



Criminal Law Protection of Local Genetic Resources and Seeds in Support of National Food Sovereignty

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Abstract: Indonesia is a megabiodiverse country that has an extraordinary wealth of genetic resources and local seeds. However, threats such as biopiracy, land conversion, concentration of seed control by multinational corporations, and weak law enforcement are serious challenges to national food sovereignty. This study comprehensively examines how criminal law instruments in Indonesia can be at the forefront of protecting genetic resources and local seeds. This study uses doctrinal legal research with socio-legal context and comparative approaches. This method was chosen because the research is essentially a study of legal principles, legal systematics, and comparative law in relation to the protection of genetic resources between Indonesia, Malaysia and India. This study analyzes Law Number 13 of 2010 concerning Horticulture, Law Number 12 of 1992 concerning Plant Cultivation Systems, Law Number 29 of 2000 concerning the Protection of Plant Varieties, Law Number 11 of 2013 concerning the Ratification of the Nagoya Protocol, as well as provisions in the Criminal Code and other related regulations. The results of the study show that there are four fundamental weaknesses: (1) the disharmony of norms between laws and regulations; (2) the lack of clarity in the operational definition of local seeds and genetic resources in the criminal context; (3) disproportionate criminal sanctions that do not provide a deterrent effect; and (4) the absence of a recovery mechanism (restitutive) for the farming community that is the victim. This study recommends establishing a comprehensive Genetic Resources Protection Law with a corresponding criminal charge, the development of environmental criminal law doctrines that are responsive to food sovereignty issues, and the strengthening of law enforcement institutions specializing in agrarian crimes and genetic resources.

Keywords: Criminal Law; Local Seeds; Food Sovereignty; Biopiracy.

Introduction

Indonesia occupies a strategic position in the world's biodiversity landscape because it has thousands of local varieties spread across the country from Sabang to Merauke.¹ This condition makes Indonesia's genetic resources not only an ecological asset but also a foundation for food security, traditional health, and national economic sovereignty.²

The most common empirical threat is biopiracy, which is the practice of taking, utilizing, and claiming genetic resources and traditional knowledge without consent and fair benefit-sharing.³ In the context of international law, biopiracy poses serious problems because it intersects with the rights of indigenous peoples, state rights to biological resources, and the principle of legitimate access and benefit-sharing.

¹ C Kusmana and A Hikmat, "Keanekaragaman Hayati Flora Di Indonesia", *Jurnal Pengelolaan Sumberdaya Alam Dan Lingkungan* 5, no. 2 (2015): 187–198, <https://doi.org/10.19081/jpsl.5.2.187>

² Kementerian Lingkungan Hidup, *Status Kekinian Keanekaragaman Hayati Indonesia 2024* (Jakarta: Kementerian Lingkungan Hidup, 2024).

³ N G A Tanjung and D Apriani, "Konsep Access and Benefit Sharing Sebagai Pencegahan Biopiracy Di Indonesia," *Belli Ac Pacis: Jurnal Hukum Internasional* 3, no. 2 (2017): 14–26, <https://doi.org/10.20961/belli.v3i2.27480>

Various cases illustrate this urgency, including the export of germplasm for tempeh by foreign researchers, the genetic exploitation of Kalimantan medicinal plants, and patent claims on local Indonesian rice varieties by multinational corporations, as discussed by Prasada.⁴ At the global level, the concentration of seed control is also showing stronger structural pressures. FAO 2023 data show that the 4 largest companies control more than 60% of the world seed market.⁵ These statistics confirm that seeds have become a strategic commodity concentrated in large corporate actors, so that the space for smallholder farmers is increasingly limited. This is in line with the study of the relationship between intellectual property rights in agriculture and global food security.⁶

For Indonesian farmers, the impact is very real. Reliance on commercial hybrid seeds has caused many farmers to lose access to local seeds that have been the backbone of subsistence farming across generations. The misalignment between the concept of individual breeders' rights and the communal legal culture of Indonesian society often leads to the criminalization of farmers who use seeds of new varieties.⁷

When local seeds are eliminated, farmers not only lose production independence but also lose hereditary knowledge about seed breeding, selection, and storage, while the effectiveness of institutions such as the Center for Plant Variety Protection and Agricultural Licensing in providing legal protection for crop varieties is also still in the spotlight.⁸

This problem is ultimately closely related to efforts to realize legal protection for farmers within the framework of a welfare state⁹. From a criminal law perspective, this issue has three main dimensions: first, the need to criminalize acts that threaten the availability and accessibility of seeds; second, harmonization between national criminal law and international regimes such as the CBD, ITPGRFA, and Nagoya Protocol; Third, there are still issues of proof, jurisdiction, and adequacy of sanctions in the prosecution of genetic resource crimes.

It is at this point that this research needs to be formulated in a more targeted manner in order to be able to answer the need for criminal law reform that comprehensively protects Indonesia's genetic resources and local seeds. This research aims to: first, analyze the normative framework of Indonesian criminal law in the protection of local genetic resources and seeds; second, identifying existing legal weaknesses and gaps; third, to examine the comparison of regulations in other countries; and fourth, formulate recommendations for comprehensive legal reform.

Based on the above background, this study formulates two main research questions. First, what is the existence and problems of criminal law in the protection of genetic resources and local seeds in Indonesia? Second, what is the ideal model for criminal law reform for the protection of genetic resources and local seeds for Indonesia?

Studies on the protection of genetic resources have evolved from conservation issues to issues of governance, access, and benefit-sharing. However, most research is still in the realm of civil law, administration, or sectoral policy, so there are not many that have specifically built a structured and operational model of criminal law reform. Susanti¹⁰ analyzes the legal protection of Indonesia's genetic

⁴ Erisa Ardika Prasada, "Perlindungan Hukum Terhadap Pengetahuan Tradisional Di Indonesia," *Jurnal Kepastian Hukum Dan Keadilan* 4, no. 1 (2022): 45–54, <https://doi.org/10.32502/khdk.v4i1.4488>

⁵ Jennifer Clapp, "The Problem with Growing Corporate Concentration and Power in the Global Food System," *Nature Food* 2, no. 6 (2021): 404–408, <https://doi.org/10.1038/S43016-021-00297-7>

⁶ S Sugeng, W R Aidy, and A C Jr, "Intellectual Property Rights in Agriculture: Plant Variety Protection and Food Security," *Audito Comparative Law Journal* 5, no. 2 (2024): 66–91, <https://doi.org/10.22219/acjl.v5i2.33097>

⁷ S Bustani, "Budaya Hukum Penerapan Perlindungan Varietas Tanaman Dalam Mewujudkan Kedaulatan Pangan Indonesia Di Era Global," *Jurnal Hukum Pidana Dan Pembangunan Hukum* 4, no. 2 (2022): 1–11, <https://doi.org/10.25105/hpph.v4i2.14765>

⁸ IS Effendi, N Nurwati, and R Y A Ilyanawati, "The Effectiveness of the Center for Plant Variety Protection and Agricultural Licensing in Providing Legal Protection of Plant Varieties," *Transnational Business Law Journal* 4, no. 2 (2023): 154, <https://doi.org/10.23920/transbuslj.v4i2.1500>

⁹ Suciati, "Perlindungan Hukum Terhadap Petani Dalam Menggapai Negara Kesejahteraan (Welfare State)," *Jurnal Moral Kemasyarakatan* 1, no. 2 (2016): 149–61, <https://doi.org/10.21067/jmk.v1i2.1532>

¹⁰ S Susanti, H S Tisnanta, and R W Putri, "Legal Protection of Indonesian Genetic Resources in Communal Intellectual Property Regime," *Negrei: Academic Journal of Law and Governance* 4, no. 1 (2024), <https://doi.org/10.29240/negrei.v4i1.11659>

resources in the communal intellectual property regime with a normative approach, but has not formulated specific criminal offenses for the violation of communal rights. Fachrurazi¹¹ reviewed the implementation of the access and benefit-sharing mechanism (ABS) based on the Nagoya Protocol in a descriptive-analytical manner, but the discussion still focused on the effectiveness of contract negotiations and had not touched on the criminalization aspect of the misuse of access to biological resources. Nurani and Bagja¹² examined the legal reform of crop variety protection through a sui generis model to protect farmers' rights, but the research focused more on the design of collective intellectual property rights than on the development of criminal legislation instruments to prevent seed monopolies.

Meanwhile, Ferdinan¹³ evaluated the harmonization of national regulations against the threat of *biopiracy* after CBD ratification, but has not yet produced the formulation of operational special criminal norms to ensnare corporate actors. On the other hand, Nurfitri et al.¹⁴ explores the use of inclusive moral rights as a normative basis for the protection of genetic resources for indigenous peoples in a critical-philosophical way, but this concept has not yet been formulated into a model model of practical national legislation and strict criminal law enforcement.

These studies are important, but they still have three fundamental limitations: (a) they mostly only highlight civil or administrative aspects; (b) there is no normative model explicitly designed for the needs of legislation; and (c) a systematic long-term research roadmap has not been developed to support ongoing legal reform. This study offers four fundamental novelties that place it different from previous studies and at the same time broaden the scope of the analysis towards an applicable legal reform draft.

First, conceptual novelty. This research builds on the doctrine of "*crimes against genetic resources*" as a conceptual framework to read acts that damage, control, or exploit genetic resources without social and legal legitimacy. This framework places the destruction of genetic resources as an attack worthy of understanding in the horizon of environmental crime and crime against coexistence, this is in line with the perspective of green criminology as put forward by White in his book entitled: "*Crimes against nature: Environmental criminology and ecological justice*".¹⁵

Second, normative novelty. This study prepared a normative model design that relies on three elements, namely the object of protection, prohibited acts, and proportionate sanctions. This model is directed to be operationalized in the formation of national legal norms, so that it does not stop at conceptual descriptions alone.

Third, comparative novelty. This study builds a comparison matrix of several countries that have relatively the same biodiversity as Indonesia, this aims to identify criminal protection strategies that are relevant to Indonesia. In line with the comparative method of cross-border criminal law reform which was also pursued in the study of the decolonization of Indonesian and Indian criminal law¹⁶. In addition, this approach allows for more contextual normative adaptations because it departs from the experience of countries that have similar biodiversity challenges.

Fourth, about the research method used. This study uses doctrinal legal research with socio-legal context and comparative approaches to read the relationship between rules, practices, and reform needs.

¹¹ Fachrurazi, "Akses Dan Pembagian Manfaat Sumber Daya Genetik Indonesia Oleh Negara Lain Dalam Konteks Komersialisasi Serta Penyelesaian Sengketa Berdasarkan Perjanjian Internasional Yang Berlaku Di Indonesia," *Jurnal Ilmu Hukum, Humaniora Dan Politik* 5, no. 3 (2025), 1691-1703, <https://doi.org/10.38035/jihhp.v5i3.3871>

¹² N Nurani and H N Bagja, "Protection of HKI Sui Generis Traditional Knowledge and Farmer Rights: A Legal Reform Model for Plant Variety Protection in Indonesia," *KnE Social Sciences*, 2025, 25-37, <https://doi.org/10.18502/kss.v10i27.20046>

¹³ Dominggus Ferdinan, "Between Biodiversity and Biopiracy: Indonesia's Legal Approach," *Preprints*, June 13, 2025, <https://doi.org/10.20944/preprints202506.1147.v1>

¹⁴ D Nurfitri, S Bustani, and S B Yunari, "Protecting Genetic Resources and Traditional Knowledge in Indigenous Communities and Government through Inclusive Moral Rights," *Scholars International Journal of Law, Crime and Justice* 8, no. 7 (2025), 160-167, <https://doi.org/10.36348/sijlaj.2025.v08i07.002>

¹⁵ Rob White, *Crimes against Nature: Environmental Criminology and Ecological Justice* (Cullompton, Devon, United Kingdom: Willan Publishing, 2008).

¹⁶ A Singh Kavia and K Singh Chouhan, "Crime, Morality and Decolonization: A Critical Comparative Analysis of Criminal Law Reforms in Indonesia and India," *Jurnal Penelitian Hukum De Jure* 25, no. 1 (2025): 49-66, <https://doi.org/10.30641/dejure.2025.V25.49-66>

With this approach, the results of the research are expected to be more complete, not only prescriptive, but also realistic in answering the need for legal reform.

The roadmap of this research is designed as a five-year program that moves gradually from strengthening conceptual foundations, mapping normative weaknesses, international comparisons, formulation of legislation models, to dissemination of policy recommendations. This timeline allows research to develop from initial studies to results that are ready to be used as material for academic advocacy and legislation.

There are two crucial aspects to this roadmap. First, temporal relevance, which is to ensure that each phase answers actual legal needs, including the dynamics of national regulatory discussions. Second, the involvement of stakeholders, especially policymakers, academics, farmer organizations, and local knowledge ownership communities, so that research results do not stop at the academic space but are transformed into policy inputs that can be implemented.

The long-term impact of this research is targeted at three levels. At the legislative level, research is expected to make a substantive contribution to the discussion of the Genetic Resources Protection Bill, especially on criminal provisions. At the institutional level, the results of the research are aimed at encouraging the establishment of a special unit for handling genetic resources crimes in the National Police and the Attorney General's Office. At the community level, this research is directed to improve legal understanding and capacity of farming communities and indigenous peoples in accessing available protection mechanisms.

The importance of this research is getting stronger as the discussion of the Genetic Resources Protection Bill continues in the House of Representatives of the Republic of Indonesia. Indonesia needs an effective legal architecture, not only to close the exploitation gap, but also to ensure that the protection of genetic resources becomes an integral part of the agenda of food sovereignty, ecological justice, and sustainable national development. Therefore, this research is placed as an academic foundation to encourage more rigorous, contextual, and future-oriented criminal law reform

Research Methods

This study uses doctrinal legal research with socio-legal context and comparative approaches. This method was chosen because the research is essentially a study of legal principles, legal systematics, comparative law, and legal history in relation to the protection of genetic resources.¹⁷ The approach used includes three complementary approaches that reinforce each other. First, a statute approach that examines all regulations related to genetic resources, seeds, and food security, both at the national and international levels. Second, a conceptual approach that examines the doctrines of environmental criminal law, food sovereignty theory, the concept of restorative justice, and the doctrine of crimes against genetic resources developed in this study. Third, the comparative approach¹⁸, which compares the genetic resource protection system in several countries that have similar biodiversity characteristics to Indonesia, namely Malaysia and India.

The comparative study in this study is analyzed by comparing the legal frameworks of Malaysia and India to find a model of criminal law reform that is relevant to Indonesia in protecting genetic resources and food sovereignty. Malaysia is analyzed through the Protection of New Plant Varieties Act, which specifically provides an explicit farmer exemption, giving smallholders legal space to store and exchange non-commercial seeds without the risk of criminalization. Meanwhile, India was analyzed as a *sui generis* model through the Protection of Plant Varieties and Farmers' Rights Act (2001) which succeeded in balancing the rights of breeders and farmers, including guaranteeing the right of farmers to sell their crops (as long as they do not use breeders' trademarks) and providing an institutionalized benefit-sharing mechanism. The synthesis of these two countries resulted in recommendations for

¹⁷ Soerjono Soekanto and Sri Mamudji, *Penelitian Hukum Normatif: Suatu Tinjauan Singkat* (Jakarta: RajaGrafindo Persada, 2017).

¹⁸ Peter Mahmud Marzuki, *Penelitian Hukum* (Jakarta: Kencana Prenada Media Group, 2009).

Indonesia to adopt farmer's privilege, establish a single, integrated institution, and develop a compensation mechanism for local communities

The primary legal materials studied include the Constitution of the Republic of Indonesia in 1945, the Criminal Code (KUHP), Law Number 12 of 1992 concerning Plant Cultivation Systems, Law Number 29 of 2000 concerning the Protection of Plant Varieties, Law Number 18 of 2012 concerning Food, Law Number 13 of 2010 concerning Horticulture, Law Number 11 of 2013 concerning the Ratification of the Nagoya Protocol, Convention on Biological Diversity (CBD), International Treaty on Plant Genetic Resources for Food and Agriculture (ITPGRFA).

Secondary legal materials include scientific literature, national and international legal journals, reports of international institutions and relevant results of previous research. The analysis is carried out qualitatively using prescriptive-analytical techniques, which are not only describing existing regulations but also formulating legal norms that should apply (*das sollen*) in order to achieve the goal of optimal protection of genetic resources.

Results and Discussion

Empirical Portrait of Threats to Local Genetic Resources and Seeds

Before entering into the normative analysis, it is important to first map the concrete form of threats to Indonesia's genetic resources and local seeds, because the formulation of good criminal norms can only be built on an accurate understanding of the pattern of acts to be prevented. Several research articles and verified website sources show that the threat manifests itself in three interlocking patterns: the practice of biopiracy by foreign parties, the concentration of multinational corporations' power over global seed markets, and, paradoxically, the criminalization of smallholders of local seed breeders by the domestic legal instruments themselves.

As a megabiodiversity country that stores about 80% of the world's biodiversity in the tropics¹⁹, Indonesia has repeatedly been targeted by biopiracy. The most frequently cited case is the patent on *tempeh*, a typical Indonesian soy fermented food, where a United States entity owns at least 35 patents related to *tempeh* and 6 patents are owned by a Japanese entity, while Indonesia itself has only filed two patent applications that have not been fully processed.²⁰ A similar pattern occurred in Shiseido's intellectual property claims on medicinal plant products from Indonesia, the registration of indications related to Toraja coffee and its cultural elements of its traditional house by foreign entities, the collection of hundreds of samples of organisms from the forest area of West Kalimantan, and the collection of research samples without permission by foreign nationals in the Murung Raya Protected Forest, Central Kalimantan, in 2012.²¹ This series of cases confirms that the vulnerability of illegal access to Indonesian germplasm is not a hypothetical problem, but a recurring pattern across decades and across commodities, most of which originated from scientific research activities that formally appear legitimate but are not accompanied by a fair benefit-sharing mechanism as mandated by the Nagoya Protocol.

The second threat is structural, namely the concentration of corporate power in the global seed and agrochemical industries. Research conducted by Clapp shows that the global seed and agrochemical industries have become increasingly consolidated in recent years, and that concentrated companies have the potential to use their power to shape markets, technology and innovation agendas, and broader food policy and governance frameworks, so a series of policy measures are needed so that such concentration does not erode the fundamental goals of the food system such as livelihoods, justice and sustainability.²² The implications for Indonesia are twofold: farmers' structural dependence on imported commercial

¹⁹ Denny Indrawanto et al., *Ekologi Kehutanan Tropis*, ed. Iko Mart Nadeak (Medan: Yayasan Kita Menulis, 2021).

²⁰ Soraya Novika, "Cerita Tempe: Dipatenkan Jepang, Sulit Dicari Di Indonesia," <https://finance.detik.com/berita-ekonomi-bisnis/d-5319870/cerita-tempe-dipatenkan-jepang-sulit-dicari-di-indonesia>

²¹ Angga Dwiartama et al., *Menyusun Cetak Biru Bioprospecting Di Indonesia Untuk Yayasan Keanekaragaman Hayati Di Indonesia*, ed. Edi Warsidi (Bandung: ITB Press, 2020).

²² Jennifer Clapp, "The Problem with Growing Corporate Concentration and Power in the Global Food System," *Nature Food* 2, no. 6 (June 3, 2021): 404–8, <https://doi.org/10.1038/s43016-021-00297-7>

hybrid seeds erodes the genetic basis of local seeds, while the market power of large corporations makes domestic legal instruments relatively powerless to reach large-scale violations that are most detrimental to food sovereignty.

The sharpest irony appears in the third pattern: criminal instruments that are formally intended to protect seed quality and breeders' rights are most often applied to smallholders who breed local seeds, not to the intended party of the policy. The records of the Indonesian Farmers Alliance show that at least 14 smallholder seed breeders in Kediri have been arrested and tried for glorifying and selling their own seeds to fellow farmers without official permits and labels,²³ Dan Kuncoro in Kediri (2010)²⁴ is a clear example of criminalization on the basis of Law Number 12 of 1992 concerning Plant Cultivation Systems, even though the seeds that are propagated are obtained legally.

The case that is most cited in the most recent development is the case of Munirwan, a farmer as well as a village head and breeder of IF8 rice seeds in North Aceh, who on July 23, 2019 was designated as a suspect by the Aceh Police based on Article 12 paragraph (2) juncto Article 60 paragraph (1) of Law No. 12 of 1992 for distributing seeds from breeding that have not been released by the variety.²⁵ Febrian Halomoan et al. emphasized that such cases are a direct consequence of the clash between the concept of individual breeders' rights, as embraced in the Plant Variety Protection Law, and the socio-economic structure of Indonesian agriculture which relies on the communal practice of storing, exchanging and selling seeds between farmers.²⁶

Fundamental Weaknesses of the Applicable Criminal Law Framework

Departing from the empirical map above, the normative analysis of Law No. 12 of 1992, Law No. 29 of 2000, Law No. 13 of 2010, Law No. 11 of 2013, and relevant provisions in the Criminal Code confirm four fundamental weaknesses that are closely interrelated. The first weakness is the disharmony of norms between laws and regulations. The criminal legal framework for genetic resources and local seeds is spread across five regimes with different basic philosophies: the Plant Cultivation System Law rests on the administrative logic of permitting the release of varieties; The Plant Variety Protection Law rests on the logic of the individual exclusive rights of breeders which are *sui generis* from patents; The Horticulture Law adds partial sectoral arrangements; The Nagoya Protocol Ratification Law rests on the logic of state sovereignty and the access-benefit-sharing mechanism; while the Criminal Code provides general provisions that are not specifically designed for this context. The most obvious tension occurs between the Plant Cultivation System Law and the Plant Variety Protection Law, because the concept of individual breeders' rights clashes with the communal legal culture of the peasant community, so that the utilization and exchange of seeds between farmers that are sociologically legitimate can actually be qualified as a criminal act.

The absence of bridging norms makes law enforcement have broad discretion in choosing the legal basis for prosecution, as illustrated by the difference in the articles used in the cases of Kuncoro and Munirwan even though the character of the acts is similar. On the other hand, this disharmony creates a void of enforcement against the perpetrators that are actually targeted by the Law on the Protection of Plant Varieties and, like the Nagoya Protocol, that is, foreign parties or corporations that access genetic resources without prior informed consent and without a benefit-sharing agreement. A study conducted

²³ Aliansi Petani Indonesia, "Pemuliaan Benih Berujung Pada Kriminalisasi," Aliansi Petani Indonesia, 2019, <https://api.or.id/petani-kecil-pemulia-benih-berujung-pada-kriminalisasi/>.

²⁴ Salmah Muslimah, "Kisah Petani Dibui 7 Bulan Karena Jual Benih Tak Bersertifikat," <https://news.detik.com/berita/d-2042263/kisah-petani-dibui-7-bulan-karena-jual-benih-tak-bersertifikat>

²⁵ Aliansi Petani Indonesia, "Kronologi: Kepala Desa Meunasah Aceh Utara Dan Benih IF8 Yang Berujung Dilaporkan Ke Polisi Dan Menjadi Tersangka," Aliansi Petani Indonesia, 2019, <https://api.or.id/kronologi-kepala-desa-meunasah-aceh-utara-dan-benih-if8-yang-berujung-dilaporkan-kepada-polisi/>.

²⁶ Febrian Halomoan et al., "Hak Petani Atas Pemuliaan Tanaman Menelusuri Perlindungan Hukum Di Indonesia Dan Malaysia," *Amandemen: Jurnal Ilmu Pertahanan, Politik Dan Hukum Indonesia* 2, no. 3 (June 18, 2025): 216–32, <https://doi.org/10.62383/amandemen.v2i3.1072>

by Fachrurazi on the implementation of the post-ratification access and benefit-sharing mechanism of the Nagoya Protocol concluded that its enforcement mechanism at the national level is still weak because Indonesia does not yet have a Genetic Resources Law that specifically regulates criminal sanctions for violations of illegal access by foreign parties.²⁷

The second weakness is the unclear operational definition of "local seeds" and "genetic resources" which creates legal uncertainty in the application of criminal norms. The Law on Plant Cultivation Systems in Indonesia is more likely to emphasize the administrative aspect of "varieties that have been released". The Law on the Protection of Plant Varieties emphasizes the technical criteria of novelty, uniqueness, uniformity, and stability;²⁸ while the Nagoya Protocol and the Convention on Biological Diversity place more emphasis on "genetic material containing functional units of inherited traits" without requiring any element of novelty at all.²⁹ This difference in pressure points has direct consequences: acts that are substantially the same, such as taking germplasm from local medicinal plants without a permit and then commercialized, may be subject to different sanctions regimes depending on which law the investigator chooses. A study conducted by Sugeng et al. on the relationship between agricultural intellectual property rights and global food security confirms that the fragmentation of this kind of definition is one of the sources of ineffective enforcement of agricultural intellectual property laws in developing countries.³⁰

The third weakness is disproportionate criminal sanctions and the unequal targets of law enforcement. Nominally, the criminal threat in the Plant Variety Protection Law appears severe, with the threat of fines of up to around Rp 2.5 billion, but empirically it is more applied to smallholder farmers with small-scale administrative violations, while large-scale violations by corporations rarely lead to a complete criminal process.³¹ Halomoan et al. explained this inequality as a consequence of the weak institutional capacity of the Center for Plant Variety Protection and Agricultural Licensing in conducting cross-border investigations against multinational entities.³² From the perspective of criminal law policy, this inequality reflects a failure of the principles of subsidiarity and proportionality as one of the criteria in criminalization.³³

Moeljatno and Sudarto as quoted by Valerian emphasized that the criminalization of an act should take into account the principle of subsidiarity, namely that criminal law is only used if non-penal efforts are proven inadequate, as well as the principle of proportionality between the severity of the act and the sanction threatened, so that criminal law really functions as the ultimate remedium.³⁴ a principle that was clearly violated when the Plant Cultivation System Law was applied to non-commercial seed breeders.

The fourth and most fundamental weakness is the absence of a recovery mechanism (restitutive) for the victim farming community. The entire criminal law regime studied is built on a retributive-repressive paradigm that is oriented solely towards the imposition of criminal penalties on perpetrators, without providing a recovery mechanism for communities that have lost access to local seeds and traditional knowledge, or for farmers who have been wrongly criminalized. Suciati emphasized that legal protection for farmers should be placed within the framework of a welfare state that contains the state's

²⁷ Fachrurazi, "Akses Dan Pembagian Manfaat Sumber Daya Genetik Indonesia Oleh Negara Lain Dalam Konteks Komersialisasi Serta Penyelesaian Sengketa Berdasarkan Perjanjian Internasional Yang Berlaku Di Indonesia."

²⁸ Muh. Aldhyansah Dodhy Putra, "Uji Keunikan Sebagai Syarat Diberikan Hak Perlindungan Varietas," *JISIP (Jurnal Ilmu Sosial Dan Pendidikan)* 6, no. 2 (2022): 3812–18, <https://doi.org/10.58258/jisip.v6i2.2981>

²⁹ Brad Sherman and Robert James Henry, "The Nagoya Protocol and Historical Collections of Plants," *Nature Plants* 6, no. 5 (May 15, 2020): 430–32, <https://doi.org/10.1038/s41477-020-0657-8>

³⁰ Sugeng, Widya Romasindah Aidy, and Andre Cardenas Jr, "Intellectual Property Rights in Agriculture: Plant Variety Protection and Food Security," *Audito Comparative Law Journal (ACLJ)* 5, no. 2 (May 6, 2024): 66–91, <https://doi.org/10.22219/acjl.v5i2.33097>

³¹ Effendi, Nurwati, and Ilyanawati, "The Effectiveness of the Center for Plant Variety Protection and Agricultural Licensing in Providing Legal Protection of Plant Varieties."

³² Halomoan et al., "Hak Petani Atas Pemuliaan Tanaman Menelusuri Perlindungan Hukum Di Indonesia Dan Malaysia."

³³ Dion Valerian, "Kriteria Kriminalisasi: Analisis Pemikiran Moeljatno, Sudarto, Theo De Roos, Dan Iris Haenen," *Veritas et Justitia* 8, no. 2 (December 26, 2022): 415–43, <https://doi.org/10.25123/vej.v8i2.4923>

³⁴ Valerian.

affirmative obligation to recover the structural losses suffered by this vulnerable group.³⁵ A finding that is consistent with the results of a study by Talu et al. that legal protection for plant breeders in Indonesia is still focused on the recognition of formal-administrative rights and has not yet reached post-victimization recovery.³⁶

Recent developments in Indonesia's environmental criminal law have actually opened up space for a more restorative approach: Triwijaya et al. show that a dual mediation approach that combines the restoration of the perpetrator-victim relationship with the restoration of physical damage can be a more equitable settlement model than a purely retributive approach.³⁷ while Pravifjayanto emphasized that the orientation of corporate criminalization should be directed towards recovery, not mere retaliation.³⁸ These two studies provide a relevant conceptual foundation for adoption in the criminal law reform of local genetic resources and seeds.

The Doctrine of Crimes Against Genetic Resources and Its Comparison with Malaysia and India

The four weaknesses above show that the root of the problem is not merely legislative technical, but also more paradigmatic: Indonesia's criminal law has so far treated infringement of genetic resources solely as an administrative issue of licensing or infringement of individual intellectual property rights,³⁹ not as a crime against collective and ecological interests.⁴⁰ To overcome these limitations, the research departs from the framework of green criminology developed by White,⁴¹ which views the act of destroying, dominating, or exploiting natural resources without social and legal legitimacy as part of a crime against ecological justice, on par with other conventional crimes that harm the common good.

The doctrine of crimes against genetic resources built in this study is a specialization of the framework for the Indonesian context, with three constituent elements. First, the protected object is formulated not as an exclusive right of the individual breeder, but as a collective interest in genetic material and traditional knowledge related to local seeds, including seeds that have not been registered as a detached variety but have been used for generations by certain communities. Second, prohibited acts are formulated differentially, distinguishing between illegal access, unilateral ownership claims, and monopolization that deprive the community of origin of access, on the one hand, from the use of local seeds by farmers within noncommercial boundaries, on the other. Third, the losses that are the measure of criminal objections are formulated as collective losses in the form of loss of food sovereignty and national genetic diversity, not just individual economic losses of the breeders. This doctrine is not intended to expand the scope of punishment haphazardly, but rather to correct the direction of criminalization that has been mistargeted, in line with the principle of selective and goal-oriented criminalization put forward by Moljatno and Sudarto, where criminal law is only used for acts that are truly detrimental to the collective interests significantly.⁴²

³⁵ Suciati, "Perlindungan Hukum Terhadap Petani Dalam Menggapai Negara Kesejahteraan (Welfare State)."

³⁶ Hermina Intan Talu, Jimmy Pello, and Orpa J. Nobatonis, "Perlindungan Hukum Terhadap Petani Yang Memiliki Keahlian Dalam Pemuliaan Tanaman," *Aliansi: Jurnal Hukum, Pendidikan Dan Sosial Humaniora* 1, no. 6 (October 26, 2024): 179–92, <https://doi.org/10.62383/aliansi.v1i6.574>

³⁷ Ach. Faisol Triwijaya, Yaris Adhial Fajrin, and Chintya Meilany Nurrahma, "Dual Mediation : Penyelesaian Perkara Lingkungan Hidup Yang Melibatkan Korporasi Sebagai Pelaku Melalui Pendekatan Restorative Justice," *Jurnal Magister Hukum Udayana (Udayana Master Law Journal)* 9, no. 2 (July 31, 2020): 401–28, <https://doi.org/10.24843/JMHU.2020.v09.i02.p14>

³⁸ Mochammad Rafi Pravifjayanto, "Rekontruksi Sistem Pertanggungjawaban Pidana Korporasi Atas Kejahatan Terhadap Lingkungan Hidup Perspektif Hukum Progresif," *Jurnal Hukum & Pembangunan* 55, no. 1 (March 31, 2025): 90–102, <https://doi.org/10.21143/jhp.vol55.no.1.1738>

³⁹ Aldira Dwinindita et al., "Pentingnya Perlindungan Sumber Daya Alam Genetik Terhadap Perairan Laut Indonesia," *Notary Law Journal* 3, no. 3 (2024): 139–51, <https://doi.org/10.32801/nolaj.v3i3.71>

⁴⁰ Dzaky Rafif Nugraha et al., "Implikasi Yuridis Pembaruan Regulasi Konservasi Sumber Daya Alam Hayati Dalam Undang-Undang Nomor 32 Tahun 2024 Terhadap Perlindungan Keanekaragaman Hayati," *Jurnal Analisis Hukum Dan Kebijakan* 7, no. 1 (2026): 122–36, <https://ejournals.com/ojs/index.php/jahk/article/view/4794/5781>

⁴¹ Rob White, *Crimes against Nature: Environmental Criminology and Ecological Justice* (Willan, 2013), <https://doi.org/10.4324/9781315880723>

⁴² Valerian, "Kriteria Kriminalisasi: Analisis Pemikiran Moeljatno, Sudarto, Theo De Roos, Dan Iris Haenen."

To enrich the formulation of the normative model, this study conducted a comparative analysis of Malaysia and India, two jurisdictions with agrarian characteristics and biodiversity challenges that are relatively comparable to Indonesia.

Table 1. Comparison of Bioprospecting Regulation Matrix in Indonesia, Malaysia and India

Indicator	Indonesia (Plant Cultivation System Law & PVP Law)	Malaysia (Protection of New Plant Varieties Act)	India (PPV & FR Act)
Object Definitions	Fragmented between laws: The Crop Cultivation System Law emphasizes the administrative aspect of 'varieties that have been released'; The PVP Law emphasizes the technical criteria of novelty, uniqueness, uniformity, and stability. There is no single definition that includes local seeds/genetic resources that have not been released as a variety, other than the approach to genetic material according to CBD and the Nagoya Protocol.	It is regulated through the Protection of New Plant Varieties Act, with the scope of objects explicitly accommodating exemption spaces for small-scale farmers. Details of specific object definitions are not elaborated in depth in the comparative literature referenced in this study.	The object of protection includes registered crop varieties while simultaneously recognizing the interests of breeders, researchers and farmers within a single regulatory framework. It also accommodates the genetic material from farmers' conservation, which can be the basis for compensation claims if used by other parties.
Farmer Exemption (Farmer's Privilege)	It has not been explicitly regulated as a criminal exception norm. The absence of this norm is one of the factors that contribute to the high frequency of criminalization of small-scale seed breeders, even though seed exchanges between farmers are sociologically prevalent and non-commercial.	It was adopted more explicitly than in Indonesia. Provide a clear legal space for small-scale farmers to store, replant and exchange their own crops without criminal risk, as long as they are done within non-commercial limits.	It is regulated the most elaborative among the three countries. Guarantee the right of farmers to store, replant, exchange, and sell their own crops including seeds of registered varieties as long as they do not use the breeder's trademark.
Criminal Sanctions and Restitution	The nominal criminal threat is quite severe (fines of up to around Rp 2.5 billion), but empirically it is more often applied to small-scale farmers with minor administrative violations, while large-scale violations by corporations are rarely fully processed. The regime in force is retributive and has not provided a recovery mechanism (restitution) for communities that have lost access to local seeds and traditional knowledge.	Details of the criminal sanctions scheme and restitution mechanism are not elaborated specifically in the comparative literature referenced in this study.	Equipped with an institutionalized benefit-sharing mechanism: farming communities can file compensation claims with the PPV&FR Authority if their conserved genetic material is used to develop new varieties that are then commercialized by other parties. Along with the awarding of annual awards for communities that contribute to the conservation of agricultural biodiversity, the implementation still faces obstacles such as low awareness among farmers and the risk of monopolizing certain varieties by large corporations.
Enforcement Agencies Law	Authority is spread across various agencies (Center for Plant Variety Protection and Agricultural Licensing,	Details on law enforcement institutions are not specifically elaborated in the	Using a single authority (PPV & FR Authority) that handles in an integrated manner both the registration of breeders' rights and the protection of

Indicator	Indonesia (Plant Cultivation System Law & PVP Law)	Malaysia (Protection of New Plant Varieties Act)	India (PPV & FR Act)
	Directorate General of Intellectual Property, etc.) without adequate integration. Weak institutional capacity, especially in conducting cross-investigation limits against multinational entities are also the cause of the imbalance in law enforcement between small-scale and large-scale actors.	comparative literature referenced in this study.	farmers' rights, including benefit-sharing claims. This single-integrated institutional model is one of the main lessons recommended for institutional reform in Indonesia.

Source: Halomoan et al. (2025), Kumar and Deepika (2020), and has been processed by the author

Comparative analysis of Indonesia and Malaysia by Halomoan et al.⁴³ Showing that Malaysia, through the Protection of New Plant Varieties Act, adopted the farmer exemption more explicitly than the Indonesian Plant Varieties Protection Act, provides a clear legal space for small-scale farmers to store, replant, and exchange their own crop seeds without criminal risk as long as they are done within non-commercial limits. The absence of equal arrangements in Indonesian law is one of the factors that explains why the criminalization of seed breeders is more frequent in Indonesia, even though the agrarian structures of the two countries are relatively similar.

India provides a more elaborate precedent. When the TRIPS Agreement required member states to protect plant varieties through patents, an effective sui generis system, or a combination of both, India consciously chose not to patent crop varieties and instead enacted the Protection of Plant Varieties and Farmers' Rights Act in 2001, which explicitly accommodated the interests of breeders, researchers, and farmers alike, by guaranteeing farmers the right to keep, replant, exchange and sell its own crops, including seeds of registered varieties, as long as it does not use the trademark of the breeder.⁴⁴ The law also contains a benefit-sharing mechanism that allows farming communities to submit compensation claims to the PPV and FR Authorities if their conserved genetic material is used to develop new varieties that are then commercialized by other parties, along with annual awards for communities that contribute to the conservation of agricultural biodiversity.⁴⁵ Kumar and Deepika assert that by balancing the rights of farmers, farmers, and researchers at the same time, India's PPV and FR Act appear to be a relatively effective sui generis system, although recent studies have also noted limitations in its implementation, including weak awareness of farmers and the risk of monopolization of certain varieties by large corporations.⁴⁶

The synthesis of these two jurisdictions yields three main lessons for Indonesia: First, the importance of explicit farmer's privilege to reduce the risk of criminalization without sacrificing the rights of commercial breeders; Second, the importance of an institutionalized benefit-sharing mechanism for the conservatory community; and Third, the importance of a single institution that handles the registration of breeders' rights as well as the protection of farmers' rights in an integrated manner, instead of being spread across various ministries as is the current condition of Indonesia. This kind of comparative approach is in line with the comparative method of criminal law reform that is also taken in the study of the decolonization of Indonesian and Indian criminal law, which emphasizes the

⁴³ Halomoan et al., "Hak Petani Atas Pemuliaan Tanaman Menelusuri Perlindungan Hukum Di Indonesia Dan Malaysia."

⁴⁴ Raj Ganesh et al., "Farmers' Rights and Plant Breeders' Rights under Indian Regulations of Plant Variety Protection: A TRIPS Compliant Harmonised Coexistence," *Indian Journal of Plant Genetic Resources* 35, no. 3 (2022): 13–17, <https://doi.org/10.5958/0976-1926.2022.00033.X>

⁴⁵ Ganesh et al.

⁴⁶ Murugan Saravana Kumar and Chinniah Deepika, "The Protection of Plant Varieties and Farmers' Rights Act of India," *SSRN Electronic Journal*, 2020, 1–7, <https://doi.org/10.2139/ssrn.3720685>

importance of contextual adaptation, not the transplantation of norms that will actually have the potential to cause things that are not in accordance with the existing conditions in the country.

Criminal Law Reform Model and Its Implications for Food Sovereignty In Indonesia

The doctrine of crimes against genetic resources built in this study places the interference of genetic resources and traditional knowledge as a crime against collective and ecological interests in line with the framework of green criminology developed by White,⁴⁷ not just an administrative issue of licensing or infringement of individual intellectual property rights. In order to be applied consistently in practice, its dogmatic construction needs to be further operationalized on three aspects: the limit actus reus between traditional use and commercial biopiracy, the proper mens rea structure, and the transnational corporate criminal liability model. All three determine whether the proposed reforms actually correct the mistargeted direction of criminalization, while closing the impunity gap for large-scale exploitation.

This doctrine formulates prohibited acts differentially: separating illegal access, unilateral ownership claims, and monopolization that deprive the community of origin of access, on the one hand, of the use of local seeds by farmers within non-commercial boundaries, on the other. In order for this separation not to stop at a vague normative level, objective indicators that law enforcement can test are needed. This study proposes five cumulative tests as a criterion for limiting actus reus. First, the purpose test, which is whether the seeds or genetic material are used for their own consumption and informal exchange between farmers in the community of origin, or are sold to third parties outside the community, especially seed or industrial business actors, or are used as the basis for the development of new varieties for commercialization. Second, the scale and volume test, namely whether the activity is on the subsistence scale of local households or farmer groups, or has exceeded the subsistence needs of the community towards significant commercially valuable production. Third, the provenance and consent test, which is whether access to genetic material or traditional knowledge is carried out with the prior informed consent of the community of origin as required by the Nagoya Protocol,⁴⁸ or is carried out without the knowledge and consent of the community. Fourth, the exclusivity claim test (appropriation test), which is whether the perpetrator claims exclusive rights in the form of patents or Plant Variety Protection rights to genetic material or knowledge derived from the community without consent and without a benefit-sharing scheme. Fifth, the branding test, which refers to the farmer's privilege model in the PPV & FR Act of India,⁴⁹ where the criminal exemption for farmers is forfeited if their crops are sold using registered breeder trademarks or labels.

The five tests were applied cumulatively, not alone. A new act qualifies as commercial biopiracy that is punishable if the absence of the consent of the community of origin, claims of unilateral exclusivity, and the scale of exploitation that exceeds subsistence limits are met simultaneously. For example, the sale of small quantities of seeds in the local market without claims of exclusive ownership does not necessarily meet the element of actus reus. This approach is in line with the principles of subsidiarity and proportionality affirmed by Moeljatno and Sudarto,⁵⁰ that criminal law is only used as an ultimum remedium when the act is truly detrimental to the collective interests significantly, thus preventing the recurrence of the pattern of criminalization of wrongly targeted small-scale seed breeders.

Furthermore, the implementation of strict liability as a whole risks magnifying, not correcting, the criminalization of the wrong target, because the element of guilt is no longer a requirement for criminalization for farmers in good faith. On the other hand, the dolus that is rigidly applied to all categories of actors makes it difficult to prove against corporations that act through complex organizational structures. Therefore, this study proposes a layered mens rea structure, following the

⁴⁷ White, *Crimes against Nature: Environmental Criminology and Ecological Justice*, 2013.

⁴⁸ Convention Biological on Diversity, "The Nagoya Protocol on Access and Benefit-Sharing," 2026, <https://www.cbd.int/abs/default.shtml>

⁴⁹ Kumar and Deepika, "The Protection of Plant Varieties and Farmers' Rights Act of India."

⁵⁰ Valerian, "Kriteria Kriminalisasi: Analisis Pemikiran Moeljatno, Sudarto, Theo De Roos, Dan Iris Haenen."

differentiation of the category of actors in the reform model. For the first category, namely small-scale farmers and breeders who carry out non-commercial seed exchanges between fellow farmers, criminalization can only be carried out if the element of *dolus* (intentionality) is proven, i.e. the perpetrator knows and wants that his actions exceed the limits of farmer's privilege, for example by deliberately selling seeds using registered breeder brands or deliberately claiming exclusive rights; There is also a presumption of good faith which is in line with the principle of *geen straf zonder schuld* (no crime without guilt). For the second category, namely illegal access without consent, unilateral ownership claims, and large-scale commercial exploitation, the element of *culpa* (negligence) is sufficient for derivative delinquencies that are administrative-regulatory in nature, for example negligence in conducting due diligence on the origin of genetic material in the supply chain; However, core offenses that contain serious criminal threats, such as patent claims without the consent of the community of origin or monopolization that deprive the community of access, still require proof of *dolus* so that the severe criminal threat remains proportionate.

For corporations, the due diligence obligation becomes an anchor of *mens rea*: failure to implement a due diligence system on the origin of genetic material and traditional knowledge can be constructed as sufficient organizational negligence for criminal liability in administrative-regulatory matters, in line with the direction of the progressive reconstruction of the corporate criminal liability system according to Pravifjayanto,⁵¹ while the *dolus* element is still needed for administrators who are consciously designing an access and benefit-sharing (ABS) obligation avoidance scheme. This layered *mens rea* structure is consistent with the layered sanctions design in the reform model, while affirming that the protection of non-commercial farmers and the crackdown on large-scale commercial exploitation are not two contradictory goals, but rather two sides of one proportionate and selective penal framework.

On the other hand, the cross-border character of large-scale genetic resource violations demands a corporate accountability model that does not rely solely on the identification doctrine, which requires that proof of directing mind in top management is difficult to prove in transnational corporations operating through subsidiaries, agents, or supply chain partners in various jurisdictions, especially when the cross-border investigative capacity of supervisory agencies such as the Central Government Plant Variety Protection and Agricultural Licensing are still weak.⁵² This research proposes three operational elements. First, the organizational/aggregation model, in which corporate errors are attributed from the accumulation of organizational compliance system failures, not solely from the actions of one individual management, in line with the direction of regulating corporate criminal liability in Law Number 32 of 2024,⁵³ which can be expanded to include genetic resource crimes. Second, the expansion of the jurisdictional base, i.e. Indonesia's criminal jurisdiction, needs to be constructed not only based on the principle of pure territoriality, but also the principle of effects-based territoriality, which attributes criminal acts to the activities of subsidiaries, agents, or supply chain partners of transnational corporations operating in Indonesian territory, even if the strategic decisions or main beneficiaries are domiciled abroad. Third, strengthening the mandate of the cross-border law enforcement special unit, namely the special unit for handling genetic resources crimes recommended in this reform model, which involves the National Police of the Republic of Indonesia and the Attorney General's Office together with the Center for Plant Variety Protection and Agricultural Licensing, the Directorate General of Intellectual Property, and the germplasm database management agency, needs to be given an explicit mandate to cooperate in cross-border investigations through mutual legal assistance mechanism and coordination with access and benefit-sharing compliance mechanisms under the Nagoya Protocol.⁵⁴

⁵¹ Pravifjayanto, "Rekonstruksi Sistem Pertanggungjawaban Pidana Korporasi Atas Kejahatan Terhadap Lingkungan Hidup Perspektif Hukum Progresif."

⁵² Effendi, Nurwati, and Ilyanawati, "The Effectiveness of the Center for Plant Variety Protection and Agricultural Licensing in Providing Legal Protection of Plant Varieties."

⁵³ Nugraha et al., "Implikasi Yuridis Pembaruan Regulasi Konservasi Sumber Daya Alam Hayati Dalam Undang-Undang Nomor 32 Tahun 2024 Terhadap Perlindungan Keanekaragaman Hayati."

⁵⁴ Convention Biological on Diversity, "The Nagoya Protocol on Access and Benefit-Sharing."

In terms of sanctions, transnational corporations that are proven guilty should be subject to a combination of fines proportional to the economic value of the exploitation as proposed in the reform model, the obligation of restitution/benefit-sharing to communities of genetic origin in line with the recovery orientation put forward by Pravifjayanto,⁵⁵ and the dual mediation approach of Triwijaya et al.⁵⁶ as well as non-financial sanctions in the form of revocation of business/export-import licenses and temporary prohibition on registration of rights Protection of Plant Varieties in Indonesia, considering that corporate sanctions against foreign corporate administrators are often difficult to execute due to extradition constraints, so the deterrent effect also needs to be built through administrative and reputational instruments. The effectiveness of this model ultimately depends on the completeness of Indonesia's mutual legal aid network and the capacity to activate the Nagoya Protocol's compliance mechanisms, given that the enforcement of the post-ratification access and benefit-sharing mechanisms at the national level is still relatively weak,⁵⁷ an implementation aspect that requires further study beyond the scope of this normative research.

The above multi-layered operationalization of *actus reus*, *mens rea*, and transnational corporate accountability reinforces two sides of the reform's objectives at once: clear and *mens rea* criteria that distinguish the good faith of farmers from the intentions of commercial actors protect local seed breeding practices from the criminalization of targets, while a model of corporate accountability that no longer relies solely on the doctrine of identification closes the gap in the impunity of exploiters Cross-border large-scale. Thus, the proposed criminal law reform is not only technical-juridical, but substantively underpins national food sovereignty, the preservation of the genetic diversity of local seeds, and community control over its own genetic resources as the foundation of long-term food security.

Conclusion

This study shows that threats to Indonesia's genetic resources and local seeds take place in three interrelated patterns of biopiracy by foreign parties, the concentration of multinational corporations' power over the global seed market, and the criminalization of targeted mistargeting of small-scale seed breeders while the prevailing criminal legal framework (Plant Cultivation System Law, Plant Variety Protection Law, The Horticulture Law, the Nagoya Protocol Ratification Law, and the Criminal Code) are unable to respond adequately due to four fundamental weaknesses: the disharmony of interregulatory norms, the unclear operational definition of "local seeds" and "genetic resources", the disproportionality of sanctions that target farmers instead of large-scale exploitation corporations, and the absence of a restitutive mechanism for aggrieved communities and farmers. These findings answer the first research question: the root of the problem is paradigmatic, because existing criminal law treats the disruption of genetic resources solely as an administrative issue of licensing or violation of individual rights, not as a crime against collective and ecological interests.

On this basis, this study formulates the doctrine of *crimes against genetic resources* as an answer to the second research question, which is operationalized through three interlocking elements: the restriction of *actus reus* through five cumulative tests to separate traditional use from commercial biopiracy; a layered *mens rea* structure that distinguishes the conditions of proof of *dolus* for good-faith farmers, *culpa* for administrative-regulatory violations, and due diligence obligations for corporations; and transnational corporate criminal accountability models that go beyond the doctrine of identification through the attribution of organizational errors, the expansion of effect-based jurisdiction, and the strengthening of the mandate of cross-border law enforcement units. Comparisons with Malaysia

⁵⁵ Pravifjayanto, "Rekonstruksi Sistem Pertanggungjawaban Pidana Korporasi Atas Kejahatan Terhadap Lingkungan Hidup Perspektif Hukum Progresif."

⁵⁶ Triwijaya, Fajrin, and Nurrahma, "Dual Mediation : Penyelesaian Perkara Lingkungan Hidup Yang Melibatkan Korporasi Sebagai Pelaku Melalui Pendekatan Restorative Justice."

⁵⁷ Fachrurazi, "Akses Dan Pembagian Manfaat Sumber Daya Genetik Indonesia Oleh Negara Lain Dalam Konteks Komersialisasi Serta Penyelesaian Sengketa Berdasarkan Perjanjian Internasional Yang Berlaku Di Indonesia."

and India reinforce this model, particularly the urgency of explicit farmer's privilege and the institutionalized benefit-sharing mechanism as practiced by India. Together, these three elements correct the direction of criminalization that has been mistargeted while closing the gap of impunity for large-scale exploitation, thereby supporting national food sovereignty through the preservation of the genetic diversity of local seeds and community control over its own genetic resources.

The implications of the policy are urgent: Indonesia needs a separate Genetic Resources Protection Law that explicitly harmonizes the five previously fragmented regulatory regimes, establishes farmer's privilege as a strict norm of criminal exemption, adopts a layered mens rea structure and an institutionalized benefit-sharing mechanism, expands the base of criminal jurisdiction to functional territorial principles to reach out to transnational corporations, and integrating the surveillance and investigation authorities currently spread across the Centre for Plant Variety Protection and Agricultural Licensing, the Directorate General of Intellectual Property, and the germplasm management agency into a single integrated authority at the level of the PPV & FR Authority of India. Without these legislative measures, the pattern of criminalizing smallholder farmers will continue to be repeated, while the gap of impunity for large-scale and cross-border exploitation of genetic resources remains open.

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