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10 **DURC Landscape in Southeast Asia:**
11 **Prioritisation, Gaps, and Challenges**

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DURC Landscape in Southeast Asia: Prioritisation, Gaps, and Challenges

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Abstract

This article examines the governance of Dual Use Research of Concern (DURC) in Southeast Asia, highlighting both progress and persistent gaps in biosafety and biosecurity. While significant developments have been made in biosafety and biosecurity, the region remains underprepared to address the complexities of DURC. This under-preparedness stems from diverse factors, including varying levels of exposure to biosecurity threats across countries, competing priorities within national biosecurity agendas, limited awareness of DURC issues, and weak institutional capacity to implement effective oversight mechanisms. These factors create inconsistencies in the implementation of DURC governance across countries, undermining efforts to establish robust safeguards against potential misuse of scientific research. The article argues that addressing these domestic issues is crucial for building more effective DURC governance frameworks. Strengthening national policies, improving institutional capabilities, and fostering awareness of DURC risks are essential steps toward mitigating biosecurity threats and ensuring the responsible conduct of research within the region.

I. Introduction

Why Southeast Asia

Asia is among the fastest growing markets for biotechnology products today given dynamics such as its rising middle class, aging populations, and growing healthcare programmes.¹ By one estimate, the global biotechnology market was valued at USD1.38 trillion in 2023, with the Asia-Pacific contributing approximately 24% of global revenues (as of August 2024).² Asia's biotechnology market has been projected to grow the fastest across regions globally from 2023.³

Southeast Asia has seen a rapid growth in its biotechnology industry, which accelerated significantly in the face of the COVID-19 pandemic.¹ The BioPharma APAC Insight Series for instance identified Singapore's growing biopharmaceuticals hub; Thailand's rapidly growing industry; Vietnam's heavy investment in healthcare infrastructure; and Indonesia's growing population of 270 million and large and growing middleclass, which make the region a significant market for biopharmaceutical companies that rely on biotechnology. Beyond these, the other promising players in the Asia-Pacific region include China's Shanghai province, Taiwan, New Zealand, and Melbourne, owing to increased R&D activity. This has led to rapid compound annual growth of 16.8% in the Asia Pacific Region from 2023 to 2028.⁴

Southeast Asia is also an important region for biotechnology from both geoeconomic and geopolitical perspectives. According to Gong Xue, the growing demand for biotech

1 products has resulted in a significant influx of active pharmaceutical ingredients (APIs)
2 from China, which are essential raw materials for biotech production. She noted that
3 China is now the largest supplier of APIs to Indonesia, Vietnam, and other Southeast
4 Asian countries. This trend has made Asia a potential battleground for competition in
5 biotech innovation between China and the United States.⁵

6 There have been concerns whether the rapid growth in biotech research and
7 development in the region, could also pose a risk if the new knowledge developed fell
8 into the wrong hands and were used for malicious purposes. Dual-Use Research of
9 Concern (DURC) refers to “research that is intended to provide a clear benefit, but
10 which could easily be misapplied to do harm,”⁶ and this may be applicable to cases of
11 laboratory accidents, as well as targeted biocrime and/or bioterrorism and the
12 development of biological weapons. This concept has gained significant attention in
13 global security discussions, especially in Western countries, where comprehensive
14 policies have been developed to mitigate the risks associated with DURC.⁷

15 *Objectives and Research Question*

16 This article explores the DURC landscape in Southeast Asia, building on an earlier
17 report, “Emerging Biosecurity Landscape in Southeast Asia”, published by the S
18 Rajaratnam School of International Studies in collaboration with the Asian Centre for
19 Health Security.⁸ The report’s **coverage of biosecurity/biological threats included**
20 **risks** of emerging/re-emerging infectious diseases; laboratory accidents; biotech/dual
21 use research of concern; and deliberate/bioterrorism, which may cause harm to
22 humans. In the said report, we considered “**biological threats**” and “**biosecurity**
23 **threats**” **interchangeably**, as representing threats from biological agents that can be
24 harmful to humans.” We followed the WHO’s definition of **biological agents** in its
25 “Global Guidance Framework for the Responsible Use of the Life Sciences” (hereafter
26 “Global Guidance Framework”), as “A microorganism, virus, biological toxin, particle
27 or otherwise infectious material, either naturally occurring or genetically modified,
28 which may have the potential to cause infection, allergy, toxicity or otherwise create a
29 hazard to humans, nonhuman animals or plants.”¹ The WHO’s 2014 guide to EIDs and
30 zoonoses, also considers that “different pathogen classes include viruses, bacteria,
31 fungi and prions,”¹ and that a **pathogen**, is as “**an infectious agent (a germ) that is**
32 **capable of causing disease in a human, animal or plant host**”. While the report
33 focused on the broader aspect of biosecurity, this article focuses on the DURC aspect
34 of biosecurity and raises the following questions:

- 35 1. How big a concern is DURC to states in Southeast Asia?
- 36 2. To what extent are concerns on DURC reflected in the states’ policies and
37 commitment to international biosecurity regimes?
- 38 3. Do the regional states have the necessary protocols and practices for effective
39 DURC governance at the national level?

40 In examining these questions, we argue that while Southeast Asia has made strides
41 in biosafety and biosecurity, the region remains underprepared for addressing DURC.

1 This lack of preparedness can be attributed to a combination of differing security
2 priorities, limited awareness, and weak institutional capacity. Southeast Asia has
3 traditionally focused on addressing immediate security challenges such as political
4 instability, public health issues, and economic development. This has resulted in
5 placing biosecurity risks such as the DURC lower on their agenda. A comparison of
6 national policies and regional efforts will highlight where gaps exist and what steps
7 can be taken to improve the governance of dual-use research. This analysis is timely,
8 given the increasing role that biotechnology plays in the region's economic and
9 scientific development, and the potential security challenges that come with it.

10 The paper is structured as follows. Section II will discuss briefly the methodology
11 applied in this study, followed by the findings (section III) from our brief assessment
12 addressing the two research questions. Section VI presents our discussion of potential
13 explanations for the differences in attention to DURC within Southeast Asian countries.
14 Section V concludes.

15 II. Methodology

16 This paper comprises two stages of assessment. Part I of the assessment examines
17 the prioritisation by countries of DURC based on national statements in BWC meetings
18 and conventions, while Part II examines how this prioritisation (based on national
19 statements) is reflected in the policies adopted on the ground, in the five Southeast
20 Asian countries included in this study (Indonesia, Malaysia, Thailand, the Philippines,
21 and Singapore).

22 *Part I methodology*

23 A comparison of how DURC is prioritised among policymakers in Southeast Asia and
24 the rest of the world necessitates a comparative basis for accounting for the existing
25 levels of prioritisation to begin with. Yet, there is currently no existing explicit reference
26 point for comparing DURC policies. The next best approach is to compare DURC-
27 *related* policies in the present day based on the latest related literature, as was done
28 in a paper commissioned by the United States Committee on Dual Use Research of
29 Concern in 2017.¹ Piers Millet was tasked with assessing the gaps in international
30 governance of DURC.⁹ According to Millet, the Biological Weapons Convention (BWC)
31 is likely “the logical international forum through which to address DURC” from a
32 governance perspective. The BWC is a treaty that prohibits the use of biological and
33 toxin weapons in warfare. In the 2017 report by Millet, he observed that the importance
34 of DURC was highlighted in reports by the US, the Russian Federation, the Republic
35 of China, and the Commonwealth of Australia, given the ‘dual use potential’ in some
36 of the research conducted in these countries.”⁹ We examine and compare whether
37 there is *any* mention (whether *implicit* or *explicit*) of research and/or DURC within
38 BWC-related reports by the five Association of Southeast Asian Nations (ASEAN)
39 member states, focusing on the latest reports available. It is important to note that
40 despite its heightened global interest following the **Severe Acute Respiratory**
41 **Syndrome (SARS)** outbreak, attention to DURC as a policy and security issue has

1 remained relatively scarce in Southeast Asia. Discussions on DURC are typically
2 embedded within broader conversations about biosafety, biosecurity, and emerging
3 biological risks. It was only in 2014 that Malaysia explicitly raised concerns about
4 DURC in the context of bioterrorism.¹⁰

5 *Part II methodology*

6 The data for Part II of our assessment, on the adoption of DURC policies the ground,
7 was collected through two primary methods: semi-structured interviews with subject
8 matter experts and a thorough review of relevant governmental documents, policies,
9 and draft legislation. This mixed-methods approach was chosen to ensure both
10 qualitative insights from experienced professionals and contextual understanding from
11 official regulatory frameworks across Southeast Asia.

12 The semi-structured interviews were conducted with 32 experts from five Southeast
13 Asian countries: Indonesia, Malaysia, Thailand, the Philippines, and Singapore,
14 spanning from March 2024 to September 2024.ⁱⁱ These experts come from diverse
15 professional fields, including health, security, academia, laboratory management, and
16 biology. They were selected for their specialised knowledge in biosecurity, biosafety,
17 and biotechnology, ensuring a well-rounded perspective on the issues at hand. The
18 interviews focused on topics such as national biosecurity policies, gaps in current
19 governance frameworks, DURC oversight, the rapid development of biotechnology,
20 cyberbiosecurity concerns, bioterrorism, and regional cooperation.

21 In addition to the interviews, a comprehensive review of government documents,
22 policies, and draft legislation was conducted to supplement and contextualise the
23 qualitative data. This included publicly available documents, such as national
24 biosecurity strategies, laboratory biosafety and biosecurity guidelines, and relevant
25 legislative drafts concerning biosecurity governance in the five countries under study.
26 This in-depth document analysis helped to identify regulatory gaps and variations in
27 national approaches to biosecurity and DURC, providing a crucial backdrop to the
28 expert interviews.

29 *III. Findings*

30 *Part I: Assessment: How do Southeast Asian countries compare in prioritising DURC,* 31 *based on National Statements in BWC Reports/Commitments?*

32 All five of the ASEAN members included in our study had ratified the BWC (Appendix
33 table A1). Adding to this, we also examined the submission by countries of reports to
34 the UN Security Council (UNSC) as regards UNSC Resolution (UNSCR) 1540
35 applying controls to prevent non-state actors (i.e., potential terrorists) from gaining
36 access to weapons of mass destruction and found that all countries have made
37 submissions. Therefore, while the ratification of BWC,¹¹ and the submission of UNSCR
38 1540 national implementation reports were common among the five states, this does
39 not indicate that they will necessarily have more policies to regulate DURC.¹²

1 One potential caveat to using only the BWC ratification as basis for assessing the
 2 importance of DURC to countries, is that there was previously limited attention paid to
 3 this kind of research in BWC meetings, and it was only in the mid-2000s when DURC
 4 was raised during these meetings. As noted by Millet there was no mention of DURC
 5 in the outcome document of the BWC’s 2002 Fifth Review Committee, although it
 6 appeared twice in the outcome document of the 2006 Sixth Review Conference.⁹
 7 According to Millet, it was the 2008 Report of the BWC Meeting of State Parties that
 8 had explicit reference of the “value of being informed about advances in bio-science
 9 and bio-technology research with the potential of use for purposes prohibited by the
 10 convention” as well as “the necessity of strengthening ties with the scientific
 11 community” was made.⁹ In the same report, oversight measures were brought up
 12 although efforts were made to avoid language that would create “undue restrictions on
 13 scientific research, development, publication and biotechnology.”⁹ Thus, it was only
 14 in 2008 when the terms “dual-use” and “dual-use research” appeared in the report.
 15 Millet further observed that it was in the 2010s when more significant attention was
 16 given to DURC.

17 And so, we attempt a comparison of DURC prioritisation within Southeast Asia,
 18 following Millet’s methodology. We examine and compare whether there is mention of
 19 research and/or DURC within BWC-related reports by the five ASEAN member states,
 20 focusing on the latest reports available, namely i) National Statements to 2023
 21 Biological Weapons Convention — Meeting of States Parties;¹³ ii) National Statements
 22 to Review Conference of the BWC;¹⁴ and iii) national reports in the Biological Weapons
 23 Convention National Implementation Measures Database.¹² A summary of our
 24 findings is presented in Table 1 below, followed by further details on how we arrived at
 25 this assessment.

26 **Table 1: Summary of Relevance of DURC in National Statements to BWC**
 27 **Meetings/Conferences**

Country	2023 Biological Weapons Convention — Meeting of States Parties	2022 9th Review Conference of BWC	Biological Weapons Convention National Implementation Measures Database
Indonesia	Yes, Explicit:	Yes, Indirect	Yes, Explicit
Malaysia	Yes, Indirect	Yes, Indirect	N/A (No update)
Philippines	Yes, Indirect	Yes, Indirect	Yes, Explicit
Singapore	Yes, Indirect	Yes, Indirect	Yes, Explicit
Thailand	Yes, Indirect	Yes, Explicit	Yes, Explicit

28 Sources: United Nations Office for Disarmament Affairs,^{11,13} United Nations 1540
 29 Committee¹²

1 *1. 2023 BWC Meeting of State Parties – National Statements*

2 We find that Southeast Asia is rather late to the game as far as DURC is concerned.
3 Based on national statements during the latest **2023 Biological Weapons**
4 **Convention – Meeting of States Parties**, there is still no explicit recognition of
5 research or “dual-use” in most countries, with the exception of Indonesia, as part of
6 their national statements, and only implicit mention in the rest of the countries.¹³ (**Table**
7 **A2** in the appendix contains further details on the relevant statements in this regard).

8 *2. 2022 Ninth Review Conference of the BWC –National Statements*

9 Did DURC figure in the national statements of countries during the latest 9th Review
10 Conference of the BWC?¹⁴ Our findings show that only Thailand explicitly mentioned
11 it as a priority in its national BWC statements. Across four of the countries studied,
12 there was only implicit mention of DURC. (**Table A3** in the appendix contains further
13 details on the relevant statements in this regard).

14 *3. Biological Weapons Convention National Implementation Measures Database*

15 Finally, we reviewed the summaries of country practices under the “Biological
16 Weapons Convention National Implementation Measures Database.”¹² We observe
17 explicit mention of gain-of-function research and dual use research in four of the five
18 countries, except for Malaysia where there is no information on the UN ODA website.
19 (**Table A4** in the appendix) contains further details on relevant statements in this
20 regard).

21 *4. Summary and Questions that Remain*

22 While all countries have already ratified the BWC, this brief review value adds by
23 assessing whether DURC is in the BWC national statements or measures reported by
24 the five Southeast Asian countries, and whether the mention of research or DURC in
25 these statements is explicit or implicit.

26 Firstly, based on the National Implementation Measures Database for the BWC, **all**
27 **the countries have explicitly mentioned that there is some degree of oversight**
28 **over the DURC** (this is with the exception of Malaysia where the website indicates
29 that its webpage is still under development). The explicit reference to research/DURC
30 is further supported by one or more laws or policies on DURC oversight, such as
31 Articles 335 and 336 of “Health Law” in **Indonesia’s case**; “Manual of Laboratory
32 Biosafety and Biosecurity Standards” in the **Philippines’ case**; Section 39 of the
33 “Biological Agents and Toxins Act 2005” in **Singapore’s case**; and Sections 6 and 28
34 of the “Pathogens and Animal Toxins Act B.E. 2558” (2015) and Section 4 of the
35 Section 28 of “Announcement of the Ministry of Public Health Re: rules, procedures
36 and conditions” require that agencies must establish a biosafety control committee
37 (2017), in **Thailand’s case**.¹²

38 Secondly, the review in Part I of our assessment finds that despite the existence of
39 these laws/policies, the trend is that DURC is **often only mentioned indirectly within**
40 **national statements** during BWC meetings/conventions. It was only explicitly
41 mentioned by one of the five countries in the 2023 Biological Weapons Convention —

1 Meeting of States Parties (i.e., Indonesia)¹³ and, and by one of the five countries in
2 the 2022 9th Review Conference of BWC (i.e., Thailand).¹⁴

3 Therefore, there is a lack of consistent explicit mention of DURC in the latest national
4 statement reports among most of the countries, indicating a potential lack of saliency
5 of the issue in those countries. We now complement this with further sensing of the
6 actual adoption of DURC policies, in the next section.

7 *Part II. Assessment based on DURC Governance Practices in Five ASEAN*
8 *Countries*

9 To complement our analysis above, we conducted further comparisons of laws and
10 policies on the ground. The assessment of country-level DURC governance practices
11 focuses on four key aspects, namely, i) **Legal Measures on DURC**; ii) **List of**
12 **Security Sensitive Biological Agents (SSBAs)**; iii) **establishment of an**
13 **Institutional Biosafety (or Biosecurity/ Biorisk) Committee**; and iv) **the presence**
14 **of Agencies to govern DURC governance practices**. Our findings are summarised
15 in **Table 2** and further elaborated in this section.

16 **Table 2: Findings on DURC Governance: i) Oversight, ii) list of control**
17 **pathogens, iii) IBC, and whether and IBC is mandatory, iv) oversight agencies**

Countries	Legal Measure	List of Security Sensitive Biological Agents (SSBA)	Institutional Biosafety (or Biosecurity/ Biorisk) Committee	Oversight Agencies
Indonesia	Guidelines	Draft	Voluntary	No
Malaysia	Guidelines	Draft	Voluntary	No
The Philippines	Guidelines	Draft	Voluntary	No
Thailand	Law (implicit mention only of DURC)	Yes	Mandatory	Yes
Singapore	Law (explicit mention of DURC)	Yes	Mandatory	Yes

18 Source: Team analysis based on interviews as described in methodology

19
20 *1. Summary*

21 There is significant diversity in DURC implementation across the 5 countries studied
22 in this article. Of the five, only Singapore has the most robust biosecurity regime in

1 terms of i) Legal Measures on DURC; ii) List of Security Sensitive Biological Agents
2 (SSBA); iii) an Institutional Biosafety (or Biosecurity/ Biorisk) Committee; and iv) the
3 presence of Agencies to govern DURC governance practice. Following Singapore,
4 Thailand also has ii) SSBA list and iii) IBCs, but its PATA law only indirectly addresses
5 DURC (only implicitly mentioned in law, on Pathogens with Pandemic Potential or
6 PPP). The rest of the countries have not yet passed comprehensive laws governing
7 DURCs; had only draft SBA lists; had only voluntary (and not mandatory IBCs); and
8 no dedicated body for DURC oversight.

9 2. *DURC Governance in Southeast Asia*

10 i. **Legal Measures on DURC**

11 DURC governance remains inconsistent across Southeast Asia, with varying degrees
12 of legislative frameworks, policies, and implementation mechanisms among nations.
13 Indonesia currently lacks a national framework, legislation, or dedicated agency to
14 address DURC, leaving a significant gap in its biosecurity landscape. Although
15 Indonesia is a signatory to the BWC, which began explicitly addressing DURC in the
16 2012 Meeting of Experts, the country has yet to develop a comprehensive strategy for
17 assessing or regulating dual-use research.^{9,15} A draft Biological and Toxin Weapons
18 Bill, proposed in 2015, included provisions for mandatory licensing and registration for
19 facilities handling controlled biological agents. However, as the bill remains unenacted,
20 the regulatory system envisioned has not materialised, leaving areas like virology and
21 synthetic biology potentially vulnerable to misuse.

22 Malaysia, while similarly lacking national legislation and a dedicated agency for DURC,
23 has focused on awareness-building and voluntary guidelines. **The Laboratory
24 Biosafety and Biosecurity Policy and Guidelines (2015)** encourage institutions to
25 establish Institutional Biosafety and Biosecurity Committees (IBBCs) to oversee
26 research activities.¹⁶ Additionally, **the Malaysian Educational Module on
27 Responsible Conduct of Research (RCR)**, introduced in 2018, includes a chapter
28 dedicated to dual-use risks, emphasising a culture of safety and responsible science.¹⁷

29 The Philippines addresses related DURC concerns through **the Strategic Trade
30 Management Act**, which regulates the trade of hazardous materials, including
31 biological agents and associated technologies.¹⁸ The Department of Health has also
32 issued in 2023 the Laboratory Biosafety and Biosecurity Standards Manual which
33 serves as a reference document to update local laboratory biosafety and biosecurity
34 guidance.¹⁹ However, this law and guideline do not extend to the oversight of DURC
35 or related research activities, leaving a gap in managing dual-use risks domestically.

36 In Thailand, DURC is indirectly governed under **the Pathogens and Animal Toxins
37 Act (PATA)**, first enacted in 2015 and amended in 2020.²⁰ While PATA does not
38 explicitly mention DURC, it mandates licensing and strict biosafety and biosecurity
39 measures for individuals and organisations handling high-risk biological materials.
40 This provides a foundational framework for mitigating dual-use risks, though without
41 explicit DURC-specific provisions.²⁰

1 Singapore stands out for its robust and comprehensive measures to prevent the
2 misuse of laboratory research and address DURC. **The Biological Agents and**
3 **Toxins Act (BATA)**, enacted in 2006, regulates the possession, use, transfer, and
4 transportation of biological agents, ensuring strict control of research activities.²¹
5 Complementing this is **the Biorisk Code of Conduct for the Life Sciences Industry**
6 **and Professionals**, which aligns with international standards such as the BWC and
7 WHO biosecurity guidelines.²² Singapore also includes dual-use goods and research
8 under its **Strategic Goods Control List**, further strengthening its capacity to regulate
9 and mitigate DURC.²³

10 ii. **List of Security Sensitive Biological Agents (SSBA)**

11 Several Southeast Asian countries are in varying stages of developing or revising
12 national lists of Selective and Sensitive Biological Agents (SSBA), with some already
13 establishing frameworks and others still working through logistical and regulatory
14 challenges. In Indonesia, a national SSBA list has been drafted and is pending
15 approval by the parliament. This effort, led by the Indonesian One Health University
16 Network (INDOHUN) and the Indonesian Biorisk Association (ABI) with support from
17 the United States. The Biosecurity Engagement Program (BEP), aims to regulate
18 various aspects of SSBA management, including pathogen definitions, storage
19 protocols, and research activities. However, there is a significant delay due to
20 disputes over which ministry or agency should take responsibility for publishing the
21 document.²⁴

22 Malaysia has also worked on a list of sensitive biological agents, which is part of the
23 broader Biological and Toxin Weapons Bill (BWC Implementation Bill). However, like
24 Indonesia, the country has faced delays due to conflicting interests and political
25 obstacles, with the bill and the SSBA list remaining stalled since 2015. Malaysian
26 biosecurity experts are still reviewing the list, and until the bill is passed, there is limited
27 formal oversight of these agents.²⁵

28 Meanwhile, the Philippines has a draft SSBA list created by local biosecurity experts
29 and government agencies, “but it has not yet been finalised and published due to
30 ongoing delays with the related comprehensive BWC and biosecurity legislation,”
31 according to a Filipino biosecurity expert who helped develop a draft list.²⁶

32 This situation contrasts with Thailand, where the PATA includes a controlled list of
33 regulated agents. The PATA categorises dangerous pathogens into four groups, based
34 on risk factors such as prevention methods, treatment, and potential impact on
35 humans and animals. While Thailand has already established this classification, the
36 absence of an explicit DURC framework leaves room for improvement in the
37 comprehensive regulation of dual-use risks.²⁰

38 Finally, Singapore has already implemented a comprehensive and regularly updated
39 SSBA list. This list is part of a broader regulatory effort that includes the BATA and
40 aligns with international biosecurity standards. Singapore's advanced approach to
41 biosecurity is exemplified by its Programme for Research in Epidemic Preparedness

1 and Response (PREPARE), which specifically focuses on viruses with pandemic
2 potential.²⁷ This proactive research agenda demonstrates Singapore's commitment to
3 mitigating biosecurity risks through scientific innovation and preparedness.

4 iii. **Institutional Biosafety (or Biosecurity/Biorisk Committee)**

5 Institutional Biosafety Committees (IBCs) play a crucial role in managing biosecurity
6 risks, including DURC in Southeast Asia. However, just like the two previous
7 indicators, the implementation and effectiveness of IBCs vary widely across the region.
8 In Indonesia, IBCs are underdeveloped or absent in many research institutions. While
9 some universities have IBCs, their scope is usually limited to basic biosafety concerns,
10 and they often lack the training or guidelines to assess DURC potential. This gap
11 leaves Indonesia's research institutions vulnerable to the misuse of dual-use
12 technologies. An expert in Indonesia noted “that life scientists and researchers are not
13 aware that their research might already have DURC elements, underlining the need
14 for a more robust and informed IBC framework to address this issue effectively.”²⁴

15 IBCs are also not mandatory in Malaysia, and it is estimated that only 30 percent of
16 public universities have established one. Even where IBCs exist, they often face
17 challenges due to a lack of specialised knowledge in DURC and lengthy approval
18 processes. Research proposals can take months to be reviewed, which could delay
19 the identification of potential dual-use risks.²⁸ Malaysia's reliance on voluntary
20 compliance, coupled with limited institutional capacity, hinders timely intervention in
21 research with possible dual-use implications.

22 The Philippines has a similar system, where the establishment of Institutional
23 Biosafety and Biosecurity Committees (IBBCs) is not mandatory for BSL-3
24 laboratories, but these committees do review and approve research involving high-risk
25 pathogens. However, Filipino laboratory biosecurity experts claimed that “the lack of
26 IBBCs in smaller universities creates security gaps, as these institutions are less likely
27 to detect and address DURC risks.”²⁹

28 On the other hand, section 28 of Thailand's PATA mandates that agencies conducting
29 research establish biosafety control committees, providing a clearer regulatory
30 framework for overseeing research involving sensitive biological agents.²⁰ Additionally,
31 the Ministry of Public Health's 2018 Notification (Book 135, 43 Ngor) also requires
32 annual reporting on research activities, which contributes to more structured oversight
33 but does not specifically address DURC.³⁰ Singapore has a more structured approach,
34 with the BATA requiring facility operators to establish a biosafety committee. These
35 committees are responsible for ensuring that no research is conducted without a risk
36 assessment, ensuring a higher level of oversight for potential DURC activities.^{21,31}

37 iv. **Presence of Oversight Agencies to Govern DURC Governance** 38 **Practices**

39 In Southeast Asia, the oversight of DURC also remains inconsistent, with varying
40 levels of institutional involvement and regulatory frameworks. Indonesia, for instance,

1 has published a Code of Conduct on Biosecurity through the Indonesian Academy of
2 Sciences, which includes guidelines for handling dangerous pathogens, toxins, and
3 pathogens with pandemic potential (PPP), but lacks regulatory oversight or a
4 dedicated national agency to govern DURC.¹⁵ Similarly, Malaysia has not enacted any
5 specific legislation or created an agency to regulate DURC.²⁵ While both countries
6 have initiated some biosecurity frameworks, they lack the formal structures and
7 dedicated bodies required to fully address the risks associated with dual-use research.

8 The Philippines has a strong institutional presence through the Research Institute for
9 Tropical Medicine (RITM), which operates high-containment laboratories for
10 researching dangerous pathogens.³² However, the country lacks a national-level
11 agency dedicated solely to overseeing DURC in laboratories or the biotechnology
12 sector, leaving gaps in governance. Filipino biosecurity experts have highlighted the
13 risk of DURC in research, even within the state's high-security laboratories, suggesting
14 a need for more comprehensive oversight.³³

15 In comparison, Thailand has made significant strides by establishing the Department
16 of Medical Sciences under the Ministry of Public Health to oversee research involving
17 dangerous pathogens, especially those with pandemic potential.³⁰ Research
18 institutions are encouraged to create Institutional Biosafety Committees (IBCs) to
19 review and approve projects involving high-risk biological agents.³⁴ However, despite
20 these efforts, there is still no standardised approach to evaluating DURC potential in
21 research. The lack of a clear mandate for DURC assessment at the institutional level
22 weakens Thailand's biosecurity framework in this regard.

23 Singapore's approach to DURC oversight is more established, relying on existing
24 regulatory frameworks and collaborative efforts between multiple government
25 agencies. The Genetic Modification Advisory Committee (GMAC), in coordination with
26 agencies such as the Ministry of Health and the Singapore Food Agency, provides a
27 robust system for assessing the potential risks of DURC in research involving
28 genetically modified organisms (GMOs), viruses, and toxins.³⁵ Singapore's Biological
29 Agents and Toxins Act (BATA) requires BSL-3 laboratories to have IBCs that assess
30 research proposals and recommend risk mitigation strategies, ensuring that dual-use
31 risks are thoroughly reviewed and managed. This integrated, multi-agency approach
32 places Singapore ahead in terms of addressing DURC within the region.³¹

33 34 IV. Discussion: Potential explanations

35 We discuss four potential explanations why DURC in the five ASEAN countries'
36 practices, have been unevenly adopted, with limitations in most of these countries.

- 37 • Differing degrees of prior exposure to biological attacks/threats

38 In many Western countries, high-profile cases such as the 2001 anthrax attacks in the
39 U.S. and the rapid development of synthetic biology have heightened the awareness
40 of dual-use risks.³⁶ These events served as catalysts for the implementation of robust

1 DURC regulations and oversight mechanisms. In contrast, Southeast Asia has been
2 slower to develop similar frameworks, even though the region's growing biotechnology
3 industry and the increasing complexity of research capabilities make DURC a relevant
4 concern. Furthermore, incidents of accidental laboratory releases or the high likelihood
5 for bioterrorism in Southeast Asia underscore the importance of addressing these
6 risks, yet national policies and capacities remain limited.

7 One of the potential reasons why Singapore has the most robust biosecurity regimes,
8 is its previous exposure to multiple biosecurity threats. Over the past two and a half
9 decades, Singapore has experienced and battled various biological events - 1999
10 Nipah outbreak, 2001 anthrax hoaxes, 2003 SARS epidemic, 2009 H1N1 pandemic
11 and numerous influenza outbreaks as well as the recent COVID-19 pandemic and
12 mpox cases. In this regard, the establishment of national containment BSL
13 laboratories in recent years has been for the strengthening of Singapore's health
14 security and pandemic preparedness. But certain research may cause harm through
15 accident or misapplication. A Singapore biosecurity professional stated that "with this
16 kind of research activities involving dangerous pathogens, guidelines and proper
17 conduct standards are needed, along with effective oversight by institutions and
18 leadership (i.e. robust risk management)." ³¹

19 • **Competing Priorities of other Biosecurity Threats**

20 Another explanation could be the differing security priorities. For instance, the absence
21 of effective oversight of DURC can be traced to weakness in the broader biosecurity
22 governance in the Philippines (of which DURC governance is only one of its
23 components). The delay in establishing nationwide SSBA list also highlights the
24 challenges countries in the region face in developing effective biosecurity frameworks
25 and aligning priorities. In our interview with Filipino laboratory biosecurity practitioners,
26 they noted that:

27
28 "More attention and resources are invested in biosafety than in biosecurity. The
29 absence of a comprehensive biosecurity legislation poses a big challenge to effective
30 responses to bioterrorism and DURCs. Currently, it is not in the legislative priority of
31 the Philippine Congress as it has low awareness on the importance of a
32 comprehensive biosafety and biosecurity legal framework."²⁹

33
34 To assess whether this argument in the Philippines can be generalised across the five
35 countries, **Table 3** below shows opinions of interviewed experts, indicating the ranking
36 of biosecurity risk perceptions in Southeast Asia. This is drawn from our earlier report,
37 with a scale of "high" (red fill), "moderate" (yellow fill) and "low" (blue fill) levels.⁸
38 Experts ranked i) emerging/reemerging infectious diseases (EIDs/REIDS) highest
39 across all countries, while the risk of ii) laboratory accidents are perceived to be high
40 in Malaysia and the Philippines, moderate in Indonesia, and low in Thailand and in
41 Singapore.⁸ Next, Indonesia places a high-risk perception on iii) DURC within the
42 biotechnology industry/research clusters, while this risk is perceived as moderate in

1 the Philippines, low in Malaysia and Singapore, and less significant in Thailand. Finally,
 2 the risk perception on iv) deliberate misuse/bioterrorism is moderate in Malaysia, the
 3 Philippines and Singapore, but low in Indonesia and Thailand. It must be noted that
 4 risks, such as bioterrorism or breaches of laboratory biosafety, are perceived to be
 5 low/moderate because of established health and security systems and regulations that
 6 can mitigate or prevent the said risk, but not low in terms of how these are prioritised
 7 by the state.

8
 9 **Table 3: Summary Table of Southeast Asia's Biosecurity Risk Perceptions**

	i) EIDs/ REIDs	ii) Laboratory Accidents	iii) Biotech / DURC	iv) Deliberate misuse/ Bioterrorism
Indonesia	High	Moderate	High	Low
Malaysia	High	High	Low	Moderate
Philippines	High	High	Moderate	Moderate
Singapore	High	Low	Low	Moderate
Thailand	High	Low		Low

10 *Source: Team analysis. Note: Other types of risk will be further explored in later*
 11 *editions/versions of this report, as the research is ongoing for ASEAN countries.*

12 Based on **Table 3**, it appears that DURC is only one among the many biosecurity
 13 threats facing the region. The lack of comprehensive DURC governance leaves these
 14 growing industries vulnerable to dual-use risks, including the potential misuse of
 15 research for malicious purposes or the unintentional release of dangerous pathogens.
 16 Accidental releases from laboratories, which have occurred globally, highlight the need
 17 for more stringent biosafety and biosecurity measures that include DURC
 18 assessments. Moreover, as the hotspot of terrorism—whether by non-state actors or
 19 other entities—it is critical for Southeast Asia to strengthen its regulatory frameworks
 20 to ensure that scientific advancements do not inadvertently contribute to security risks.

21 • **Lack of a Comprehensive Biosecurity Policy Framework**

22 The lack of a comprehensive biosecurity legal framework also impedes the
 23 development of effective DURC measures in some of the Southeast Asian countries.
 24 Singapore demonstrates that the adoption of a biosecurity policy framework can
 25 effectively enhance the development of DURC oversight mechanisms. DURC is a
 26 biosecurity issue as life sciences research could be misused to pose a significant
 27 threat to public health, agriculture, animals, the environment, or national security.
 28 Managing DURC is a key aspect of biosecurity and therefore necessitates a
 29 comprehensive biosecurity policy framework. Effective management of DURC
 30 requires a robust policy framework. Although all five countries—Indonesia, Malaysia,
 31 the Philippines, Singapore, and Thailand—are signatories to the BWC, the absence

1 of comprehensive biosecurity laws in Indonesia, Malaysia, and the Philippines to fully
2 implement the Convention makes it difficult to establish effective policies for DURC
3 oversight.

4
5 In mitigating potential and emerging biological risks, the development of biosafety
6 governance at the national level is more robust and have longer history than
7 biosecurity. Preventing the possible adverse effects of genetically modified organisms
8 or GMOs on food safety, public health and the environment was the initial factor that
9 pushed countries to adopt stronger biosafety frameworks that began in the 1990s.
10 They also subsequently ratified (with the exception of Singapore) Cartagena Protocol
11 on Biosafety, given their common concerns over GMOs.

12 Currently, existing policies reveal that biosafety governance is much stronger than
13 biosecurity governance. In recent years, with their ratification of the Biological
14 Weapons Convention, Southeast Asian countries have crafted various government
15 regulations and legislative frameworks to implement the BWC. However, a majority of
16 countries in the region have yet to produce a comprehensive biosecurity act or BWC
17 implementation act. Singapore has put in place a robust biosafety and security regime,
18 underpinned by the BATA legislation. Its government regularly reviews and amends its
19 legislation, practices, and procedures to ensure they remain relevant and aligned with
20 international best. Thailand's PATA aligns with the current global context, including
21 outbreaks of emerging and re-emerging diseases, as well as advances in modern
22 biotechnology, such as the genetic modification of pathogens, which can be used for
23 both beneficial and harmful purposes.³⁴

24 Biosecurity regulations in most of the Southeast Asian countries remain patchy,
25 characterised by varying degrees of stringency and enforcement across different
26 countries. The region's diverse landscape of agricultural practices, wildlife trade, public
27 health capacity, national security interests and economic priorities contributes to the
28 inconsistent implementation of biosecurity measures.

29 One key scenario that should be considered is a DURC incident in a research lab in
30 any of the countries in the region that would have transboundary consequences. With
31 lack of effective DURC governance even at the national level in most of Southeast
32 Asian countries, it would be extremely challenging for national response agencies to
33 deal with possible cases of DURC accidents that would have severe implications on
34 public health. Moreover, given the lack of national policies on DURC in most of the
35 Southeast Asian countries, having a harmonised ASEAN-wide regional policy is not
36 feasible. It follows that it would be extremely difficult to mount a regional response and
37 provide assistance to the affected country. It would be difficult for countries to
38 coordinate joint/regional responses in case of lab accidents, that would have regional
39 consequences.

40 Another significant gap is the lack of national control list of dangerous biological
41 agents. The oversight of DURC with especially dangerous pathogens, toxins,
42 pathogens with pandemic potential entails a national control list of biological agents.

1 Singapore and Thailand have fully developed a systematically categorised list of
2 biological agents, which can translate into effective regulatory oversight of DURC and
3 limiting the capacity of malicious actors to access biological agents. Meanwhile, some
4 countries in Southeast Asia have just started developing such a list through national
5 consultations and workshops with stakeholders and agencies involved in national
6 security, health services, life sciences and biotechnology.

- 7 • **Low Awareness of DURC and Biosecurity**

8 “Several life science researchers have conducted research without realising that it
9 could be classified as DURC,” noted one of our interviewees.²⁴ In fact, this sentiment
10 is shared among several Southeast Asian countries, indicating a limited awareness of
11 dual-use research concerns among researchers. This lack of awareness may result
12 from the absence of comprehensive biosafety and biosecurity regulations and
13 protocols, as well as the differing capacities and effectiveness of IBCs to detect and
14 review DURC. Additionally, certain universities and private organisations do not have
15 established research protocols or oversight bodies, such as IBCs, in place.

16
17 Low awareness of DURC could also come from the lack of biosecurity awareness in
18 general. In fact, our research interviews indicated that even in Singapore and Thailand,
19 where there are strong biosecurity legal frameworks, life science and biotechnology
20 researchers still have limited awareness of potential indications of DURC in their
21 respective projects and biosecurity in general. A biosecurity expert opined that “a huge
22 awareness gap exists between biosafety and biosecurity.” Scientists, medical
23 professionals, the health security community, academics, and laboratory staff are
24 more accustomed to biosafety practices, whereas “biosecurity remains a relatively
25 unfamiliar concept to many of these groups.”²⁹

26
27 To enhance awareness and oversight of DURC, we strongly recommend the
28 mandatory establishment of IBCs within research institutions in all Southeast Asian
29 countries, given that Singapore is the only country in the region that has a noticeably
30 clear and strict requirement on the establishment of IBCs in life science and health-
31 related research facilities. Additionally, all IBC members should undergo standardised
32 training to ensure consistent expertise in biosafety and biosecurity and that they are
33 updated on new developments in modern biotechnology and life sciences.
34 Furthermore, the establishment of a national-level coordinating body or committee on
35 DURC with oversight functions is also advised to strengthen DURC governance. This
36 body would be responsible for setting uniform standards and protocols, facilitating
37 national trainings for all IBCs as well as promoting the adoption of best practices
38 across institutions, thereby fostering a cohesive and robust framework for oversight.

39 40 **VI. Way Forward**

41 Southeast Asia has seen significant advancements in biotechnology, with an
42 increasing number of research institutions and laboratories working on sensitive areas

1 such as synthetic biology, genetic engineering, and virology.³⁷ With the rapid increase
2 in the demand for biotechnology in Southeast Asia, DURC has now become an
3 important issue for the region due to the potential risks associated with accidental
4 laboratory releases and bioterrorism.

5 Our findings show a significant variance in DURC governance in Southeast Asia,
6 based on the perspectives reflected in the national statements and measures in Part I
7 of our assessment, and in policies that have been adopted domestically in Part II of
8 our assessment. We have argued that the diversity in institutional divergence is
9 partially attributable to four factors: differing degrees of prior exposure to biosecurity
10 threats among the five countries thus according low priority to DURC as a biosecurity
11 concern; competing priorities given other biosecurity threats (EIDs, bioterrorism and
12 laboratory accidents); lack of DURC oversight policies; and low levels of awareness
13 of biosecurity threats (including among legislators). If Southeast Asia were to meet the
14 growing market demand for biotechnology products within and beyond the region, then
15 it behoves countries through ASEAN to promote greater awareness of DURC
16 governance, and for the regional body to provide guidance to its member states in
17 generating supportive policy environments.

18 Today, global guidelines already exist on mitigating biorisks within biosafety labs, as
19 noted in the WHO's "Global guidance framework for the responsible use of the life
20 sciences: Mitigating biorisks and governing dual-use research" issued in 2022.³⁸ The
21 low hanging fruit for ASEAN, moving forward, would therefore be to promote a regional
22 campaign to regionalise and localise this initiative among the ASEAN member states.
23 This can be done by issuing guidelines to its member states on the how best to adopt
24 the practices recommended in the WHO's guidance framework. Additionally, the
25 region may work towards developing an agreed list of SSBA that are relevant to the
26 member states. This could likely differ from the prioritised list of SSBA in more
27 developed countries such as the United States or in European countries but is
28 nonetheless important for biosecurity governance.

29 Finally, there is no one-size-fits all model, as can be seen in diversity of approaches,
30 for instance, Thailand's approach of assigning oversight to a dedicated agency, as
31 opposed to Singapore's approach which builds on existing structures coordinated
32 within a whole-of-government mechanism. By sharing these best practices among the
33 ASEAN member states, ASEAN can help lay the foundations for improved DURC
34 oversight and governance regionally.

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37 participated in our research interviews for sharing their subject matter expertise and
38 perspectives.

39

40

1 Appendix

2 Appendix Table A1: Ratification of BWC among Key ASEAN Member States

Countries	Biological Weapon Convention	UN Security Council Resolution 1540 (Reports of National Implementation)
Indonesia	Ratified, 1992	Submitted to UN, latest 2018
Malaysia	Ratified, 1991	Submitted to UN, latest 2018
The Philippines	Ratified, 1973	Submitted to UN, latest 2020
Thailand	Ratified, 1975	Submitted to UN, latest 2019
Singapore	Ratified, 1975	Submitted to UN, latest 2020

3 Sources: UNODA Disarmament Treaties Database,¹¹1540 Committee¹²4 Appendix Table A2: Is DURC or Research in the National Statements of the Five
5 ASEAN Countries Involved, under **2023 Biological Weapons Convention —**
6 **Meeting of States Parties?**

Country	Mention of DURC
Indonesia	Yes, explicit: “The importance of involving the scientific community and industry experts to identify and address the dual-use implications of scientific and technological advancements” (page 2, emphasis ours)
ASEAN (Malaysia one of signatories; no national statement from Malaysia)	Yes, indirect: “ peaceful uses of biological, chemical and nuclear technology” (p.1 , emphasis ours) ⁱⁱⁱ indirectly indicates awareness of non-peaceful uses
Philippines	Yes, indirect: only “CBRN National Action Plan” and “BWC Confidence Building Measures”)
Singapore	Yes, indirect: “robust biosafety and biosecurity regime, underpinned by the Biological Agents and Toxins Act (BATA)”
Thailand	Yes, indirect: “address various challenges including those that are derived from the impacts of technological developments . We stress the importance of knowledge sharing, technological transfer and capacity building” (page 2, emphasis ours)

7 Source: National statements in United Nations Office for Disarmament Affairs, 2023¹³

8

1 Appendix Table A3: Is DURC or Research in the National Statements of the Five
2 ASEAN Countries Involved, under the **9th Review Conference on the BWC?**

Country	Mention of DURC
Indonesia	Yes, Indirect: “while reviewing the operation of the Convention, the States Parties shall take into account any new scientific and technological [SnT] developments relevant to the Convention [BWC] . We however have never assumed this mandate in the past Review Conferences. We note that the States Parties have widely recognized the need to establish a SnT review mechanism and various constructive proposals have also been submitted on this matter. We therefore hope that this Conference will find a landing zone to move this matter forward” (emphasis ours)
Malaysia	Yes, Indirect: “review of developments in the field of science and technology related to the Convention; strengthening national implementation, assistance, response and preparedness; addressing concern on compliance issues; and strengthening the BWC institutional matters. ” (emphasis ours)
Philippines	Yes, Indirect: “an advisory mechanism recognizing the need for a proper balance between risk mitigation and promoting innovation to maximize benefits from peaceful uses of biotechnology. ” (emphasis ours)
Singapore	Yes, Indirect: “ robust biosafety and security regime , underpinned by the Biological Agents and Toxins Act (BATA). We constantly review our legislation and procedures to ensure they remain relevant and aligned with international best practices. By 2025, Singapore will have our first Biosafety Level (BSL) 4 lab, which will be equipped to handle highly infectious and lethal diseases such as Ebola.” (emphasis ours)
Thailand	Yes, Explicit: “On Thailand’s part, legislations and measures have been put in place to ensure biosafety and biosecurity and the prevention of the misuse of pathogen which also cover all the dual-use items. In addition, the BIOTEC also develops training courses to raise awareness on biosafety amongst researchers and students.” (emphasis ours)

3 Source: National statements in United Nations Office for Disarmament Affairs, 2022¹⁴

4

1 Appendix Table A4: Is DURC or Research in the National Statements of the Five
 2 ASEAN Countries Involved, under the **Biological Weapons Convention National**
 3 **Implementation Measures Database?**

Country	Mention of DURC
Indonesia	Yes, Explicit: “Oversight of life-sciences dual-use research: Articles 335 and 336 of Health Law require research to comply with ethical and scientific principles in compliance with provisions of laws and regulations. Any research of utilization of health technology must consider potential risks and benefits to public health.”
Malaysia	No update: Website entry was “under development” as of the time of access on 24 October 2024
Philippines	Yes, Explicit: “Oversight of life-sciences dual-use research: Institutional Biosafety and Biosecurity Committees review, approve and oversee research involving the use of recombinant or synthetic DNA/RNA and other biohazards especially for Dual Use Research of Concern. Biorisks officers have advisory functions to the management on establishing and monitoring workplace biosafety and biosecurity procedures.”
Singapore	Yes, Explicit: “Oversight of life-sciences dual-use research: Under Section 39 of the Biological Agents and Toxins Act 2005, every operator of a facility must appoint a biosafety committee. Section 41 of the Act requires operators to ensure no research, teaching or operational activity involving biological agents or toxins at the facility is undertaken until a risk assessment of the activity is conducted by the biosafety committee. Part 5 of the Biorisk Code of Conduct for Life Sciences Industry and Professionals also addresses institutional oversight over research.”
Thailand	Yes, Explicit: “Oversight of life-sciences dual-use research: Sections 6 and 28 of the Pathogens and Animal Toxins Act B.E. 2558 (2015) and Section 4 of the “Announcement of the Ministry of Public Health Re: rules, procedures and conditions that agencies under section 28 must comply with and establishing a biosafety control committee (2017)”, provide for oversight over research for the purpose of disease control, disease prevention and therapy, which involves pathogens or animal toxins.”

4 Source: National statements in United Nations 1540 Committee, 2024¹²

5

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ⁱ The committee is co-chaired by Co-chaired by **Richard A. Meserve (NAE)**, Senior Of Counsel, Covington & Burling LLP and **Harold E. Varmus (NAS/NAM)**, Lewis Thomas University Professor, Weill Cornell Medicine.

ⁱⁱ Conducting interviews with our research participants has been approved by the Institutional Review Board of the Nanyang Technological University with Protocol Reference Number IRB-2023-1047.