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Implementation of Access and Benefit Sharing in Indonesia: Review and Case Studies

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Abstract

The Nagoya Protocol on Access and Benefit-Sharing (ABS) was adopted in 2010, but parties have been facing many challenges to implement the protocol. The objective of this paper was to provide information on the current status of the ABS implementation in Indonesia, and to present some case studies for drawing the lessons learned. Information was collected through desk study and a focus group discussion, involving 25 resource persons from various stakeholders. There were many institutions related to ABS, but unfortunately some key functions for ABS were still not assigned to a specific institution(s). For law and regulations, there was no law and regulations specifically created for ABS (*except Law Number 11/2013 on the Ratification of the Nagoya Protocol*)*, but many existing laws and regulations can be used to address various issues related to ABS. From three case studies presented, it was clear that there were many constraints and challenges to implement the protocol. The institutional arrangement as well as law and regulations are very crucial to ensure a fair and equitable sharing of the benefits derived from the use of genetic resources, under Nagoya Protocol.*

Keywords: ABS, biopiracy, Convention on Biological Diversity, genetic resources, Sakata seed

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Introduction

As one of megadiversity countries, Indonesia is blessed with various genetic resources that can be used for various purposes. The genetic resources, which could be utilized in large industrial scales, might be traded among/between countries and, therefore, linked to international regulation pertaining access to genetic resourced and benefit sharing (ABS), also known as the Nagoya Protocol.

Under Convention on Biological Diversity (CBD), the Nagoya Protocol on Access and Benefit-Sharing is an international treaty adopted in Nagoya, Japan on 29 October 2010. Its main goal is the fair and equitable sharing of the benefits derived from the use of genetic resources. By implementing the Nagoya Protocol, the parties of CBD would contribute to the conservation and sustainable use of biodiversity, as one of the three objectives of the CBD.

The Nagoya Protocol entered into force on 12 October 2014. At present there were 102 signatory countries of ABS. The implementation of the Nagoya Protocol, however, is at an early stage and many parties have yet to adopt legislative, administrative or policy implementing measures at the domestic level. Indonesia is a party to the Nagoya Protocol, and the Government of Indonesia signed the Protocol on 11 May 2011. Following the protocols' ratification by the Government of Indonesia on 24 September 2013, the protocol was officially entry into force starting on 12 October 2014.

The objective of this paper was to provide information on the current status of the ABS implementation in Indonesia, including current institutional arrangement and legal instruments. In addition, case studies of ABS implementation in Indonesia were also presented, mainly for drawing the lessons learned.

Methods

The method to the study consisted of desk study and focus group discussions (FGDs). Desk study was conducted mainly related to the issues of status on national effort to implement Law Number 11/2013 Ratification of the Nagoya Protocol on Access to Genetic Resources and Benefit Sharing (*Undang-Undang tentang Pengesahan Protokol Nagoya tentang Akses pada Sumber Daya Genetik dan Pembagian Keuntungan yang Adil dan Seimbang yang Timbul dari Pemanfaatannya atas Konvensi Keanekaragaman Hayati*), as well as the potential and challenges on implementing the above law in Indonesia.

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Several case studies were also analyzed, to enhance the knowledge of the practicality of the ABS in the field. Unfortunately, there was very few published case studies related to ABS in Indonesia, and therefore, only three cases were presented: (1) H5N1virus, summarized from Sedyaningsih et al. (2008); Irwin (2010); Lawson and Hocking (2010), (2) Shiseido case, summarized from Pesticide Action Network (PAN) Indonesia (2013), and (3) SunPatiens, summarized from Sakata Seed (2016).

A two-day FGD was conducted in September 2017 to obtain information regarding the current situation and the important issues or topics as a basis to develop logical framework for the proposed project. The FGD (involving 25 resource persons) was conducted in coordination with UNDP Environment Unit. Resource persons invited to the FGD were officers from the Ministry of Environment and Forestry (as the official contact for CBD), officers from Ministry of Agriculture, officers from Ministry of Fisheries and Marine Affairs, officers from Ministry of Foreign Affairs, researchers from Indonesian Institute of Science), officers of Intellectual Property Right, academia, lawyers who involve in ABS, and private sectors.

Results and Discussion

Institutional arrangement The platform for exchanging information on ABS (Article 14 and 18 (3) of the Nagoya Protocol) is the Access and Benefit Sharing Clearing House (ABS Clearing House). The ABS Clearing House basically assist in facilitating the implementation of the Nagoya Protocol in a certain country by (1) enhancing legal certainty and transparency on procedures for access and benefit-sharing, (2) monitoring the utilization of genetic resources and the value chain, including through the internationally recognized certificate of compliance, (3) offer opportunities for connecting "users" and "providers" of genetic resources and associated traditional knowledge.

The information available in the ABS Clearing House is divided into three main categories: (1) National Records, (2) Reference Records, and (3) CBD Secretariat Managed Records. As the name implies, parties are required to provide and manage the first two records. The last record was conducted by CBD Secretariat.

As Indonesia has already ratified the protocol, Indonesia needs to develop institution as required by the protocol. Below is the current situation and development of the National Record and the Reference Record for Indonesia.

1 National Records

National Records (summarized in Table 1) were published by Governments and include (1) national information relevant for the implementation of the Nagoya Protocol, and (2) information that are obliged to provide in accordance with the protocol. Prior to being made publicly available in the ABS Clearing House, all National Records need to be approved by the National Publishing Authority (PA).

The National Records consisted of:

National Focal Point (NFP) The NFP is responsible to liaise with the secretariat and make available information on procedures for accessing genetic resources and establishing mutually agreed terms (e.g., information on Competent National Authorities/CNA, indigenous and local communities, stakeholders). As for Indonesia, the history of the institutional change in the Ministry of Environment and Forestry is important to know, in order to understand the current position of the NFP and how the strategic decision was/will be made.

When Indonesia ratified the Nagoya Protocol on 24 September 2013, the institution that lead the ABS process was the Ministry of Environment, and thus the Ministry of Environment acted as the NFP for ABS (as well as for CBD) since 2013. In 2014, there was a major change in the Government of Indonesia. The Ministry of Environment was merged with the Ministry of Forestry and became a new ministry named the Ministry of Environment and Forestry. On 16 June 2017, a new Director General of Natural Resources and Ecosystem Conservation (Mr. Wiratno) was officially appointed by the Minister of Environment and Forestry, and thus the ABS NFP was automatically is in the hand of the new Director General. The change had a huge impact on issues related to conventions that used to be managed under

Table 1 Summary of the current status of National Record for Indonesia

National record required for Access and Benefit Sharing (ABS)	Current status
National Focal Point (NFP)	Director General of Natural Resources and Ecosystem Conservation, Ministry of Environment and Forestry
Competent National Authorities (CNA)	J Ministry of Agriculture J Food and Drug Agency
Legislative, administrative or policy measures on access and benefit-sharing (MSR)	Not yet available; there are many laws, government regulations, ministerial decrees that relevant to ABS, but not specifically address ABS
National Databases and Websites (NDB)	Not yet available; many data bases available but not intended for ABS
Checkpoints (CP)	Not yet available; candidates have been identified
Internationally Recognized Certificates of Compliance (IRCC)	Not yet available
Checkpoint Communiqués (CPC)	Not yet available
Interim National Report on the Implementation of the Nagoya Protocol (NR)	Already submitted by the Directorate of Biodiversity Conservation (Director General of Natural Resources and Ecosystem Conservation Ministry of Environment and Forestry)

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the Ministry of Environment. Matters related to international conventions, including CBD and its related protocols, currently was placed under a lower echelon, as the Ministry of Environment and Forestry become much bigger institution following the merger of two ministries.

Competent National Authorities (CNA) The CNA is responsible for (1) granting access or issuing written evidence that access requirements have been met, and (2) advising on applicable procedures and requirements for obtaining Prior Informed Consent (PIC) and entering into mutually agreed terms. CNA is established in accordance with applicable national legislative, administrative or policy measure of a certain country.

The CNA for Indonesia has not decided yet when FGD was held in the late 2017. The reason for this primarily because matters related to genetic resources is scattered under different ministries (Table 2), and therefore, the CNA could also will consist of various Ministries which to decide on which ministry will act as a coordinator of all related ministries. Currently (early 2019), Indonesia listed two institutions for the CNA, namely Ministry of Agriculture and Food and Drug Agency.

Legislative, administrative or policy measures on ABS (MSR) The MSR is a measure adopted at domestic level to implement the access and benefit-sharing obligations of the convention or/and the Nagoya Protocol. Until now, Indonesia has not created legislation system specifically address the Nagoya Protocol. However, some related policies and regulations do exist

National Databases and Websites (NDB) NDB are information and links to national websites or databases that are relevant for ABS. Similar to the legislation situation, Indonesia has not built database system specifically addressing ABS, although many other databases are available and can be used for ABS. However, partial records and databases do exist and being constructed, as part of the implementation of Indonesian Biodiversity Strategic and Action Plan (IBSAP). The records and databases related to genetic resources have been created and maintained by Indonesian Institute of Sciences (*Lembaga Ilmu Pengetahuan Indonesia*, LIPI), for example Indonesian Biodiversity Information System (InaBIF). Other databases that could be incorporated for the ABS are database of plant species (as mandated by the Global Taxonomy).

The Ministry of Environment and Forestry also has been creating databases. Most databases are related to national parks and other types of protected areas, including plant and animal species found in protected areas. Other available database is database related to environment and wildlife crimes, but matters related to ABS (for example biopiracy) was not included in the database.

Internationally Recognized Certificate of Compliance (IRCC) IRCC is a certificate constituted from the information on the permit or its equivalent registered in the ABS Clearing House, serving as evidence that the genetic resource which it covers has been accessed in accordance with prior informed consent and that mutually agreed terms have been established. It contains information that can assist in monitoring the utilization of genetic resources by users throughout the value chain (Article 17). Indonesia does not have this yet.

Checkpoints (CP) Checkpoints are entities designated by parties to effectively collect or receive relevant information related to prior informed consent, to the source of the genetic resource, to the establishment of mutually agreed terms and/or to the utilization of genetic resources, as appropriate. Indonesia has not assigned the Checkpoints, although candidates have been identified.

Checkpoint Communiqués (CPC) CPC is a summary of the information collected or received by a checkpoint related to prior informed consent, to the source of the genetic resource, to the establishment of mutually agreed terms and/or to the utilization of genetic resources and registered in the ABS Clearing

Table 2 Ministries and institution related to Access and Benefit Sharing (ABS)

Name of ministry of institution	Roles and responsibilities related to ABS
Ministry of Environment and Forestry	Manage and conserve genetic resources in terrestrial ecosystem, especially of wild origin; National Focal Point for Convention on Biological Diversity and Nagoya Protocol
Ministry of Agriculture	Manage cultivated genetic resources, including for plants and animals; under this ministry there are many research centres
Ministry of Fisheries and Marine Affairs	Manage and conserve genetic resources in marine ecosystem, especially of wild origin
Ministry of Law and Human Rights	Granting patents
Ministry of Research, Technology and Higher Education	Granting permit to foreign researcher to conduct research and taking samples
Ministry of Foreign Affairs	Responsible for political relationships between/among countries
Ministry of Health	Responsible for the national health, including related to virus and pathogen
Indonesian Institute of Sciences	Responsible for the scientific decision related to national matters; approval to give permit for taking samples, Mutually Agreed Terms, database

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House. Indonesia does not have this yet.

Interim National Report (INR) INR is a set of information submitted by parties to report on the measures that it has taken to implement the Nagoya Protocol. Until 2016, Indonesia has not presented the INR. For the year 2017 Indonesia has already submitted the report.

2 Reference Records

Reference Records (i.e., ABS relevant resources and information) can be submitted by any registered user of the ABS Clearing House (including governments, international organizations, local communities, and other relevant stakeholders). The Reference Records includes Virtual Library Resources, Model Contractual Clauses, Codes of Conduct, Guidelines, Best Practices and/or Standards, Community Protocols and Procedures and Customary Laws, and Capacity-Building Initiatives.

Virtual Library Resources in the ABS Clearing House hosts a number of ABS relevant resources including general literature on ABS, awareness-raising materials, case studies, videos, and capacity-building resources. Model Contractual Clauses serve to assist in the development of agreements that are consistent with ABS requirements and may reduce transaction costs while promoting legal certainty and transparency. Codes of Conduct, Guidelines, Best Practices, and/or Standards may assist users to undertake their activities in a manner that is consistent with ABS requirements while also taking into account the practices of different sectors can help other actors to understand and respect the community's procedures and values with respect to access and benefit-sharing. The last one, Capacity-Building Initiatives contains information on capacity-building initiatives (projects, programmes, activities) at national, regional, and international levels, are shared to promote synergy and coordination on capacity-building and development for access and benefit-sharing. As for Indonesia, until now there has been no Reference Records established explicitly for the purpose of ABS.

Legal instruments related to ABS Considering that the institutional arrangement for ABS in Indonesia is still in the infancy stage, the legal instruments created from it is also not yet developed. Many other legal instruments surely existed (Table 3), although not specifically addressed issues in ABS.

The basic law of biodiversity conservation in Indonesia is the Law Number 5/1990 on Conservation of Living Resources and its Ecosystem. This law has been revised for the last 10 years or probably longer than that, but so far there has been sign of the finalization of the law. Part of the situation is that the new law actually a merge of two big topics, namely conservation of living resources (lead by the Ministry of Forestry, then) and management of genetic resources as the newly added topic (lead by the ministry of Environment, then).

During the process of the merging of both draft laws, as mentioned previously, the President of Indonesia at that time decided to merge the Ministry of Forestry and the Ministry of Environment, and created a new ministry called the Ministry of Environment and Forestry. Under the new ministry, all matters related to biodiversity (including matters related to international conventions) were transferred to the Directorate of Biodiversity Conservation, under the Directorate General of Conservation of Natural Resources and Ecosystem.

Until now, Indonesia has not finished drafting the Revised Law Number 5/1990. Considering that matters related to ABS will also under this law, many developments

Table 3 Some existing regulations in Indonesia that relevant with ABS and can be adopted as transitional measures

Law/regulation	Topic
Law Number 5/1990	Conservation of living resources and its ecosystem
Law Number 11/2013	Ratification of the Nagoya Protocol on Access to Genetic Resources and Benefit Sharing
Government Regulation Number 41/2006	Permits for foreign universities, R&D institutions, companies and individuals
Government Regulation Number 7/1999	Preservation of wild plants and animal species
Government Regulation Number 8/1999	Utilization of wild plant and animal species
Decree of Minister of Forestry Number 447/Kpts-II/2003	Administration directive for harvest or capture and the distribution of the specimens of wild plant and animal species
Decree of Minister of Forestry Number 284/Menhut-II/2007	Delegation of authority granting permission or transport of samples for parts of wild plant and animal species and its results for research purposes
Decree of Minister of Forestry Number 447/Kpts-11/2003	Regulates the harvest, capture, and transportation of wildlife specimens
Decree of Minister of Agriculture Number 15/Permentan/OT.140/3/2009	Guidance of the making of Material Transfer Agreement
Decree of Minister of Agriculture Number 37/Permentan/OT.140/7/2011	Conservation and utilization of plant genetic resources
Decree of Minister of Environment and Forestry Number 755/Menlhk/KSDAE/KUM.0/9/2016	Establishment of Working Group on Biodiversity Clearing House (CBD, Cartagena Protocol, and Nagoya Protocol); the members of the working group are representative from related ministries or institutions that relevant to biodiversity issues
Presidential Decree Number 100/1993	Research permit for foreigners
Governmental Regulation Number 41/2006	Permit of conducting research activity and development for foreign universities, foreign research and development institutions, and foreign business entities and foreigners

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of related regulations have been postponed, while waiting for the Revised Law Number 5/1990 finalized. Another law which is very important to ABS is the Law Number 11/2013 on Ratification of the Nagoya Protocol.

As for the legal protection of the traditional knowledge, Indonesia has had some regulations governing the problems of legal protection of traditional knowledge which are related to genetic resources. However, the regulations only cover in sectorial scale and are still considered as rules giving lack of protection on traditional knowledge and anything related to it.

Case studies of implementation of access and benefit sharing

1 Dispute on H5N1 Virus

In December 2003, a highly pathogenic H5N1 influenza A virus was first identified amongst poultry in Indonesia. Two years later, in 2005, Indonesia reported the first human H5N1 case. By the end of 2007, the H5N1 virus had the largest number of cases (116) with a case fatality rate of over 80%. Although the outbreak was concentrated in Indonesia, there were fears of a widespread global pandemic. At that time, there was initially limited capacity to detect the H5N1 virus.

Indonesia has a national influenza center which are part of the Global Influenza Surveillance Network (GISN). The GISN is a structure within World Health Organization (WHO)'s global influenza governance and has been operated for nearly 60 years. The GISN has four collaborating centers in the UK, USA, Japan, and Australia, where samples from participating countries were sent to and analyzed. The WHO then decides which strains pose the most risk and decide how to proceed with vaccine production accordingly

In accordance with provisions under the International Health Regulation, Indonesia sent specimens to the GISN Collaborating Center in Australia. International aid and assistance from the WHO subsequently helped the country to build capacity to detect the virus. Preparations for pandemic influenza began across the globe. Laboratory results were disseminated in international conferences, while specimens being shared with pharmaceutical companies without notification of the Indonesian Government and scientists.

The issue emerged when an Australian-based company approached the Indonesian Government to offer to sell large quantities of vaccine based on an "Indonesian strain" of the virus. It was suspected that the company had been given the virus by the GISN Collaborating Center in Australia and allowed to commercially produce the vaccine by WHO without Indonesia's knowledge or consent. The situation was further worsened by the WHO's acknowledgement that patents had been sought on modified versions of H5N1 samples shared via the GISN within the consent of their countries of origin.

In January 2007, Indonesia stopped sharing additional H5N1 specimens with the WHO/GISN in Australia, for various reasons: (1) that Indonesian samples would be used by pharmaceutical companies to create vaccines that were unlikely to be available to Indonesia was unfair, (2) the incentives for Indonesia to continue sharing samples was questionable, (3) it also unfair that Indonesia that were hardest hit by a disease must also bear the cost for vaccines and treatment, while the benefits of these products are enjoyed by pharmaceutical companies, and (4) transparency within the virus-sharing system was lacking.

Following meetings between the WHO and the Government of Indonesia in Jakarta, in March 2007 Indonesia announced to resume the sharing of virus samples. This decision was taken by the Indonesian Government after a series of agreement that WHO (1) promised to help increase global vaccine production capabilities, (2) explored short-term responses such as national stockpiling of vaccine and influenza drugs, and guarantees that if industry were to set aside a percentage of the vaccine, (3) agreed to revise the current Terms of Reference for WHO laboratories, which would outline agreed uses of the virus samples, including their provision to pharmaceutical companies, and (4) conducted a transfer of vaccines and technology from current manufactures to pharmaceutical industries in low- and middle-income countries.

In addition, in April 2007 the WHO awarded a total of USD 18 million to Brazil, India, Indonesia, Mexico, Thailand, and Vietnam to develop their own vaccine manufacturing capability. This meeting was also followed by a High-Level Meeting of 33 countries and sponsored by the Indonesian Government at which set out the need for transparent, fair, and equitable virus-sharing in a declaration called Jakarta Declaration.

2 The battle for patents: Shiseido case

The Shiseido Corporation Ltd. is a multinational Japanese company that produce cosmetic, skin, and hair care products. In 1999 Shiseido sought for patents of various products in Japan and Europe, and many of the products contained herb species originated from Indonesia. The patent being sought was not only the herbs themselves, but also the chemical compounds within the herb. Most of the products were for skin-whitening, hair restoration, and skin rejuvenation.

One of the patents being sought was on hair tonic which contained long pepper ("*cabe jawa*"; *Piper retrofractum*), while another were claimed as a mixture of false daisy ("*orang aring*"; *Eclipta alba*), java olive ("*jangkang"*; *Sterculia foetida*), "*meniran'* (*Phyllanthuss niruri*), weeping paperbark ("*merico bolong*"; *Melaleuca leucandendra*), and chinese finger-root (*"temu kunci"; Boesenbergia pandurata*). In 1995, it was reported that more than 35 herbal plants from Indonesia have been the subjects of more than 20 patents applications by the same company.

In 1999, Shiseido successfully launched a new line of skin whitening products contained extract of bitter ginger (*"lempuyang"; Zingiber zerumbet*), another Indonesian origin herb. The bitter ginger, which serves as a popular folk medicine ("*jamu*") among Indonesians, has also been awarded many patents issued by Japanese Patent Office (WO09963950A1, JP10029924A, JP09169628A, JP09169627A, JP09071522A) for its anti-aging properties and moisture-retention properties.

Other product of hair care under patent registered number JP10316541 contained - among other ingredients - "*kayu rapet*" (*Parameria laevigata*), "*kemukus*" (*Piper cubeba*), "*tempuyung*" (*Sonchus arvensis*), "*beluntas*" (*Pluchea indica*), "*mesoyi*" (*Massoia aromatica*), "*pule*" (*Alstonia*

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scholaris), "*pulowaras*" (*Alycia reindwartii*), and "*sintok*" (*Cinnamomum sintoc*). Other Indonesia origin herbs that included in other patented products for anti-aging remedy contained "*kayu legi*" (*Glycyrrhiza glabra*), "*kelabet*" (*Trigonella foenum-graecum*), "*lempuyang*" (*Zingiber zerumbet*), "*remujung*" (*Orthosiphon staminens*), and "*brotowali*" (*Tinospora crispa*). Some of the products were also double-patented in European Patent Office.

Knowing about the effort to seek for patent of Indonesian origin herbs by Shiseido, PAN Indonesia (an Indonesian non-governmental organization) in April 2000 launched a massive boycott campaign against Shiseido. The series of campaign were linked to the genetic resource piracy and the traditional knowledge of folk medicines belong to the local community in Indonesia. Despite of the availability of modern medicine, more than 70% of Indonesian people depend heavily on the folk medicines ("*jamu*") of unpatented traditional herbs. The folk medicines and their related traditional knowledge have been playing important roles of many local community in Indonesia, especially for people living in villages, even though the modern medicines is flourishing.

For about two years after that, the Japanese cosmetics company has been bombarded with campaign messages of biopiracy from PAN Indonesia and other concerned civil society organisations. Under pressure from public protests, Shiseido Corporation Ltd. finally withdrew the patent request on products contained Indonesian herb at the end of March 2002.

3 SunPatiens⊩: Collaborative in garden flower seed production

SunPatiens⊩ is an assortment of garden flower seeds of *Impatients* (family Balsaminaceae) that has been developed by Sakata Seed Corporation (Japan), by using flower seeds originated from Indonesia. Currently, there are about 30 varieties sold worldwide. Its greatest features are the breakthrough growth vigor, the high heat tolerance withstanding the high temperatures and strong sunlight of summer, and the chance to enjoy a continuous bloom of vivid flowers for an extended period of time. The extremely vivid color range includes orange, white, pink, and red.

The collaboration between the Government of Indonesia and Sakata Seed Corporation was started in the early 2000s, when the Government of Indonesia - representing by the Indonesian Agency for Agricultural Research and Development (IAARD) - and Sakata Seed Corporation made a basic agreement for the research and utilization of the Indonesian native flowers. Starting with this basic agreement, Sakata Seed Corporation has been using Indonesian collection of genetic resources of *Impatiens* by applying Material Transfer Agreement (MTA) following CBD's regulation.

The SunPatiens⊩ was commercially launched in 2006. Following the launch, the SunPatiens⊩ has grown to be recognized worldwide as one of the best performing flowering annuals in its category, especially in Japan, Europe, North America, and South America. Since its launching, the high-performance of SunPatiens⊩ has been receiving worldwide praise from gardening enthusiasts and landscape architects. With worldwide cumulative total sales exceeding 100 million plants, it is spreading around the world as a new standard for horticultural plants.

Part of the revenue generated from sales of the product is being allocated based on the agreement for ABS for utilization of genetic resources. Sakata Seed Corporation pays a share of the SunPatiens⊩ royalty proceeds to the Indonesian Government and, in addition, performs technology transfer as a non-monetary benefit sharing.

In 2014, Sakata Seed Corporation and IAARD updated the collaboration and implemented an innovative joint research project based on the new national measures. In 2016, both parties continued to collaborate and will proceed with joint research of Indonesia and Sakata Seed Corporation.

In the next five years (2016–2021), Sakata Seed Corporation are going to provide support to the Indonesian Ornamental Crops Research Institute (IOCRI; *Balai Penelitian Tanaman Hias*, under the Ministry of Agriculture). Some planned supports are providing lectures on breeding technology to IOCRI, conducting joint collection, evaluating, and selecting for the genetic resources in Indonesia. Sakata Seed Corporation, however, possesses preferential rights for commercialization of the new superior varieties which IOCRI obtains from their support.

Constraints in implementing ABS in Indonesia ABS definitely is not an easy issue, although guidelines are available (for example Greiber et al., 2012). Many lawyers and researchers in Indonesia also already conducting assessment in ABS and related issues, for example Hartati (2012), Siswandi (2013), Yulia (2015), Pangestu (2016), and Rohaini (2016). Although the protocol has been formulated since 2010, by nature the ABS is still difficult to implement, a concluding fact based on worldwide study by Medaglia et al. (2012). Worldwide, only very few ABS agreements have been implemented so far (Pouchard, 2017). For Indonesia, Yulia and Zainol (2013) listed many constraints in implementing ABS, all linked to the biodiversity, local people, information, and regulations

As the institution dealing with ABS has not been properly in placed in Indonesia, this does not mean that the commercial utilization of the Indonesian biodiversity in international level is not in existence (Tanjung 2017). There is a high chance that the international economic transaction related to genetic use has been going on without referring to the ABS scheme. Another possible scenario for those who want to use Indonesian genetic materials was diverted it to neighboring countries in Southeast Asia which share the same biogeographic region, such as Malaysia and Thailand (except for the country endemic species). If this happening or already happened, Indonesia is or has been loosing opportunity to utilize its resources through international collaboration.

Biopiracy in genetic resources: Vague in virus and traditional knowledge The Nagoya Protocol applies to (1) genetic resources, (2) associated traditional knowledge, and (3) benefits arising from their utilization. The genetic resources, as defined by the CBD, are "material of plant, animal, microbial or other origin containing functional units of heredity of actual or potential value", but not human genetic resources. In the H5N1 virus, there had been some

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debate whether a virus can be categorized as genetic resources.

Merriam-Webster Dictionary (https://www.merriam-webster.com/dictionary/virus) defines virus as "any of a large group of submicroscopic infective agents that are usually regarded as non-living extremely complex molecules, that typically contain a protein coat surrounding an RNA or DNA core of genetic material but no semipermeable membrane, that are capable of growth and multiplication only in living cells, and that cause various important diseases in humans, animals, and plants". It is understandable if there was a big debate whether virus is indeed be included in the Nagoya Protocol. Regardless of the definition of the virus itself, referring to the overall objectives of the CBD and Nagoya Protocol, clearly the spirit of the benefit sharing can be applied for the case of H5N1 virus.

Many pharmaceutical industries in Indonesia, also elsewhere, have been known to develop cosmetics and pharmaceutical industries based in traditional knowledge. In Indonesia, the traditional knowledge has been flourished since a very long time ago. The medicinal folks ("*jamu*") is an easy proof of it (Purwaningsih, 2013). Unfortunately, only a few written documents available as proofs and references that Indonesia acts as the "provider" of the traditional knowledge, for example *Usada Taru Pramana* from Bali which was originally written in "*lontar*" leaves (Mu'jizah, 2016). Other traditional knowledge was passed orally from generation to generation. Deterioration and loosing knowledge surely happened along the way (Kusumadara, 2011), especially nowadays where local people more rely on the modern medicines and cosmetics. Formal database on traditional knowledge for the whole country definitely needed.

When the case of Shiseido emerged, perhaps the understanding of the genetic resources, biopiracy, and other related terms were still debatable. There was also a debate whether "common knowledge" of a certain species for pharmacy can be owned by a certain company or user. Clearly, the definition of biopiracy need to be specified (Tanjung, 2017), as well as genetic resources (Fajarwati, 2016).

Good lessons learned in ABS implementation in Indonesia The case of *Impatiens* provides a good lesson learned for the knowledge of the use of a certain species or genetic resources. In Indonesia, impatiens has been known as a wild flower and regarded as not a popular garden flower (Utami, 2014). The *impatiens* varieties that have been developed by Sakata Seed Corp. were from the high attitudes, which can be easily found along the road and in bushes among other wild plants and weeds. The Sakata Seed Corp. could immediately see that the wild flower was very potential to be planted during spring and summer in temperate countries.

Currently, perhaps not many Indonesian people know that the beautiful and bright coloured *impatiens* in many countries in the American continent and Europe was actually originated from Indonesia, after having a biotechnology improvement from a Japanese seed company. Considering the wealth of genetic resources in Indonesia, the possibility to have many other commercial products surely is endless.

SunPatiens® case has shown that ABS actually can be implemented properly without waiting for the formal institution (e.g., ABS Clearing House and its related organizational tools) to establish in Indonesia. In 1990s, ABS has not even formulated yet. However, due to mutual understanding of both parties, the utilization of the genetic resources from Indonesia (as the "provider" country) by Japan (as the "user" country) has been properly managed.

Political will, mutual understanding and benefit need to be developed together. In the case of Sakata Seed, it seems that the understanding and benefit sharing has been in place, leading to a sustainable utilisation of an almost neglected Indonesian resources, although Mutually Agreed Terms (MAT) and Prior Informed Consent (PIC) were not recognized during 1990.

Discovering a new resource is only a beginning of a long process toward the sustainable utilization of a genetic resources. When Sakata Seed discovered *Impatiens*, the original genetic resource was originated in a tropical country of Indonesia. And yet, the Sakata Seed Corp. develop the garden flower for temperate region, following a long process of research. In many cases, the developing countries do not have any resources to conduct intensive research to reach marketable products.

Next steps for a better implementation of ABS in Indonesia The assignment of Indonesian CNAs is a good step toward a better implementation of ABS. The CNAs and NFP can initiate further actions, including to (1) strengthening national institutions involved in the ABS and create a strong collaboration mechanism among those institutions, (2) strengthening policy for effective ABS implementation by studying law and regulation gaps, to be followed by the creation of the necessary law and regulation, (3) strengthening capacity building for policy makers and other stakeholders, and (4) supporting national database development, possibly to be hosted by LIPI.

These steps area obviously not easy, but they are necessary to properly implement the Nagoya Protocol. In this fast and global development, other neighbouring countries who have the same species might take the opportunity to utilize the genetic resources. As a result, Indonesia might lose the chance to utilize genetic resources and the possible economic generation arising from the international collaborations, if the ABS instrument is not properly in placed soon.

Conclusion

The nature of ABS is complicated and not easy to implement in the field. Many institutions and regulations are needed for a proper implementation. For Indonesia, there were many institutions related to ABS, but the unfortunately some key functions for ABS were still not assigned to a specific institution(s). As for law and regulations, many existing law and regulations issued by various Ministries can be used to address various issues related to ABS, although there was no law and regulations specifically created for ABS, except Law Number 11/2013 on the Ratification of the

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Nagoya Protocol). From three case studies presented, it was clear that there were many constraints and challenges to implement the protocol, which might create some problematic situations in the past.

Recommendation

The institutions needed to address ABS need to be assigned accordingly, while law and regulations need to be created or harmonized as soon as possible. The institutional arrangement and national regulations are very crucial to ensure a fair and equitable sharing of the benefits derived from the use of genetic resources, under Nagoya Protocol.

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