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THE 2ND INTERNATIONAL CONFERENCE AND CALL FOR PAPER



Our Speaker



Prof. Henning Glasser
 Thammasat University



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 Nagoya University



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Assoc. Prof. Dr. Hj. Sri Kusriyah
 Sultan Agung Islamic University

*Democracy In Digital Era : Law,
 Governance, Sosial And Economic
 Perspective In Asia, Australia And
 Dutch*



September 23-24, 2020
 Imam Assafel Buiding, Faculty of Law, Unissula
 Kaligawe Rd KM 4 Semarang, Central Java

THE 2ND INTERNATIONAL CONFERENCE AND CALL FOR PAPER

THEME : DEMOCRACY IN DIGITAL ERA: LAW, GOVERNANCE, SOCIAL AND ECONOMIC PERSPECTIVE IN ASIA, AUSTRALIA AND DUTCH

Keywords: *Digital Media, Political and Governance Institutions, Electoral Processes, People Representation, Digital Disinformation, Democracy, Digital Economic, Social issue*



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Melissa Crouch
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Assoc. Prof. Dr. Hj. Sri Kusriyah
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This agenda aims to provide insights in theory and practice:

1. To exchange and discuss views on the most important issues on Democracy in Digital Era: Law, Governance, Social and Economic Perspective in Asia, Australia and Dutch and its consequences to Law in countries.
2. To discuss the challenges and practical aspect of Democracy and Governance in a Digital Era.

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KATA PENGANTAR

Bismillahirrohmanirrohim

Assalamu'alaikum Wr. Wb.

Puji syukur kehadiran Allah S.W.T, Tuhan Semesta Alam Yang Maha Esa. Alhamdulillah, sebagai ucapan syukur kehadiran Allah Subhanahu Wata'ala kami dapat menyelenggarakan The 6nd Proceeding International Conference And Call Paper dengan tema "*Democracy In Digital Era : Law, Governance, Sosial And Economic Perspective In Asia, Australia And Dutch*" terselenggara dengan baik. Pemilihan tema tersebut dipilih karena pada era searang ini kita dihadapkan dengan era industri 4.0, dimana para kandidat doktor dituntut untuk bisa menyesuaikan dengan perkembangan global dan meningkatkan kompetensi keilmuan serta kemampuan.

Pada seminar ini telah dipresentasikan hasil penelitian dosen dan mahasiswa yang diikuti oleh peneliti-peneliti dari berbagai universitas yang telah membahas berbagai keilmuan Hukum dan Humaniora.

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Law Enforcement And The Potential Of Technology 4.0 In Handling Wildfire

Andi Adnan Syafruddin ,Prihartono, Mochammad Sutrisno

Abstract

This study aims to identify forest and land fires in Indonesia, as well as the potential of technology 4.0 in handling wildfire and efforts to enforce the law. This study applies normative juridical method to examine statutory regulations as a part of coherence system related to certain legal events. The type of data used in this research was secondary data; which consist of primary, secondary, and tertiary legal materials. The result of this study approves the potential of technology 4.0 in reducing wildfire risk in Indonesia, especially those related to early warning system, early detection, and early response. Yet, it is not easy to enforce the law on environmental management due to difficulty in determining and verifying standard criteria for environmental damage. Efforts to enforce environmental law are reflected on the laws currently in effect which more or less play role in shaping social engineer behavior. Firefighting performance is still considered low regardless multitude institutions engaged. It actually needs clarity of roles and functions, as well as cooperation among the institutions. Community-based wildfire control agencies have played significant role in reducing the spread of forest and land fires.

Keywords: Forest and Land Fire; Law enforcement; potential handling; technology 4.0

A. INTRODUCTION

Environmental problem is no longer domestic issues, yet it has become global concern. This is because of the environmental context, in which the source (causes) and consequences cannot be localized under certain demarcation. Along with the development of modern life in the midst of globalization and modernization, forestry industrialization has had a major impact on the sustainability of forest as a support for life and the life of living things within. Forest is vital, not only as timber resource, but also as a component of the environment. Being blessed with a wide array of terrestrial and marine ecosystems, Indonesia ranks the third of the seven Megadiversity Counties.¹

Forest is an invaluable natural resource. It contains biological diversity as a source of germplasm, timber and non-timber products. Besides, it plays an important role in regulating soil fertility and freshwater flows, preventing flood and erosion, as well as protecting biological nature for the benefit of science, culture, recreation, tourism and so on. Therefore, forest utilization and protection have been regulated in the 1945 Constitution, Law No. 5 of 1990, Law No. 23 of 1997, Law No. 41 of 1999, Government Regulation No. 28 of 1985 and several decrees of the Minister of Forestry, the Director General of Forest Protection and Nature Conservation, as well as the Director General of Forest Exploitation. However, disruption to forest resources continues and even increases in intensity. Wildfire is a form of disturbance that is increasingly occurring. It has caused enormous negative impact, including ecological damage, decreased biodiversity, decreased

1. Bambang Tri Bawono and Anis Mashdurohatun. *Penegakan Hukum Pidana di Bidang Illegal Logging Bagi Kelestarian Lingkungan Hidup dan Upaya Penanggulangannya*. Jurnal Hukum vol. XXVI, no. 2, August 2011, pp.590-611.

economic value of forests and land productivity, micro and global climate change, and the smoke which disturbs public health and disrupts all modes of transportation. Smoke disruption because of Indonesia's forest fires has crossed national borders.²

The most prominent impact of forest and land fires is smog which severely disturbs public health as well as water, air and land transportation system. Wildfire affects different sectors including transportation, health, economic, ecological, social sector, and bilateral relation. However, it is assumed that the impact of wildfire on agricultural sector is low because land burning is usually carried out for land preparation/clearing, not during the planting period, unless the fire spreads uncontrollably on producing land. Forest and land fires occur every year with varying coverage and number of hot spots.

Widespread wildfire had actually been anticipated, but the precautions were still weak. Previous studies mentioned that the causes of forest and land fires are directly related to human behavior who wants to accelerate preparation for plantation. Regardless the impact on nature and others, land owners carelessly burn the land for planting preparation by spending the lowest cost possible to increase soil acidity (pH) (from about 3-4 to 5-6) for crops (oil palm and acacia, for example) to grow well. It is also reported that traditional farmers which implements rotational farming system cannot be blamed because they have caused only 20 percent of the total burned area.³

Forest fire is a potential threat to sustainable development. In Indonesia the number of occurrence and the burned area has increased over the years. In 2012 (January-September) there were 20,850 hotspots of forest fires in Indonesia. This figure has increased by 26.7%, i.e. from 16,450 hotspots in 2011. A total of 92% wildfires occurred in Kalimantan, Sumatra, and Sulawesi; while the other 8% occurred in Java and Bali.⁴

The Fourth Industrial Revolution is characterized by the blending of technologies in daily life. With the ease of technology, activities can be perceived as more detailed, more complex and actual, including those which affect the environment and natural resources. However in terms of wildfire mitigation, anthropogenic activities still inevitably affect hydro meteorological disasters, which should have been avoided through early detection and early warning systems. Therefore, this study aims to describe the ease of communication technology and revolution currently applied to prevent slash-and-burn activities causing wildfire. This study also observes efforts of the Indonesian government to mitigate forest and land fires in this Fourth Industrial Revolution era.⁵

The phenomenon of forest fires has long term impact on the environment, including landslide and flood. Yet adaptive capacity and law enforcement are expected to promote harmony with nature. In terms of economic development, it takes effort to change traditional primary sector-based economic system (to collect and to gather) towards the secondary (manufacturing industry) and tertiary sectors (modern services).⁶ The 4.0 Industrial Revolution, on the other hand, has influenced manufacturing sector through various advanced technologies, such as artificial intelligence, e-commerce, big data, and robots. Then the question is whether local governments have prepared tactical strategies to adapt in this industrial era.

2. Irwandi, et al. *Upaya Penanggulangan Kebakaran Hutan dan Lahan di Desa Purwajaya Kecamatan Loa Janan Kabupaten Kutai Kertanegara Kalimantan Timur*. Jurnal AGRIFOR vol. XV, no. 2, October 2016, pp.201-210.

3. Pasaribu, Sahat M. and Supena Friyatno. *Memahami Penyebab Kebakaran Hutan dan Lahan Serta Upaya Penanggulangannya: Kasus di Provinsi Kalimantan Barat*. SOCA: Jurnal Sosial Ekonomi Pertanian, vol. 8, no. 1, February 2008, pp.1-23

4. Supriyanto, et al. *Analisis Kebijakan Pencegahan dan Pengendalian Kebakaran Hutan dan Lahan di Provinsi Jambi*. Jurnal Pembangunan Berkelanjutan, vol. 1, no.1, 2018, pp.94-104.

5. Sri Endah Wahyuningsih, *Protection against Witnesses in Criminal Justice Proceedings in Indonesia Based on the Humanitarian Value*, International Journal of Innovation, Creativity and Change. www.ijicc.net Volume 13, Issue 7, 2020, https://www.ijicc.net/images/vol_13/Iss_7/13701_Wahyuningsih_2020_E_R.pdf, p.1786.

6. Fischer, A. Paige and Lorien Jasny. *Capacity to Adapt to Environmental Change: Evidence from a Network of Organizations concerned with Increasing Wildfire Risk*. Ecology and Society 22(1), 2017, pp.23.

The purposes of compiling this study are to analyze law enforcement and the potential of technology 4.0 in handling wildfire.

B. RESEARCH METHOD

This study applies normative juridical approach ⁷to explain the provisions in the prevailing laws and regulations, connecting the findings and real happenings, and comparing the ideal values to actual application.⁸ This is a descriptive analysis, because the researcher tries to describe or explain the subject and object of the study. The researcher then analyzes and finally draws conclusion based on results of the study.⁹ It is said to be descriptive because by conducting this study, the researcher is expected to obtain a clear, detailed, and systematic picture. This is also an analysis because the data obtained from library research and the data case are to be analyzed to solve problems in accordance with applicable legal provision.¹⁰

C. RESEARCH RESULTS AND DISCUSSION

1. The Potential of Technology 4.0 in Handling Forest and Land Fires

Land and forest fires that repeatedly occur every year in Sumatra and Java are often caused by human factor, rather than natural incident. There is a higher chance of deliberate burning for agricultural purpose (land clearing). Although in some cases fires also occur due to accidental factors, such as throwing cigarette butts carelessly on dry, flammable land; still the main factor is human activity.¹¹

The use of technology for handling forest and land fires has widely implemented. The Ministry of Environment and Forestry (KLHK) has worked together with Agency for Meteorological, Climatological and Geophysics (Badan Meteorologi, Klimatologi, dan Geofisika/ BMKG) and National Institute of Aeronautics and Space (Lembaga Penerbangan dan Antariksa Nasional/ LAPAN) to build an early warning and detection system namely SIPONGI <https://play.google.com/store/apps/details?id=id.go.menlhk.sipongi>. This application integrates information on hotspot monitoring from LAPAN and weather prediction information from BMKG. In addition, the Peatland Water Monitoring System (Sistem Pemantauan Air Lahan Gambut/ SIPALAGA) has been developed by the Peat Restoration Agency (Badan Restorasi Gambut/ BRG). The Ministry of Environment and Forestry also monitors conditions in the field using thermal CCTV technology that is spread over fire-prone areas in six provinces. The National Disaster Management Agency (Badan Nasional Penanggulangan Bencana/ BNPB) also operates a system called InaRISK to provide information on natural disaster risk indexes in Indonesia which covers forest and land fires.¹²

On the other hand, academics and researchers at universities such as IPB have also developed systems or technologies related to wildfire monitoring and handling. For example, Dr. Imas Sukaesih Sitanggang and his team conducted a study on sequential pattern mining based on hotspot data as an indicator of forest and peatland fires in Kalimantan. Hotspot at a location for at least 3 days in a row can be a strong indicator of forest and land fires, particularly on peat lands. This study succeeded in obtaining a sequence pattern of hotspots in Kalimantan peat lands by applying the Sequential Pattern Discovery using Equivalence

7. Anis Mashdurohatun, Juramadi Efram, & Teguh Prasetyo, The Legal Protection for Indonesian Migrant Workers Based on National Philosophy Values, TEST, March-April 2020, pp.2754.

8. Soemitro, Ronny Hanitijo. *Metodologi Penelitian Hukum dan Jurimetri*. Ghalia Indonesia, Jakarta, 1990, pp. 33.

9. Salim, Agus. *Teori dan Paradigma Penelitian*. Tiara Wacana, Yogya, 2001, pp. 110-111.

10. Anis Mashdurohatun, Kurnia Halomoan, & Gunarto, The Urgency Of The Public Policy Of The Construction Service Cooperatives In Realizing The Welfare Of The Community Based On Justice Value, Hamdard Islamicus, Vol. 43 No. 1 (2020), pp.356.

11. Harsoyo, Budi. *Pemanfaatan Teknologi Modifikasi Cuaca untuk Penanggulangan Bencana Asap Kebakaran Lahan dan Hutan*. Jurnal Penanggulangan Bencana, vol. 4, no. 2, 2013, pp. 1-4.

12. Syaufina, Lailan and Rizaldi Boer Imas Sukaesih Sitanggang. "The 6th Strategic Talk: Permasalahan Kebakaran Hutan dan Lahan di Indonesia dan Potensi Penanganannya Menggunakan Teknologi 4.0." <http://dpis.ipb.ac.id/permasalahan-karhutla-dan-potensi-penanganannya/>

(SPADE) algorithm. The hotspot sequence is then combined with weather data to obtain an association pattern between the appearance of the hotspot sequence and the weather data using the association rule mining approach. Another technological result of the research namely Haze Trajectory Pattern Mining can also be used to predict smog movement.¹³

Presidential Instruction No. 11/ 2015 regulates activities on wildfire mitigation which include in prevention, enforcement as well as handling. Based on the instruction, KLHK formed an integrated patrol team to prevent and control forest and land fires. The team consisted of Manggala Agni, the police, TNI (Indonesian army), and the community namely Masyarakat Peduli Api.

Forest and land fires (wildfires) that occur almost every year in Indonesia have major impact on its economy and environment. Existing regulations and laws on forest and land fires failed to prevent wildfire from recurring.¹⁴ Technology 4.0 emerges as an alternative in controlling forest and land fires, i.e. early warning system, early detection, and early suppression. However, the newly applied technologies have a short time span. Some are close to or already in critical phase. Moreover, due to relatively short reparation period, there is still high chance of forest and land fires, especially during extreme droughts. Therefore, the government need to consider applying technology that incorporate long-term predictive aspects, especially seasonal framework.

One of prominent technology which consider climate prediction on a seasonal scale is the Fire Risk System (FRS). FRS covers weather monitoring, El Nino Southern Oscillation (ENSO) monitoring and prediction, monthly and seasonal rainfall prediction, hotspot prediction as well as fire risk prediction. Wildfire risk is obtained by combining fire vulnerability (level of ease) of an area and dry climate exposure. Vulnerability map is obtained through hotspot and biophysical data, while climate prediction data obtained from modeling-based seasonal rainfall predictions by considering data from several global climate model outputs (multi-model ensemble, MME).

Unfortunately in Indonesia, countermeasures are taken only after smoke arises. This is considered late because prediction can be made based on rainfall data months before. There is a higher chance that dry condition initiates forest fire. Thus, FRS provides early warning up to 1-6 months for better preparedness down to district/ village level. FRS is necessary to provide early information on possible of wildfire, by presenting analysis on potential forest and land fire events. FRS also offers control aspect, by disseminating near-real-time data and information on fire control to stakeholders. Regarding law enforcement aspects, FRS provides fact-based data and information upon legal action. In addition, the combination of FRS with the SIDIK system (Sistem Informasi Data Indeks Kerentanan/ Vulnerability Index Data Information System) owned by the Ministry of Environment and Forestry can be used to assist in the formulation of climate and fire resilient policy planning and development.

Following the advances in Information Technology (IT), the government shall apply transparency of information related to environmental interests. Not to mention the progress of industrial revolution, it is time for local governments to utilize IT for mitigation.¹⁵ Utilization of technology 4.0 needs to be optimized through integration of the existing system, so that it can cover wider aspects of forest and land fire control; starting from prevention, suppression, human resource development and post fire action. Wildfire mitigation shall also comprehensive considering all aspects. It includes the impact on wild and endangered fauna, as

13. *Ibid.*

14. Putra, Irfan Kemal et al. *Tantangan Kelembagaan Pengendalian Kebakaran Hutan dan Lahan pada Tingkat Tapak*. Jurnal Ilmu Pertanian Indonesia (JIPI), vol. 24 (2), April 2019, pp.151-159.

15. Putra, Romeyn Perdana et al. *Problematika Kebakaran Hutan dan Lahan dari Perspektif Ekonomi, REVOLUSI INDUSTRI 4.0 DAN PEMBANGUNAN EKONOMI BERKELANJUTAN*. Prosiding Seminar Nasional Bagian II Pusat Penelitian Badan Keahlian DPR RI, pp.233-258.

well as forest biodiversity which so far have received very little attention.

The use of technology for monitoring and data collection on various aspects is also important. In addition, one of the key factors in forestry mitigation is human resource, to educate public on wildfire awareness. Besides, a socio-economic approach that prioritizes forest sustainability is also needed to educate business actors in agricultural and plantation sectors. To realize an effective control system,¹⁶ a grand design for forest and land fire control is required in the regions. An important element in the grand design is strong institutional structure from the province down to site level. Community involvement is also essential because of their proximity to the hotspot. The formation of a new control team or revitalization of the already formed regional team shall be taken to strengthen the institutional structure. Another important factor is the division of tasks of the parties involved in forest and land fire control system.¹⁷

2. Law Enforcement in Forest and Land Fire Management

Law No. 4 of 1982 on Basic Provisions for Environmental Management (hereinafter referred to as UUPPLH) is the first step in environmental law enforcement. UUPPLH contains the principles of environmental management which provide direction for environmental legal system. After 15 years, this law was finally revoked because it was deemed inappropriate for sustainable development. It is replaced by Law No. 23 of 1997 on Environmental Management and then replaced again by Law No. 32 of 2009. Then, to ensure legal certainty and protect rights of all to have a good and healthy environment, the imposition of severe criminal sanctions is regulated in Law No. 32 of 2009.¹⁸

The old UUPPLH placed criminal law enforcement only as an *ultimum remedium*; therefore the enforcement of criminal sanctions was not dominant. The principle of *ultimum remedium* in the explanation of the old UUPPLH turned out to be unclear. The general explanation is actually an attempt to clarify the meaning of preamble. Preamble itself contains philosophical values of a law. Thus, the general explanation is legislators' attempt to reinforce the philosophical values contained in a preamble. Moreover, philosophical values of a concretized law as mentioned in the preamble are further explained in the articles of law.¹⁹

The old law abolished subsidiarity principle. In UUPPLH, the principle of substitution is replaced by *ultimum remedium*, which is limited to certain formal offenses, such as violations of wastewater quality standards, emission, and disturbance. The rest of criminal formal offenses functioned as *preimum remedium*. Basically, it is important to define punishment in a statutory regulation. Law No. 32 of 2009 on Environmental Management (UUPPLH) has included criminal provisions in Chapter XV, which consists of 23 articles, starting from Article 97 to Article 120. The provisions are much more complete and detailed compared to the old Law No. 23 of 1997 on Environmental Management.²⁰ Since the issuance, UUPPLH 2009 has provided legal protection. UUPPLH 2009 brings fundamental changes in Indonesian environmental management.

Regulations on forest and land fire management in Indonesia are:

1. Law No. 23 of 1997 on Environmental Management. It regulates the obligation of each person to preserve the environment, as well as to prevent and to overcome environmental pollution

16. Sri Endah Wahyuningsih, Jawade Hafidz, *The Development Of The Indonesian Criminal Code Derived From The Yudicial Pardon Value In Islamic Law*, ADDIN, Vo 1 ume 11, Number 2, August 2017.

17. Budiningsih, Kushartati. *Implementasi Kebijakan Pengendalian Kebakaran Hutan Dan Lahan di Provinsi Sumatera Selatan*. Jurnal Analisis Kebijakan Kehutanan, vol. 14, no.2, November 2017, pp.165-186.

18. Araya, Yulanto. *Penegakan Hukum Lingkungan Hidup di Tengah Pesatnya Pembangunan Nasional*. Jurnal Legislasi Indonesia, vol. 10, no. 1, 2013, pp. 50.

19. Kim, Soo Woong. *Kebijakan Hukum Pidana dalam Penegakan Hukum Lingkungan Hidup*. Jurnal Dinamika Hukum, vol. 13, no. 3, September 2013.

20. Satmaidi, Edra. *Politik Hukum Pengelolaan Lingkungan Hidup di Indonesia Setelah Perubahan Undang-Undang Dasar 1945*. Jurnal Konstitusi, vol. 4, no. 1, 2011, pp.69-81.

and destruction. The law imposes 10 year maximum sentence and a maximum fine of 500 million rupiahs. Besides, disciplinary actions may be imposed in the form of confiscation of profits, company closure, and repair of damage.

2. Law No. 41 of 1999 on Forestry Article 50 paragraph 3 mentions that forest burning is subject to a maximum sentence of 15 years and/ or a maximum fine of 15 billion rupiahs. Article 78 paragraph 4 declares a maximum sentence of 5 years and/ or a maximum fine of 1.5 billion rupiahs.
3. Government Regulation No. 4 of 2001 on Environmental Damage and Pollution Control. This regulation prohibits forest and land burning. Yet, it only imposes administrative sanctions.
4. Article 10 paragraph (2) letter b of Government Regulation No. 45 of 2004 on Forest Protection stipulates that forest protection activities include in prevention, suppression and handling of fire impacts. However, in articles 42 and 43 mention that regarding forest fires, criminal penalties are only applied to parties illegally cultivate the land without legal certificate and permit.
5. Law No. 18 of 2004 on Plantation regulates the obligation to preserve environmental function. It imposes three year maximum sentence and maximum fine of 3 billion rupiah.
6. Law No. 19 of 2004 on Forestry. Law No. 19 of 2004 on Forestry. The law firmly prohibits forest burning. Land burning is permitted only for special purposes or unavoidable causes, including controlling forest fires, eradicating pest and disease, or fostering plant and animal habitat. Sanctions in the form of 15 year maximum sentence and maximum fine of 5 billion rupiah. Negligence is subject to 5 years imprisonment and fine of 1.5 billion rupiah or cumulative sanctions.
7. Law No. 32 of 2009 on Environmental Management. Article 69 clearly regulates acts against the law which causes pollution and/ or damage to the environment. In addition, this law also regulates criminal provision for land burner.

Types of environmental crime are explained in Chapter XV, which consists of 23 articles, starting from Article 97 to Article 120 UUPPLH. Article 97 states that offenses referred to in Chapter XV equal to crime. Thus, crimes against the environment are regulated in the chapter. Apart from the UUPPLH, crimes against the environment are also regulated in Criminal Code (KUHP). It includes Article 187, Article 188, Article 202, Article 203, Article 502, and Article 503 of the Criminal Code. Crimes against the environment are also mentioned in laws and regulations aside from the Criminal Code and UUPPLH. For example: Article 52 paragraph (1) of Law No.5/ 1960 on Basic Agrarian Principles (UUPA); Article 31 of Law No.11/ 1967 on Mining; Article 11 of Law No.1/ 1973 on Indonesian Continental Foundation; Article 15 of Law No.11/ 1974 on Irrigation; Article 16 paragraph (1) of Law No.5/ 1983 on Indonesia's Exclusive Economic Zone (EEZ); Article 27 of Law No.5/ 1984 on Industry; Article 24 of Law No.9/ 1985 on Fisheries; Article 40 of Law No.5/ 1990 on Conservation of Living Natural Resources and Ecosystem; Article 78 of Law No.41/ 1999 on Forestry; and Article 94 paragraph (1) and (2) jo. Article 95 paragraph (1) and (2) of Law No.7/ 2004 on Water Resources.

It is not easy to enforce the law on environmental management due to difficulty in determining and verifying standard criteria for environmental damage.²¹ Effort to enforce environmental law through criminal law is reflected by how the three main problems are postulated in laws to promote social engineering,²²

21. Sutrisno. *Politik Hukum Perlindungan dan Pengelolaan Lingkungan Hidup*. Jurnal Hukum, vol. 18, no. 3, July 2011, FH UII, pp. 444-464.

22. Jaya, Nyoman Serikat Putra. *Kapita Selekta Hukum Pidana*. Badan Penerbit UNDIP, Semarang, 2005, pp. 253.

which includes legal drafting, defining criminal responsibility and sanctions, both criminal and orderly. Environmental law is established not only to maintain social order, but also social engineering.

Provisions on forest fire/ burning as regulated in forestry law are inadequate to prevent wildfire, because the prohibition on burning forests as contained in the law can actually be countered for special purposes as long as it obtains permission from the authorized official. Meanwhile the provisions of Government Regulation No. 4 of 2001 are limiting the interpretation of Article 10 Government Regulation No. 45 of 2004 on law enforcement. It means, the sanctions are only effective to perpetrators who consciously burn lands any permit or legal document.²³

D. CONCLUSION

To analyze forest and land fires in Indonesia and to consider using technology 4.0 as a potential solution are among the alternatives in controlling this natural disaster, particularly through the early warning system, early detection and early response. It is not easy to enforce the law on environmental management due to difficulty in determining and verifying standard criteria for environmental damage. Efforts to enforce environmental law are reflected on the laws currently in effect which more or less play role in shaping social engineer behavior. Firefighting performance is still considered low regardless multitude institutions engaged. It actually needs clarity of roles and functions, as well as cooperation among the institutions. Community-based wildfire control agencies have played significant role in reducing the spread of forest and land fires.

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²³. Parsaulian, Baginda. *Analisis Kebijakan Dalam Upaya Penegakan Hukum Lingkungan Hidup Di Indonesia*. Jurnal Reformasi Administrasi, vol. 7, no. 1, March 2020, pp.56-62.

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