will have a negative impact on deforestation if the achievements and indicators are not implemented and are separated from monitoring; (iv) If integration is carried out, land use that is free from deforestation and following the principles of green growth in South Sumatera can be realized.

From interviews conducted with informants from provincial and district level government agencies (OKI Regency), The Government's commitment to zero deforestation is stated in an integrated management plan, called the Masterplan for Green Growth Based on Renewable Resources 2017-2030. This Masterplan combines spatial and land use plans with development plans with low environmental impact promote economic growth and ensures full involvement of South Sumatera's people and its surroundings. However, some respondents at the district level do not seem to fully understand the concept of zero deforestation and only implement policies according to the rules set at the provincial level. This is due to the dynamics of personnel changes in these government institutions due to mutation and rotation policies. Local government institutions are also considered bound only to have roles, responsibilities, and authorities as determined by central government policies. In addition, there are budget constraints to implement zero deforestation commitments systematically and comprehensively. The budget for implementing activities in the master plan is highly dependent on international donors and the State budget. However, through integrated multi-stakeholder management, there are no longer overlapping activities and budgets between agencies.

Private Sector Initiatives in Fulfilling Zero Deforestation Commitments

Most South Sumatera Province consists of lowlands whose land cover is agriculture, plantations, Pulpwood plantations, mangroves, and remnants of natural forests. Data shows that South Sumatera Province has 21 Pulpwood plantations companies (MOEF, 2018), 1 ecosystem restoration company, and 143 oil palm plantation companies (BPS, 2017).

To reduce deforestation, mandatory and voluntary certification in the forestry and plantation sectors are the most widely used policy implementation tools for zero deforestation commitments to business actors. Forest Trends (2015), found that four out of five commitments depend on certification. Mandatory and voluntary certifications are not two contradictory certifications but support each other. Both certifications support government regulations that apply in Indonesia and support sustainable and sustainable management. Both types of certifications are effective tools for monitoring deforestation-free supply chains. Although considered important, not all timber and oil palm plantation companies have mandatory or voluntary certification.

The Consumer Good Forum (2013, 2015) published procurement guidelines for pulp, paper, and palm oil, which identified several certification schemes deemed good enough to verify contributions to deforestation and help achieve ZDC. Fifty companies have received certification, including 14 Pulpwood plantations and 36 palm oil companies (Figure 3). There are many considerations for companies to follow these schemes, one of which is to get a premium selling price for commodities in both national and international markets.

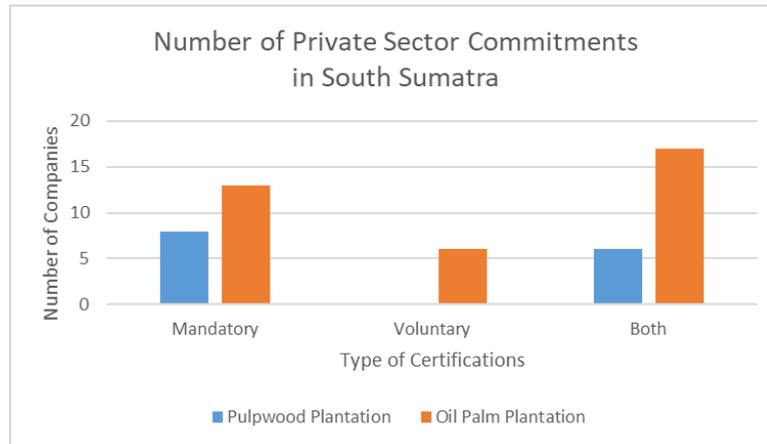


Figure 3 Number of private sector commitments in South Sumatera

Dynamics of Land Use and Cover

A multi-temporal analysis of MOEF land cover data from 1990 to 2019 shows the loss of natural forest cover in South Sumatera (Figure 4). In 1990, natural forest cover in South Sumatera was 2.1 million ha or about 25% of the total area of South Sumatera. In 10 years, South Sumatera lost half of its forest area to 1.1 million hectares in 2000, with a deforestation rate of 96 463 ha/year. The natural forest area continues to decline but at a lower loss rate in the 2011-2019 period of 24 984 ha/year, with a total natural forest area of around 1 million hectares in 2011 and 0.8 million ha in 2019. The most significant loss of natural forest cover occurred in the 1996-2000 period with an annual deforestation rate of around 25%. Approximately 1 million hectares of forest were lost in the 1996-2000 period, 64% were converted to scrub. At the end of the 2019 analysis period, the natural forest area was around 773 000 hectares. This means that South Sumatera has lost 63.8% of its natural forests from 1990-2019.

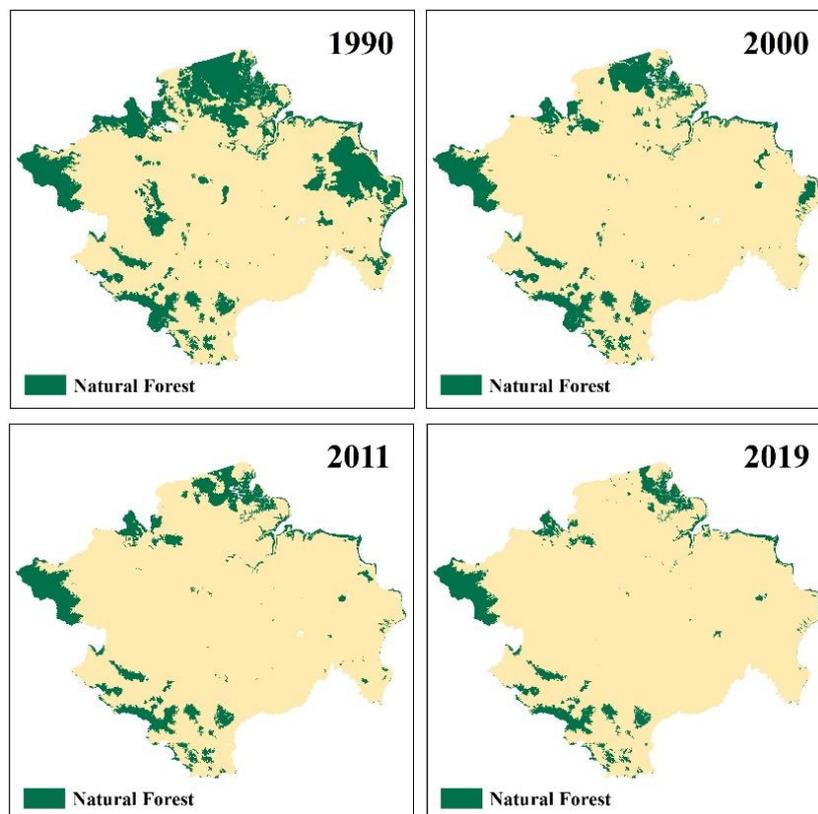


Figure 4 Dynamics of natural forest cover change in 1990-2019

Most of the land cover area in the area that was previously natural forest in 1990 was turned into a shrub, Pulpwood plantation, plantations, and agricultural land (Table 4). Shrubs were dominated the largest area change in 2000 and slowly decreased in the following period but were followed by an increase in the cover of Pulpwood plantations, agricultural land, and plantations. The dynamics indicate that natural forest is converted to bush first before turning into Pulpwood plantation, agricultural land, and plantations. There has been a significant increase in the area of open land in the last three years of analysis, which may have come from harvesting or replanting activities.

Many factors caused the high rate of deforestation in the period 1996-2000 both due to natural factors and human factors. The main cause of the high rate of deforestation that occurred was forest fires in 1997, which were recorded on the NOAA satellite, which was recorded as the largest fire that occurred due to the impact of the El-Nino phenomenon (Bastoni and Halim, 2014). In addition, political turmoil in Indonesia in 1998 affected the rate of deforestation due to increased illegal logging (Nurrochmat and Hasan, 2010). This increase in deforestation rates are also in line with the granting of natural resource management authority to local governments (regional autonomy). In 1999, deforestation increases along with the increase in the issuance of the plantation, mining, and forest use rights policies by the private sector and the community (Indrarto *et al.*, 2012).

Table 4 Distribution of changes in natural forest cover in 1990

Land cover	1996	2000	2003	2006	2009	2011	2012
Natural Forest	2 087 442	1 141 643	1 105 746	1 070 629	1 007 670	969 902	948 404
Shrubs	29 811	631 785	633 512	505 754	493 382	367 320	360 039
Pulpwood plantation	4 026	77 350	77 347	128 482	156 194	318 875	316 618
Oil palm plantation	1 753	35 029	38 595	51 741	113 183	147 095	158 721
Agriculture	12 040	147 484	148 740	174 728	192 139	198 119	201 812
Grassland		45 335	45 335	39 308	40 002	37 525	37 525
Bareland		5 970	34 820	112 779	80 562	58 287	74 004
Other		50 475	50 977	51 650	51 940	37 949	37 949
Land cover	2013	2014	2015	2016	2017	2018	2019
Natural Forest	893 907	889 331	810 163	793 468	779 200	777 560	772 659
Shrubs	364 765	361 947	300 452	306 697	325 197	324 860	278 392
Pulpwood plantation	332 302	333 274	203 712	208 848	206 063	204 356	426 905
Oil palm plantation	166 672	174 941	186 245	196 561	202 079	201 881	196 444
Agriculture	214 424	214 554	218 470	250 976	272 593	275 056	299 679
Grassland	37 525	37 525	20 600	17 501	25 652	25 652	39 211
Bareland	87 527	84 754	364 049	326 873	287 277	288 257	83 877
Other	37 949	38 747	31 381	34 148	37 012	37 451	37 905

From overlapping with forest spatial planning SK 454/MenLHK/Setjen/PLA.2/6/2016 and concession maps, deforestation in 1996-2000, areas where there was a high loss of natural forest cover were located in forest areas. In this period, deforestation occurred in Pulpwood plantation concession permits in forest areas

and forest areas that did not have concession permits, while other lands remained relatively constant. However, in Pulpwood plantation concessions, the loss of natural forest cover is planned deforestation because it is included in the Business Work Plan to manage production forests.

Discussion

The Green Growth Master Plan has mostly met the commitment to zero deforestation criteria. South Sumatera Province is focused on zero deforestation and a broader and integrated scope, namely taking a leading role in achieving Green Economic Growth that relies on land-based sectors such as agriculture, agroforestry, forestry, and all their derivatives (Dewi *et al.*, 2017). This integration raises a bit of concern because deforestation will have implications if the implementation is carried out unequally. Interventions such as in Strategy 1 Interventions 2 and 3 in the Green Growth Master Plan, namely the allocation of access to borrow and use forest areas and the release of forest areas for livelihoods in poor villages, will have a negative impact on deforestation if the achievements and indicators are not implemented and are separated from monitoring. Allocation of access to borrowing and use forest areas through social forestry schemes with the development of superior commodities.

According to Nurfatriani *et al.* (2018), there is no levy imposed on the release of forest areas for oil palm plantation areas in convertible production forest areas, so it is feared that there are no instruments that can control the rate of change of forest areas into oil palm plantations. However, if all can be implemented properly and in a balanced manner, for example, the implementation of the moratorium on oil palm plantations is fully implemented. The use of land that is free from deforestation and following the principles of green growth in South Sumatera can be realized.

Making government interventions in the form of regulations from both national and regional levels and private sector initiatives in the form of certification, which are participated by several companies, can be evidence of the seriousness of their commitment to zero deforestation. From the spatial data analysis, the existing commitments have been quite effective in reducing the rate of deforestation in South Sumatera Province. The more commitments that lead to zero deforestation, the lower the deforestation rate (Figure 5). However, public intervention at the district level cannot be measured whether the policy affects the rate of deforestation because of the limited number of district-level policies that lead to zero deforestation. Interventions with jurisdictions at the provincial level are quite influential in reducing the rate of deforestation. This reduction in deforestation rates was followed by the emergence of public and private sector commitments that were influenced by national and international rules, norms, and markets. The existing commitments have more or less affected the forest loss rate, even though the percentage of forest cover is not as wide as before. Land conversion is a definite cause of deforestation, population growth, and industrial development. So that public intervention and private sector initiatives related to forests are important to adhere to reduce the rate of deforestation.

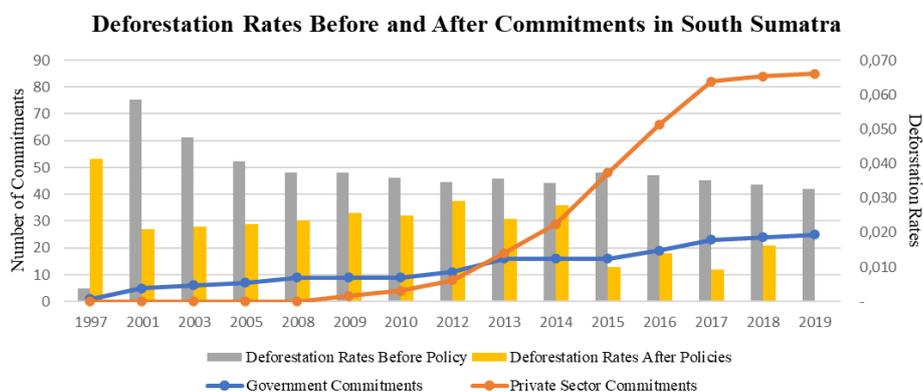


Figure 5 Deforestation rates before and after commitments

If public intervention is implemented, the positive impact of government commitments can have implications for lower deforestation rates. Before the policy year, the deforestation rate was around 4.3%, and after the policy year, it was around 2.6%. Statistically, there is a decrease in the rate of deforestation between before and after the policy implications with a 95% confidence level. The deforestation rate of the private sector having their permits until the year of commitment is 7.3%, and after the commitment year, +1 is 3.7%. There is sufficient evidence that deforestation rates decrease at a 95% confidence level. If the intervention and initiation are combined, there is a reduction in the deforestation rate from 4% to 2% between before and after the commitment with a 95% confidence level.

The declining rate of deforestation is also followed by restoration efforts carried out by both government intervention and private initiatives. There are two ecosystem restoration companies in South Sumatera and two policies related to reforestation efforts. From 1990 to 2019, reforestation was recorded, covering an area of 30 858 ha.

Public and Private Sector Commitments to ZDC

Public and Private Sector Commitment to ZDC was studied descriptively using compliance theory. There are three indicators to evaluate the attitudes of the two sectors, namely output, outcome, and impact, which will then be compared with ZDC standards, principles, and criteria as the basis for this commitment to see the alignment between the two. This indicator is by the Mindset in this study. In terms of output indicators, the government in South Sumatera has issued several policies and established landscape management partnerships related to its commitments according to the Gubernatorial Regulation No. 16 of 2017 and Governor Regulation No. 21 of 2017 as the basis for implementation approaching ZDC, which resulted in the Source-Based Green Growth Master Plan. Renewable Natural Resources 2017-2030. This Master Plan document serves as a technical guide that guides the policy process in each relevant agency. Because territoriality is the basis for the preparation of an integrated Green Economic Growth Master Plan between districts and provinces, local characteristics, needs and aspirations of local stakeholders, and inter-district linkages should form the bigger picture.

In the private sector, the output achieved is that almost most of the private sector has carried out certification that applies the principle of sustainability by minimizing the impact on the environment. However, this does not mean that if a company follows the certification, it can be said that they are not deforesting at all. Instead, when they choose to certify, they are committed not to commit their past sins and intend to atone for past mistakes. Certification schemes such as the RSPO require their members to compensate for forest areas that have been cleared since the entry into force of the RSPO in 2005. If clearing occurs after that year, they will be compensated in accordance with the rules in force in the RSPO. This compensation scheme can be monetary or replacement of land as large as forest areas that have been cleared for reforestation. If it is related to environmental damage, the company is also obliged to carry out remediation as a form of area recovery.

The outcome of the government is that there is some firmness in the government's attitude that is seen in environmental protection, which is regulated in Regional Regulation No. 8/2016, Regional Regulation No. 17/2016, Regional Regulation No. 1/2018, which is the government's firm stance in stopping forest loss management, and new land permits. From the economic side, the positive impact of establishing a landscape management partnership is that South Sumatera has had special management of independent environmental funds. In addition, targeted and integrated development planning by applying the principle of sustainability can continue to be implemented towards the commitments to be achieved.

The outcome of the private sector is a change in the company by making innovative activities that are in harmony with the environment. The company is concerned with the company's profit alone and by following the certification, many fulfillments must be achieved before obtaining the certification, and it is not easy to fulfill the principles and criteria. Certification also has implications in increasing the level of transparency and availability of public information, deregulating local permits, implementing improved management practices,

achieving increased compliance with regulations, and eradicating illegal logging and its trade. In addition, the results of monitoring and evaluation of each activity will also be assessed for the assessment. For example, the TLAS policy is considered quite successful in supporting the improvement of forest governance in the utilization and distribution of timber forest products in Indonesia (Miniarti *et al.*, 2018). This change in the attitude of the public and private sectors is in line with ZDC, which requires transformative policies on environmental protection both at the government level and at the company level.

Furthermore, if we look at the impact, what is most prominent is that the achievements of the public and private sectors in 2018 in reducing primary forest loss were lower than the average annual forest loss rate in the previous period. This decline results from the performance of various environmental protection interventions and initiatives from the public and private sectors. With the performance on the commitments, the compliance shown by the two sectors in this commitment is classified as treaty-induced compliance, judging from how this agreement is integrated into national policies, the attitude of the two sectors that show alignment with the objectives in the ZDC, as well as changes in environmental quality that are good of reduced deforestation rates. The positive trend shown in the respective commitments at the provincial and regional levels shows the optimism of the two sectors towards ZDC. Finally, in view of the sustainability of the process, ZDC will continue to be implemented until the goal is achieved, namely efforts to end the loss of natural forests by 2030. Another factor that can determine its sustainability is how the government's attitude will lead in the future, where there are structural changes that can occur with the change of power that will have an impact on the implementation of ZDC. This process must be ensured to follow the previous process regardless of the change of power. Currently, the trend shown in the implementation of this commitment is positive, especially after the formation of partnerships for landscape management.

CONCLUSION

This study uses content analysis to see what policy interventions and private sector initiatives have been carried out with the results that there are 24 policies (2 at the national level, 10 at the provincial level and 12 at the district level) and there are 50 companies that have received certification, including 14 Pulpwood plantation companies and 36 palm oil companies. In addition, a spatial analysis was carried out to see the dynamics of forest cover that occurred before and after the commitment. From this analysis, it is then calculated statistically which states that there is a decrease in the rate of deforestation between before and after public intervention and private initiation, from 4% to 2%.

Compliance theory is also used to look at the public and private sector commitments in South Sumatera in complying with the Zero Deforestation Commitment (ZDC). This study found that the public and private sectors in South Sumatera have shown an attitude of adherence to this commitment with the type of treaty-induced compliance. It shows how this commitment is integrated into policies, the attitudes of the public and private sectors in South Sumatera, which show alignment with the goals in their commitments, as well as changes in the quality of the environment that are good from the reduced rate of deforestation. This shows that one of the goals of ZDC, which is to at least halve the rate of natural forest loss globally by 2020 and work to end natural forest loss by 2030 has been implemented by both sectors.

ACKNOWLEDGMENT

The authors would like to thank the Center for Information of Forestry Research for their assistance and the opportunity for the authors to carry out this research.

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