

## Nature, colonial science and nation-building in twentieth-century Philippines

Ruel V. Pagunsan

*This article examines colonial nature-making in twentieth century Philippines. It particularly looks into natural history investigations of the American-instituted Bureau of Science and the ways in which it created a discursive authority for understanding the Philippine natural environment. These biological investigations, the article argues, did not only structure the imperial construction of the colony's nature, but also provided a blueprint for imagining notions of national integration and identity. The article interrogates the link between colonial scientific projects and nation-building initiatives, emphasising the scripting of the archipelago's nature and the creation of a national science through biological spaces.*

In the aftermath of the Pacific War in the Philippines that brought 'total destruction' to the country's 'exceedingly valuable and irreplaceable natural history collections', Eduardo Arguelles Quisumbing (1895–1986), the longest-serving director of the Philippine National Museum (PNM), embarked on a 'colossal' mission to rebuild the Natural History Museum of the newly independent Philippines. He rendered a sense of national urgency to the mission, arguing that the museum was an essential 'repository' not only for scientific specimens but also, and more importantly, for 'the Philippine culture'.<sup>1</sup> As director of the PNM from 1934 to 1961, utilising his official and overseas connections, he headed the relentless project of collecting, mounting and identifying natural history materials, in particular botanical specimens. For his many scientific contributions, primarily the rehabilitation of the National Herbarium, the Philippine government conferred on Quisumbing the National Scientist award in 1980.

Ruel V. Pagunsan is an Associate Professor at the Department of History, University of the Philippines Diliman. Correspondence in connection with this article should be addressed to: [rvpagunsan@up.edu.ph](mailto:rvpagunsan@up.edu.ph). This article is a revised version of a paper presented at 'Southeast Asian Natures: Environmentalism and the Anthropocene in Southeast Asia', University of California Riverside, 13 Mar. 2018. My gratitude to the workshop organisers, particularly David Biggs, Christina Schwenkel and Hendrik Maier, and to co-participants for their insights, references and help. I also wish to thank the *JSEAS* editors and reviewers for comments and suggestions. The archival and library research for this article was conducted during my PhD research; I wish to thank the Department of History, National University of Singapore, for its support. Finally, I am grateful to the University of the Philippines for assistance and making it possible for me to attend the workshop.

1 Elmer Merrill, 'Destruction of the Bureau of Science in Manila', *Science* 101, 2625 (1945): 401; Serlie Barroga-Jamias, 'Eduardo A. Quisumbing: Botanist par excellence and father of Philippine orchidology (1895–1986)', in *National Scientists of the Philippines (1978–1998)* (Quezon City: National Academy of Science and Technology; Anvil, 1998), pp. 164–74.

Aligning the rehabilitation of natural history collections along the national agenda was not just emblematic of the country's post-war recovery efforts. Quisumbing's endeavours may be understood as a perpetuation of colonial state initiatives tying national progress and identity with ostensibly universal scientific standards. The PNM and Quisumbing are both 'legacies' of US colonialism. The former traces its beginnings to the Museum of Ethnology, Natural History and Commerce created by the US Philippine Commission in 1901. The Museum, for much of its early history, was under the supervision of the Bureau of Science, the principal agency for scientific investigations established in 1905. Quisumbing first served as a junior botanist in the Bureau and later as assistant director of its museum division. The Filipino botanist's post-war advocacy was shaped by his close proximity to the colonial models of nation-building. A product of an American colonial and metropolitan education, Quisumbing saw himself as embodying the ideals of a scientific nation and appropriating them in postcolonial Philippine society.

Looking at the colonial context that honed Quisumbing's early career, this article examines the ways in which the scientific making of the natural environment intertwined with nation-building pursuits. This examination informs the key question of this article: How did colonial scientific investigations of the natural environment produce notions of nationhood?

The article interrogates over three decades of colonial nature-making in the Philippines — from the Bureau's origin as a laboratory in 1901 to its appointment of Filipino scholars to research natural resources after the inauguration of a Filipino-led Commonwealth Government in 1935. Throughout the American regime, nature had been understood as a vital element of imperial expansion. In the 1920s, as moves toward independence were taking shape, nature became associated with nation-building. The expanding meaning of the Philippine environment was best illustrated in the Bureau's projects, particularly in its natural history surveys, scripting of Philippine nature and creation of biological laboratories. I argue that these biological investigations did not only structure colonial scientists' imperial vision, but also provided the blueprint for a 'national' imagination.

### **Science, knowledge production and nationalism**

During his political exile by the Spanish colonial government in Dapitan in northern Mindanao (1892–96), Filipino physician and patriot José Rizal collected natural history specimens for museums in Manila and Europe, performed taxidermy operations, and identified local species of flowers, shells and insects. He maintained a correspondence with the German zoologist Adolph Meyer, who sent books to Rizal in exchange for crates of specimens from the Philippines. Though his movement was limited, Rizal found encouragement from Meyer and other European scientists who prodded him to continue with specimen collecting, and even encouraged him to involve native collectors to increase the possibility of discovering 'new varieties' of species that would be 'very rewarding for science'.<sup>2</sup> Like Quisumbing, Rizal deployed science as a way of imagining the would-be Philippine nation. Aside from natural

2 K.M. Heller, Letter to Jose Rizal, Dresden, 5 Feb. 1895, *Miscellaneous correspondence of Dr. Jose Rizal* (Manila: Philippine National Historical Institute, 1992), pp. 315–16.

history, Rizal and fellow *ilustrado* (lit., ‘the enlightened’; Filipino educated class) immersed themselves in ethnology, linguistics and other currents of modern knowledge in their project to scientifically reconstruct an indigenous history and culture. *Ilustrado* writings, crafted along the ideas of anti-colonial nationalism, laid down the intellectual foundations for the creation of a Filipino national identity and its symbols.<sup>3</sup>

Unlike Quisumbing, however, Rizal and other Spanish-era Filipino intellectuals operated outside the colonial ambit of knowledge construction. Sidelined by the Spanish colonial state, the *ilustrado* connected themselves to outside scholarship in order to create narratives that ‘saw themselves and their homelands figured’.<sup>4</sup> American-educated Filipinos, on the other hand, were right at the centre of colonial epistemic production, participating in various state projects aimed at creating a corps of native ‘experts’. Quisumbing, for instance, participated in the investigation and utilisation of Philippine flora and fauna according to contingent and expanding state interests and priorities. Throughout his scientific career, he witnessed how the Philippine natural world had become an object and subject of nation-state building projects. Warwick Anderson and Hans Pol have shown that medical and biological scientists were the first among the generation of educated natives in colonial Southeast Asia to articulate ideas of anti-colonial nationalism.<sup>5</sup> In the Philippines, Caroline Hau argues, US colonialism was able to change the direction and content of Filipino nationalism by investing in developing an American-oriented native intelligentsia.<sup>6</sup> As ‘modern’ and ‘model’ citizens, this new breed of *ilustrado* would also be in the vanguard of nation-building in the twentieth century.

Nature-making in the twentieth century was interwoven with nation-building. The discovery, cataloguing and codifying of Philippine landscapes and species served as the foundational mechanisms in which to articulate the country’s biological geography as a unitary body. Colonial institutions devoted to nature investigations strengthened imperial capacities to govern the colonised, but at the same time, cultivated an agenda of national integration. Benedict Anderson’s conceptualisation of nation formation remains relevant in this work.<sup>7</sup> Anderson outlined the emergence an imagined national community from collective experiences that molded common memory and shared stories. Distinctly relevant to Southeast Asia, moreover, was the role of the ‘local colonial state’ in engendering the ‘grammar of nationalisms that eventually arose to combat it’.<sup>8</sup> Anderson suggests that colonial governments helped create a ‘consciousness of connectedness’ through technologies of rule such as the census, maps and museums, all of which projected and portrayed the nation

3 See Resil Mojares, *Brains of the nation: Pedro Paterno, T.H. Pardo de Tavera, Isabelo de los Reyes, and the production of modern knowledge* (Quezon City: Ateneo de Manila University Press, 2006).

4 Megan Thomas, *Orientalists, propagandists, ilustrados: Filipino scholarship and the end of Spanish colonialism* (Minneapolis: University of Minnesota Press, 2012), p. 7.

5 Warwick Anderson and Hans Pol, ‘Scientific patriotism: Medical science and self-fashioning in Southeast Asia’, *Comparative Studies in Society and History* 54, 1 (2012): 93–113.

6 Caroline Hau, ‘Foreword’, in Thomas, *Orientalists, propagandists, ilustrados*, (Quezon City: Anvil, 2016), p. xvii.

7 Benedict Anderson, *Imagined communities: Reflections on the origin and spread of nationalism*, rev. edn (London: Verso, 2006).

8 *Ibid.*, p. xiv.

as a tangible, knowable and unified body.<sup>9</sup> This article extends the discussion by exploring the function of nature-making in nation building. Focusing on the natural sciences, it examines the colonial state's appropriation of nature to convey a sense of national territory, attachment, narrative and responsibility.

Scholars have interrogated the mechanisms in which science helped redefine natural spaces as political categories. The scientific construction of Southeast Asia's environment had its origins in colonialism. Colonial accounts are said to have 'helped open Western scientific eyes to the abundant variety of flora, fauna and marine life' in the region.<sup>10</sup> The colonial production of the region's natural history carried templates and paradigms that resonated in the ways the region was being imagined as an ecological frontier. Scholars have linked the practices of natural history with the expansion of Western colonialism. Some even refer to it as the nineteenth century's 'big science' because of its role in shaping imperial ambitions for control of territory and nature.<sup>11</sup> As a science, natural history bestowed concepts and categories to transform 'unknown' and 'complex' environments into mapped and classified entities, and provided pertinent frameworks in which to extract the relevance and usefulness of nature. In particular, the Linnaean system of standardised classification facilitated the annexation of species from all parts of the globe to the Western scientific 'code'.<sup>12</sup>

The increasing concern to order and classify the natural world paved the way for the delineation of natural history into specific subjects such as entomology, ornithology, botany and ichthyology. At the heart of this evolution to particularity were institutions that had transformed the study of nature into academic pursuits. Museums, academies and universities became important sites of nature-making by subjecting the natural specimens to scientific naming, descriptive analysis and laboratory experimentation. These institutions were not only repositories of collected specimens but also 'arenas for the discussion of various schemes for classifying and arranging' the environment.<sup>13</sup> Attendant to the partition of natural history into specialised disciplines was the rise of specialised journals and bulletins, most of which were administered by the same institutions that sponsored the transplanting of specimens from fields to cabinets and laboratories. Over the second half of the nineteenth century, there emerged 'countless new publications ... designed in part to bring order and efficiency to literary research in natural sciences'.<sup>14</sup>

Knowledge-producing institutions were replicated in the colonies to facilitate their own research autonomous from the metropolitan purview. Historians of

9 See Anderson, *Imagined communities*, pp. 163–85.

10 Victor Savage, *Western impressions of nature and landscape of Southeast Asia* (Singapore: Singapore University Press, 1984).

11 Roy Macleod, "'On visiting the moving metropolis": Reflections on the architecture of imperial science', in *Scientific colonialism: A cross-cultural comparison*, ed. Nathan Reingold and Marc Rothenberg (Washington, DC: Smithsonian Institution Press, 1987), p. 219.

12 Staffan Müller-Wille, 'Walnuts at Hudson Bay, coral reefs in Gotland: The colonialism of Linnaean botany', in *Colonial botany: Science, commerce and politics in the early modern world*, ed. Londa Schiebinger and Claudia Swan (Philadelphia: University of Pennsylvania Press, 2005), pp. 34–48.

13 John MacKenzie, *Museums and empire: Natural history, human cultures and colonial identities* (Manchester: Manchester University Press, 2010).

14 Alex Csiszar, 'Seriality and the search for order: Scientific print and its problems during the late nineteenth century', *Journal on the History of Science* 48, 3–4 (2010).

Southeast Asia have interrogated the establishment of gardens, museums and scientific agencies in the colonies as the way for colonial governments to invigorate and modernise investigations of natural resources for profit and prominence. Andrew Goss, in *The floracrats*, examines the Buitenzorg Botanical Gardens in Java as the manifestation of Dutch efforts to transplant the Enlightenment tradition in the conduct of tropical research in colonial Indonesia.<sup>15</sup> Goss shows how the floracrats — ‘naturalists working as colonial officials on state projects’ — utilised the Buitenzorg Botanical Gardens to boost the East Indies’ international reputation as a ‘center of agricultural knowledge’.<sup>16</sup> Timothy Barnard, in *Nature’s colony*, positions the Singapore Botanic Gardens at the centre of the British endeavour to gain knowledge and control of the botanical world of the Malay Peninsula.<sup>17</sup> In illustrating the works of the Singapore ‘economic garden’ in the successful transformation of introduced species into commercial items, notably rubber and palm oil, Barnard affirms the role of botanical research in achieving imperial wealth and power.

In the Philippines, the US colonial state ventured into various projects that defined and fixed the national territory. During their rule in the first half of the twentieth century, the Americans built the epistemic infrastructure and apparatus to inventory and codify the colony’s natural resources. The Bureau of Science, mandated to carry out ‘practically all phases of natural-history investigations’, was at the forefront of government endeavours to annex the archipelago’s natural environment into colonial knowledge.<sup>18</sup> This colonial institution produced forms of knowledge, which while primarily intended to strengthen state scientific capacity, had constituted a basis for advancing ideas about Filipino nationality.

Scholars of Philippine history have argued that US colonialism had engineered a brand of Filipino nationalism embedded within American notions of development and modernity. Resil Mojares, in particular, has opined that much of what contemporary Philippines has considered as national symbols and traditions were produced during the US regime.<sup>19</sup> The colonial state, according to Mojares, was successful in creating national institutions ‘charged with being the keepers and shapers of national identity’. Institutions such as the National Museum, the Bureau of Science, and the University of the Philippines were created to stimulate the production and propagation of a national character. Through bulletins and journals, public commemorations, exhibits and public fora, these institutions aimed to entice Filipinos about new and ‘rational’ ways of building the nation. Mojares argues that through these institutions, US colonialism had shifted the discourse of nationalism in the Philippines from the revolutionary, militant forms of nationalism in the war years (1898–1901) to the

15 Andrew Goss, *The floracrats: State-sponsored science and the failure of enlightenment in Indonesia* (Madison: University of Wisconsin Press, 2011).

16 *Ibid.*, pp. 10, 80.

17 Timothy Barnard, *Nature’s colony: Empire, nation and environment in the Singapore Botanic Gardens* (Singapore: NUS Press, 2016).

18 Elmer D. Merrill, *Twenty-first annual report of the Bureau of Science, Philippine Islands; to the Honorable the Secretary of Agriculture and Natural Resources; for the year ending December 3, 1922* (Manila: Bureau of Printing, 1923), p. 6.

19 Resil Mojares, ‘The formation of Filipino nationality under U.S. colonial rule’, *Philippine Quarterly of Culture and Society* 34 (2006): 11–32.

‘rational’ civic nationalism that followed.<sup>20</sup> Following Mojares’ observation, this article looks at how American colonial scientific institutions played a role in the formation of Philippine nationality. In particular, it examines how the Bureau of Science redefined and celebrated the Philippine natural world through the discourse of national unity and identity.

### **Tropical crisis and colonial natural history**

During his inspection tour around the Philippines following his appointment as governor-general in 1909, William Cameron Forbes could not contain his ‘fascination’ for the tropical archipelago.<sup>21</sup> He expressed how his ‘old enthusiasm’ for ornithology was ‘aroused’ upon encountering various unfamiliar bird species. He spoke of the ‘boundless’ possibilities for fisheries development after observing diverse kinds of marine resources in the Mindoro Islands. He was mesmerised by the ‘grandeur’ of forests in northern Luzon so much so that it ‘uplifted [him] to the point of coining the word “bositude” which brings with it the idea of solitude, of luxuriant nature growing wild, to the maximum degree’. In these encounters and discoveries, Forbes conveyed the need to connect these ‘unknown uninhabited islands off in these tropic seas’ into the knowledge world by bringing to the colony ‘experts on fish, trees and birds, [in order] to learn what the significance of these places [in the Philippine Islands] be’.<sup>22</sup>

The Bureau of Science illustrated Forbes’ aspiration to link the Philippines’ natural environment with the scientific world; it would institutionalise and consolidate investigations of the archipelago’s nature. The Bureau was created from the reorganised Government Laboratories in 1905, intended to stress the agency’s revised function as the centre for scientific research, including biological investigations.<sup>23</sup> With the consolidation of ‘scientific energies’ in one institution, the Bureau absorbed the natural history function from other agencies (Insular Museum, Bureaus of Forestry and Agriculture). By 1913, the Bureau of Science performed practically all the government laboratory research and supervised other fields, including those under the Division of Mines and the Division of Ethnology. The largest of the divisions, and publicised as the Bureau’s ‘most important department’, was the Biological Laboratory under which were the sections of Botany, Entomology, Ichthyology and Ornithology and Taxidermy.

While Forbes focused on depicting the archipelago as a tropical paradise, US army captain George Ahern, chief of the Philippine Bureau of Forestry for over ten

20 Ibid., p. 14.

21 United States Library of Congress (LOC), Manuscript Division, W. Cameron Forbes Papers (1904–46).

22 Forbes Papers, W. Houghton Library, Harvard University, quoted in Warwick Anderson, ‘Science in the Philippines’, *Philippine Studies* 55, 3 (2007): 299.

23 The Philippine Commission Act no. 156, July 1, 1901, created the Government Laboratories in 1901 to take charge of vaccines and sera for disease eradication and control. See Paul F. Russell, ‘Biological and medical research at the Bureau of Science, Manila’, *Quarterly Review of Biology* 10, 2 (1935): 119–53; Warwick Anderson, *Colonial pathologies: American tropical medicine, race and hygiene in the Philippines* (Durham, NC: Duke University Press, 2006), pp. 111–13. Its renaming as the ‘Bureau of Science’ was approved through the Philippine Commission Act no. 1407, October 26, 1905, or ‘The Reorganization Act’. This law ordered for the bureaucratic changes that disbanded some bureaus and streamlined functions of other agencies. The Bureau of Science continued to be under the Department of Interior.



years, was concerned about the apparent ecological crisis. As he toured the country, the forestry director complained of the many wastelands which, in 1912, had been estimated to occupy some 68,000 square miles of the entire country. These wastelands were deemed 'useless' as the cogon grass that grew there was unsuitable for grazing and was destroying the soil's productivity; they also had become a fire hazard during the dry season and a breeding place of locusts. Ahern attributed the growth of these wastelands to the locals who practised *caingin* (forest clearing through cutting and burning):

These devastators of the forest will travel for many miles from their barrios (villages) to the edge of the forest and begin operations by ringing the tall trees, later felling and burning them. The ash makes a good fertilizer, the soil is loose, and plowing with a stick is all they deem necessary; a small amount of rice is planted and a very small crop is raised.

In a year or two the tall cogon grass begins to appear and forces the man, who will even attempt to plow it out, to move once more into the heavy timber and repeat the former operation.<sup>24</sup>

Ahern's observations similarly placed the Bureau in an important role of preserving the country's biological treasures through scientific documentation. The Bureau saw the urgent need to gather information regarding the archipelago's botanical and zoological treasures for fear that *caingin* and other human activities would destroy them. The Bureau's policy in its early years was for its scientists to spend considerable time in field, collecting specimens and understanding natural habitats. Arriving in the archipelago with little knowledge of the diverse character of the tropics, scientists spent a significant portion of their Philippine career documenting species. The experiences of the Bureau's personnel in the mountains, forests and remote islands buttressed the imperial imagination of a tropical nation — a paradise with economic potential, on the one hand, but wild and erratic, on the other.<sup>25</sup> The colony was believed to possess natural beauty yet was surrounded by tropical hazards and untamed peoples. Treating the Philippine environment as a 'scientific problem', the Bureau was convinced that the colony's biological resources could only be uncovered and safeguarded if the natural world was annexed to science.

If the Philippine environment was depicted as chaotic and backward, the Bureau was projected as an embodiment of a modern scientific institution. Interior secretary Dean Worcester, chief architect of the Bureau of Science, envisioned the institution as the most advanced institution for scientific research in the colony, both epistemologically and physically.<sup>26</sup> Worcester was able to secure the legislative nod and

24 George Ahern, *Annual Report of the Director of Forestry of the Philippine Islands for the period July 1, 1906, to June 30, 1907* (Manila: Bureau of Printing, 1908), p. 16.

25 David Arnold, *Travelling gaze: India, landscape, and science, 1800–1856* (Seattle: University of Washington Press, 2006).

26 Worcester argued for the centralisation of scientific activities under one institutional roof to avoid what he believed to be an impending duplication of works and the cultivation of scientific turf. He cited his experience at the University of Michigan where zoological investigations were conducted by several academic units and thus leading to duplication of functions and resources. America's experience in the Philippines, according to Worcester, was 'a golden opportunity to start right', saying that centralisation would benefit the colonial government in saving time and expenditures. Dean Worcester, *The*

exceptional funding for his project, primarily the establishment of a new building for the Bureau — one of the first US government buildings constructed in the capital. Boasted as one of its kind in the tropical colonies, the edifice, upon completion in 1912, was fitted with its own power plant, ‘thoroughly equipped’ laboratory rooms, a library of reference and scientific materials, and storage rooms and cabinets for biological and zoological specimens.<sup>27</sup> These modern facilities were also intended as an attraction for foreign scientists, envisioning the Bureau as a research haven for the ‘best investigators’ capable of carrying out quality scientific work for the ‘advancement of the Philippine people’.<sup>28</sup> The edifice was presented as the centrepiece of the government’s vision for a Science and Education Complex, providing a visible marker for the government’s campaign to bring modern science to the Philippines.

As the Bureau benefited from a colonial infrastructure, its undertakings were overtly tied to colonial projects. Natural history investigations, in particular, were intimately connected with the colonial venture of advancing tropical studies, with an emphasis on botany, entomology, ichthyology, ornithology and other biological disciplines with economic and practical applications. While the Bureau intended an all-encompassing investigation of the colony’s natural history, it pursued select disciplines which the colonial state deemed important to address priority problems in agriculture, health, fisheries and forestry. The Bureau was tasked with identifying plants with commercial potential; providing information on plants, insects, and birds harmful and beneficial to farm crops; and determining fish species and marine resources for industrial production.

Natural history research was therefore aligned to the modernist culture of science, which linked epistemological discoveries to the agenda of bringing economic and social progress to the colony. The Bureau had to justify to the central government that the collection and classification of specimens was a necessary step for generating ‘data of use to the economic problems of the islands’, and that the results of such procedures served as an important basis for the work of other government agencies. The Bureau’s Botany Section, for instance, was expected to support the Bureaus of Forestry and Agriculture by inventorying species for commercial and other uses and to assist the Bureau of Health by investigating native plants with curative properties.<sup>29</sup>

Being the ‘custodian of the government collection of natural history material’, the Bureau of Science was the designated liaison in the sale and foreign distribution of natural history specimens. It became the middleman in an international and inter-

*Philippines, past and present*, vol. 1 (New York: Macmillan, 1921), pp. 488–500. See also, Sullivan, *Exemplar of Americanism*, pp. 115–17.

27 Paul Freer, *Description of the new buildings* (Manila: Bureau of Public Printing, 1905).

28 Paul Freer, *Fourth annual report of the Superintendent of the Bureau of Government Laboratories for the year ending August 31, 1905 to the Honorable the Secretary of Interior* (Manila: Bureau of Printing, 1905), pp. 11–12.

29 Paul Freer, *Fifth annual report of the Director of the Bureau of Science to the Honorable the Secretary of Interior for the year ending August 1, 1906* (Manila: Bureau of Printing, 1906), p. 13. The Section of Botany was formed in 1902 as a unit of the Bureau of Agriculture, though botanical research under the Americans had started two years earlier by Capt. George Ahern, as chief of the Philippine Forestry Bureau, an agency absorbed from the Spanish *Inspeccion de Montes* and reorganised by Americans in April 1900. George Ahern, *Special report by the Forestry Bureau, Philippine Islands* (Washington: Government Printing Office, 1901). The colonial government also absorbed the *Inspeccion de Minas* which became the Division of Mines under the Bureau of Science.



institutional traffic of Philippine botanical and zoological specimens which were sent abroad in exchange for other specimens, for distribution or loan to scientists interested in helping to identify and classify the specimens, or for sale to individuals, museums and universities. The Bureau also traded insect, shell and fish specimens. In 1903, it began to engage in the commercial exchange of stuffed specimens and 'first-class skins' for over a hundred varieties of birds in the Philippines. It was most prominent, however, in the commercial distribution of botanical materials. In 1912 alone, 14,431 botanical specimens were sold and distributed to around fifty institutions and individuals around the world.<sup>30</sup>

In this same period when the Bureau institutionalised the scientific study of Philippine natural history, the colonial state began to impose laws that regulated public 'access' to biological species. The Bureau had actively campaigned for the protection of animals, which resulted in the passage in 1916 of an Act that prohibited the hunting, killing, selling and unauthorised possession of protected mammals, birds and fish.<sup>31</sup> However, the law allowed the Department of Interior to issue permits to individuals who collected specimens for 'scientific purposes'. It was ironic that the colonial government sought to safeguard species when the Bureau was also at the forefront of a massive global trade in Philippine biological specimens.

In 1917, Vicente Villaflor, a forestry graduate at the University of the Philippines, lamented that the full development of Philippine forestry had been hampered by various domestic problems.<sup>32</sup> Colonial scientists continued to identify *caingin* as the dominant cause of habitat destruction. The Filipino forester, echoing the sentiments of his American trainers, expressed his opinion that 'how to meet these problems ... [was] a question which only science and the technical training and experiences [could] answer'. By a scientific education, Villaflor did not only mean training for forestry students like him. He believed that science should be introduced to all Filipinos to 'foster the doctrine of conservation' to turn them into 'responsible citizens' who would work for the protection of the natural environment.<sup>33</sup> In the years that followed, the idea of scientific citizenship would guide advocacies aimed at confronting environmental crises.

### The Flora Project and scripting the nation

As the chief agency for collecting, classifying and distributing specimens the Bureau of Science cemented practices that conquered and commodified nature. The ultimate indication of its scientific conquest of the Philippine natural environment was the publication of various scientific catalogues and papers. In January 1906, the Bureau inaugurated the *Philippine Journal of Science (PJS)*. The Bureau's director explained that the journal would publish original articles on various scientific topics in the Philippines. More importantly for the Bureau, the *PJS* represented the latest research on the tropics — from biology and diseases to mineral products and natural

30 Alvin Cox, *Eleventh annual report of the Bureau of Science to the Honorable the Secretary of Interior for the year ending August 1, 1912* (Manila: Bureau of Printing, 1913), p. 10.

31 Philippine Commission, 'Act No. 2590: An Act for the Protection of Game and Fish', 4 Feb. 1916.

32 Vicente Villaflor, 'The place of forestry in our economic development', in *The Philippinensian* (Manila: University of the Philippines, 1917), pp. 158–9.

33 Ibid.

resources. The journal was intended as an enduring contribution to tropical studies with examples and cases from the Philippines, which for the Bureau was the ‘most interesting tropical country’.<sup>34</sup>

The Bureau’s publications reflected the triumph of the US empire in conquering the colony’s environment. Print was one of the most potent mechanisms in which the empire could disseminate its achievements, propagate its ideologies, and promote the colony’s products. Published references on the country’s natural resources became catalogues for ‘window shopping’.<sup>35</sup> While fulfilling its obligation to advance scientific knowledge, the *PJS* served the interests of the empire as it exhibited the colony’s natural resources for potential commercial development.

The journal’s articles tackled the commercial potential of various natural commodities in the Philippines. They were written in the format of a catalogue or directory, and in a vocabulary intended for an audience with knowledge of and interest in both ‘science’ and ‘commerce’. This endeavour was not new as it had been undertaken since the start of the US regime. The earliest such venture was carried out in connection with the Philippine’s participation in the 1904 World’s Fair in St Louis, Missouri. Following President Theodore Roosevelt’s call to create a ‘creditable exhibit’, the Exposition Board sought the assistance of all the ‘experts’ on the Philippines. To provide an overview of the Philippine Exhibit, the Board requested the US Bureau of Insular Affairs to produce ‘a catalogue in the form of precise description of the Philippine Islands’. The result was the *Official Handbook: Description of the Philippine Islands*, which contains write-ups on topography and climate, flora, agriculture, forestry, and fauna.<sup>36</sup>

The *PJS* served as extension of this early venture to globally ‘exhibit’ the results of American tropical research in the Philippines. The Bureau positioned its publications within the agenda of pursuing both ‘scientific and commercial interests’. The *PJS* targeted American readers and industrialists who could make use of this biological knowledge for commercial purposes. In a way, the *PJS* served a similar function as the World’s Fair’s *Official Handbook*, which metropolitan capitalists could use to ‘window shop’ the colony’s natural resources for commercial exploitation. The journal envisaged that its readers had the scientific mind and entrepreneurial capacity to invest in the commercial development of the Philippine’s natural treasures. The idea of collaborative endeavours between scientists and entrepreneurs was explicitly stated in *Industrial Resources of the Philippine Islands*, a pamphlet containing the Bureau’s findings, published for the Panama-Pacific International Exposition in 1915. The Bureau’s director vigorously stated the need for collaboration between scientists and industrialists in realising the full commercial potential of the Philippine’s tropical resources: ‘The establishment and development of successful

34 Alvin Cox, *Fifteenth annual report of the Director of the Bureau of Science the Philippine Islands to the Honorable the Secretary of the Interior for the year ending December 31, 1916* (Manila: Bureau of Printing, 1917), p. 58.

35 Berny Seby, ‘Exhibiting the empire in print: The press, the publishing world and the promotion of “Greater Britain”’, in *Exhibiting the empire: Cultures of display and the British Empire*, ed. John McAleer and John Mackenzie (Manchester: Manchester University Press, 2015), p. 186.

36 *Official Handbook: Description of the Philippine Islands*, compiled by the Bureau of Insular Affairs, War Department, Washington D.C. (Manila: Public Printing Office, 1903).

new, as well as improvement and perfection of old, industries must be founded on scientific knowledge, so there should always be close cooperation between scientific workers and the actual producers.<sup>37</sup> As the Bureau emphasised the commercial aspects of its biological investigations, the *PJS* and other publications embodied the American imperial vision for the Philippine's natural environment.

Despite its colonial orientation, the *PSJ* also envisaged a Philippine nation. While it aimed to record the country's flora and fauna for the world of science, it concurrently bestowed a Philippine identity by demarcating them within the national boundaries. The journal's contributing scientists supplied a sense of, to use Thongchai Winichakul's coinage, the 'geo-body' of the Philippines — classifying, identifying and scripting species as part of a political territory, reinforcing the state-structured geographical boundaries, and rendering national character to the archipelago's biological environment.<sup>38</sup>

One of the Bureau's earliest project proposals was the creation of a compendium of all plant species in the archipelago. As there was 'no comprehensive treatise on the Philippine flora' in existence yet, the colonial scientists believed that producing one would greatly aid the fledgling US government in the Philippines.<sup>39</sup> The task, however, was daunting as American biologists were overwhelmed by the unfamiliar diversity of Philippine flora which they regarded as one of the richest in the world. While the project was deemed 'of very great value', the work would take years to complete as 'the task of assembling material to represent practically a complete flora of the Archipelago [was] an enormous one'.<sup>40</sup>

The Bureau assumed the central role in the documentation project. It claimed to be the 'only place' capable of pursuing such work since it possessed the necessary resources, including researchers who could work almost full-time in the field, and who were familiar with the archipelago's environment. The Bureau also managed the National Herbarium, which provided easier access to its personnel working on plant specimens.<sup>41</sup> Despite sustained campaigns and justifications about the significance of the project, however, the Bureau failed to secure the approval of officials who deemed the project 'too elaborate for its resources and especially because of the financial stringency now existing in the Philippine Islands'. Despite this setback,

37 Alvin Cox, *Industrial resources of the Philippine Islands* (Manila: Bureau of Science, c.1914).

38 See Thongchai Winichakul, *Siam mapped: A history of a geo-body of a nation* (Honolulu: University of Hawai'i Press, 1994).

39 Despite the relatively abundant Spanish contributions, American naturalists found them incomplete and taxonomically inaccurate. Manuel Blanco's *Flora de Filipinas*, the most important contribution to Philippine botany in the 19th century, was deemed 'absolutely inadequate', 'obsolete in arrangement', and featured only 'less than one-eighth of the species now known to occur in the archipelago'. Alvin Cox, *Fourteenth annual report of the Director of the Bureau of Science the Philippine Islands to the Honorable the Secretary of the Interior for the year ending December 31, 1915* (Manila: Bureau of Printing, 1917), p. 56; Frederick Coville, Memorandum for Charles D. Walcott, Secretary of the Smithsonian Institution, 10 Nov. 1915, RU 192, Smithsonian Institution Archives (SIA), Washington, DC.

40 Alvin Cox, *Bureau of Science Press Bulletin 87* (Manila: Bureau of Science, 1918), p. 6.

41 Alvin Cox, *Sixteenth annual report of the Director of the Bureau of Science, the Philippine Islands, to the Honorable the Secretary of Agriculture and Natural Resources; for the year ending December 31, 1917* (Manila: Bureau of Printing, 1918), p. 30.

the Bureau asserted that the 'Flora' should be 'one of the ultimate objects [of Philippine scientific projects] that should not be lost sight of'.<sup>42</sup>

The project was revived in 1914.<sup>43</sup> This time the Bureau recommended that it would be handled by botanist Elmer Merrill, who had the utmost familiarity and experience of the flora of the Philippines and neighbouring islands. The project would include providing a concise taxonomic data of 12,000 species of Philippine plants, identifying their practical uses, and recording their valid native names. In time, however, Merrill realised that working on the descriptive flora of the entire archipelago was 'beyond his means'. Instead, he focused on producing the four-volume *Enumeration of Philippine flowering plants*, published between 1922 and 1926. The documentation alone was labour intensive considering 'the following figures: 8,120 species were studied, about 11,200 synonyms were cross-checked, and 13,600 vernacular names recorded'. Nonetheless, *Philippine flowering plants* was an important achievement for it 'assessed the specific endemism of the Philippine archipelago, discussed linkages with other floras and made a contribution to biogeography'.<sup>44</sup>

Since the Philippine government's support for 'admirable scientific projects' such as the 'Flora' remained problematic, the Bureau sought the assistance of the Smithsonian Institution in Washington DC. Merrill personally corresponded with the Smithsonian in seeking 'cooperative work' between the two institutions. He expressed the importance of the project not only for Filipinos but also for the 'world':

A flora based on [Philippine herbarium] material would bring together in one place all this knowledge and thus make at once available not only to residents of the Philippines but to the entire world the data now accessible only to those few who are able to consult the collections in Manila. Until a publication of this sort is issued all economic and scientific work on the resources of the archipelago in agriculture, in forestry, and in certain phases of education, pharmacy, and medicine, [would be] under a very great handicap.<sup>45</sup>

The Smithsonian considered the proposal 'a matter of prime interest' and agreed to publish the 'Flora' and lend its resources (including one of its botanists) to assist Merrill in preparing the documentation. On its part, the Bureau of Science would send specimens from the Philippines which were not available in the US National Herbarium. Governor-General Leonard Wood assured his support for the project and promised to mobilise local personnel to carry out further collecting.<sup>46</sup> However, the plan became more complicated when Merrill retired from Philippine service in 1923 to become College of Agriculture dean at the University of

42 Richard Strong, *Eighth annual report of the Bureau of Science to the Honorable the Secretary of Interior for the year ending August 1, 1909* (Manila: Bureau of Printing, 1910), p. 27.

43 A similar project was a compilation of medicinal plants. In 1916, the Bureau appointed Filipino pharmacist Leon Ma. Guerrero to lead the project. Examining the Herbarium's collection, Guerrero listed more than 150 species with curative merits. The results of his study were published in the 1918 *Census of the Philippines*, and later revised and enlarged by William Brown as part of the study on forest products in the Philippines published by the Bureaus of Science and Forestry in 1921.

44 William J. Robbins, *Elmer Drew Merrill 1876-1956: A biographical memoir* (Washington, DC: National Academy of Sciences, 1958).

45 William Maxon, Memorandum to Mr. Coville, 13 May 1922, RU 192, SIA.

46 Leonard Wood, Letter to Charles Walcott, Manila, 30 Mar. 1922, RU 192, SIA.

California Berkeley, and wanted to carry out the project in California (which would also mean transferring the specimens from Manila to San Francisco).<sup>47</sup> In the end, the realisation of the project all boiled down to funding. The Smithsonian proposed to the US Congress a budget of \$8,400, then later cut it down to \$7,500.<sup>48</sup> Half of the suggested funds would cover Merrill's salary and the other half would shoulder the payment for clerk and illustrator, travel costs and sundry expenses.<sup>49</sup> In 1924, the Smithsonian informed the Manila government that the US Congress failed to grant the appropriations for the project.<sup>50</sup>

The Bureau viewed the documentation of the Philippine natural environment as a contribution 'to the future of the Philippine Islands'.<sup>51</sup> As such, the 'Flora' project was articulated not only in the interests of annexing the Philippine natural world to colonial knowledge and global science, but also to help shape an emerging nation. To understand the nation was to know its natural environment. American scientists insisted that a comprehensive knowledge of Philippine plants, which was heavily tied to commercial and industrial progress, would contribute to building a Filipino civilisation:

A correct knowledge of the identity of Philippine plants is essential to the proper development of the Philippine lumber industry; to the highest development of industries based on the utilization of wild products of the islands; to effective agricultural expansion; to the protection of men and animals against poisonous plants; to advance education in the Islands.<sup>52</sup>

As it was intended for the emerging Philippine nation, the 'The Flora of the Philippines' project was likened to a work-in-progress. It was not completely shelved; the task had only been shifted from the colonisers to the colonised.

### **Biological laboratories and national science**

In the early years of the Bureau of Science, it recommended to the colonial government two projects that would support its biological research. The first was an experimental or botanical garden, and the second was a marine biological station. The two projects, both to be administered by the Bureau of Science, followed the earlier government-endorsed programme that allowed the Bureaus of Forestry and Agriculture to create a 'reserve' for research purposes. The Bureau of Science crafted the Botanical Garden and the Marine Laboratory as 'national' projects essential to economic investigations as well as to educational training, particularly for Filipino university students. Simultaneously, the Bureau also designed these projects as integral to the global study of tropical science. Once materialised, they would help seal the Bureau's standing as a regional hub for tropical research, both in terrestrial and maritime scientific investigations. Here, I will only focus on the botanical garden.

47 Alexander Wetmore, Memorandum, 20 Nov. 1926, RU 89, SIA.

48 Ibid. The breakdown was as follows: \$3,800—payment for botanist; \$1,400—payment for clerk; \$800—payment for illustrations; and \$1,500—for freight, travel and miscellaneous expenses.

49 Charles D. Walcott, Letter to Elmer Merrill, Washington DC, 12 Dec. 1919, RU 192, SIA.

50 W. de C. Ravenel, Letter to Leonard Wood, Washington DC, 11 July 1924, RU 192, SIA.

51 Merrill, *Twenty-first annual report*, p. 18.

52 Frederick Coville, Memorandum for Charles D. Walcott, Secretary of the Smithsonian Institution, 10 Nov. 1915, RU 192, SIA.

The Manila Botanical Garden, built during the Spanish regime, was ruined during the US military occupation in 1899.<sup>53</sup> It was later revived, but its use was reduced to recreational purposes, though it still contained some labelled trees and shrubs with some caged animals and a ‘small plant-propagating station’.<sup>54</sup> In time the size of the garden was reduced as the government allocated more of its spaces for public infrastructure and highways. Professor Harley Harris Bartlett, director of the University of Michigan Botanical Garden and exchange professor at the University of the Philippines in 1934–35, observed the ‘melancholy dwindling’ of the garden as it was temporarily occupied by the Army and used as a parking space for military vehicles and for dumping supplies.<sup>55</sup>

The Bureau of Science called the botanical garden project ‘the most important subject to be considered’ in advancing the scientific study of Philippine botany. Having a scientific garden, the Bureau insisted, would prove to be more important if the colonial state desired to attract foreign scientists to Manila:

[I]t is essential that provision be made for the establishment of a thoroughly equipped and representative botanical garden, for no matter how well the laboratory may be supplied with apparatus, books, and collections, American and European botanists will not select Manila as a locality for their investigations.<sup>56</sup>

The Bureau had been proposing the establishment of a new botanical garden since 1903. It undertook serious preparations to convince the government of its value, including sending its chief botanist to the Singapore Botanic Gardens and Buitenzorg Botanic Gardens to learn from the two most prominent examples in Southeast Asia. After five years, when the government seemed to have ignored the proposal, Bureau director Paul Freer reiterated the call, arguing that the plan ‘should not be forgotten’. In successive annual reports, he repeatedly urged the government to support the project, citing that many Asian territories had their own botanical garden whose importance ‘to the economic development of the countries in question cannot be doubted’. The Bureau director explained how the botanic garden as a scientific institution proved beneficial to Penang, Singapore and Batavia ‘not only in an educational and economic way, but also as a great attraction to the travelling public’.<sup>57</sup> Bartlett, who also made a case for a Philippine scientific garden thirty years later, similarly drew from the example of neighbouring British and Dutch territories. He

53 The Spanish colonial government established the Manila Botanical Garden in September 1858. It only gained recognition in the 1870s–80s during the administrations of Domingo Vidal, and later his brother, Sebastian Vidal. Both introduced various ‘exotic’ floral species and significantly increased its native plant collections. For a brief history of the Garden, see Elmer Merrill, *Botanical work in the Philippines* (Manila: Bureau of Public Printing, 1903), pp. 30–33.

54 The Garden had been placed under the supervision of the Manila City government from 1904. Elmer Merrill, *A descriptive catalogue of the plants cultivated in the City nursery at the Cementerio del Norte Manila* (Manila: Bureau of Printing, 1912).

55 Harley H. Bartlett, ‘Prospectus for a Philippine Botanical Garden’, n.d., Harley H. Bartlett Papers, Bentley Historical Library (BHL), University of Michigan, Ann Arbor.

56 Paul Freer, *Third annual report of the Superintendent of the Bureau of Government Laboratories for the period from September 1, 1903 to August 31, 1904* (Manila: Bureau of Printing, 1905), pp. 101–2.

57 Paul Freer, *Seventh annual report of the Director of the Bureau of Science to the Honorable the Secretary of Interior for the year ending August 1, 1908* (Manila: Bureau of Printing, 1908), p. 17.



particularly cited the scientific achievement of the Singapore Botanic Garden's Henry Nicholas Ridley in turning rubber plants to commercial use.<sup>58</sup> To generate a useful and long-term impact for the colony, Bartlett proposed that 'a Botanical Garden could serve all the purposes of a Plant Introduction Service for the Philippines', which could be patterned after the Office of Foreign Seed and Plant Introduction in the United States.<sup>59</sup> If these visions were fulfilled, the botanical garden would provide lasting value to the Philippines as a research hub of 'scientifically interesting and potentially valuable plants from the tropics around the world'.<sup>60</sup>

Freer urged the government to create a committee that would evaluate his proposal. Despite his connection to the Philippine Commission, the project was not advanced during his directorship as it was beset with problems of finding a suitable location and a permanent botanist and issues of institutional jurisdiction. Complicating the plans was the Bureau of Forestry's desire to similarly create and supervise its own botanical garden. However, the colonial foresters were more inclined to align the function of a scientific garden to undertakings that would directly provide economic benefits, primarily the enhancement of the export logging industry. The government seemed to favour the Bureau of Forestry when it approved the establishment of forest reserves (Lamao Reserve in 1904 and Mt. Makiling in 1910) which prioritised the scientific investigation of forest resources.

In 1920, Governor-General Francis Burton Harrison ordered the conversion and development of the base of the Makiling Forest Reserve as the National Botanical Garden. The site of the garden was intended for the preservation of Philippine plants and animals and the cultivation of mostly economically useful plants.<sup>61</sup> Although the Garden was put under the auspices of the Bureau of Forestry, University of the Philippines faculty and students did much of the actual work. The colonial practice of centralising scientific research under one institution similarly affected the operations of the Botanical Garden. Bartlett, a visiting scientist, noticed how the centralisation policy had corrupted the garden's functions, with much debate revolving around institutional jurisdiction. To maximise its potential as a national science project, Bartlett suggested that the Botanical Garden's operations should be a collective undertaking among all the scientific institutions, but that overall coordination should be entrusted to the state Herbarium, which, in itself should be an independent agency.<sup>62</sup>

The problem stemmed not just from institutional rivalry, but also from the larger colonial understanding of the Philippine's natural resources.<sup>63</sup> In his capacity as chairman of the US National Research Council's Committee on the Philippines, Bartlett candidly remarked that colonial policies and programmes, notably during the first two decades of the American regime, had been detrimental to Philippine exports. He believed that colonial administrators failed to diversify their approach in developing the colony's natural wealth and, instead, focused on further expanding the

58 See further Barnard, *Nature's colony*, esp. chaps. 3, 6 and 7.

59 Bartlett, 'Prospectus for a Philippine Botanical Garden'.

60 Ibid.

61 Ibid.

62 Ibid.

63 See Brendan Luyt, 'Empire forestry and its failure in the Philippines: 1901–1941', *Journal of Southeast Asian Studies* 47, 1 (2016): 66–87.

profitable timber industry: ‘Natural resources which might have been developed have been left dormant since risk could see much larger profits in items carrying high import duty into the United States.’<sup>64</sup> A national botanical garden, Bartlett insisted, could perform experiments which could determine commodities with commercial potential, hence enlarging the country’s potential to diversify its export economy.

The making of Makiling as a laboratory had allowed the Bureau to craft a localised national science. Mt. Makiling was already a Filipino cultural icon. Rizal’s writings—from his retelling of the Makiling legend to his reference to the majestic mountain in the opening chapter of *El Filibusterismo*—reinforced the notion of Makiling as a national symbol.<sup>65</sup> The Bureau and other colonial science institutions had transformed Makiling as a biological space that linked science with the Filipino people. As a national botanical garden, Makiling served as an experimental station for plants which could be propagated in various parts of the archipelago. The mountain’s forests were officially regarded as representative of the country’s ecological habitats, allowing scientists to experiment on possible solutions to various forest problems, primarily *caingin*.

The Botanical Garden was also deemed integral to the Bureau’s continued pursuit to understand the Philippine natural world. Through this biological laboratory, the colonial scientists intended to develop the Bureau as a global scientific institution dedicated to the study of the tropics. Historians of science have pointed how research stations in the twentieth century advanced the study of the tropical environment. Megan Raby argues that tropical biology emerged out of place-based science, from research stations, which allowed scientists access to field sites as well as long-term and repeated observation, experimentation and monitoring.<sup>66</sup> Hence, research stations, Raby points out, deepened scientific understanding of the tropical environment and opened up new ideas about ecology, biogeography and other concepts embedded in contemporary discourses of biodiversity. Today, biodiversity has become an essential concept that frames the many environmental conservation campaigns in the Philippines. The National Museum, for instance, enjoins all citizens to protect Philippine biodiversity because it is part of their ‘national identity’.<sup>67</sup>

## Conclusion

Let me return to Eduardo Quisumbing. In 1934, he and three other Filipino scholar-bureaucrats were appointed by Governor-General Frank Murphy to select Philippine species as the nation’s representative flora. The committee of three scientists and one historian chose the narra (*Pterocarpous indicus*) and sampaguita (*Jasminum sambac*) as National Tree and National Flower, respectively.<sup>68</sup> The selection of these national symbols was timely as the Philippines was preparing for the ten-

64 Harley Bartlett, Synopsis of possible industrial development for the Philippines, Mar. 1945, Harley H. Bartlett Papers, BHL.

65 See Resil Mojares, *Waiting for Mariang Makiling: Essays in Philippine cultural history* (Quezon City: Ateneo de Manila University Press, 2002).

66 Megan Raby, *American tropics: The Caribbean roots of biodiversity science* (Berkeley: University of California Press, 2017).

67 Teresa Montemayor, ‘National Museum of Natural History opens to public’, Philippine News Agency, 18 May 2018, <https://www.pna.gov.ph/articles/1035741> (accessed 27 Sept. 2020).

68 Frank Murphy, Proclamation no. 652, 1 Feb. 1934. *Executive orders and proclamations issued by the*

year Commonwealth transition toward independence. During this transition period, the US colonial government had pushed for various nation-building projects. In particular, 'science [projects were] conventionally linked to nation building and governmentality, supplanting the redundant and insulting American emphasis on its role in a more general civilizing mission'.<sup>69</sup>

Quisumbing was involved in the committee in his capacity as one of the country's leading botanists. He became assistant professor of botany at the University of the Philippines right after completing his PhD at the University of Chicago in 1923. In 1934, he was appointed assistant director of the Bureau of Science, placing him in charge of the Bureau's Natural History Museum. Quisumbing was living at a crucial period in Philippine science when native scholars began to take over significant positions in various national science institutions. Quisumbing was not just a witness to many science projects, but a participant and contributor. Trained under Merrill and other American scientists, he pursued scientific investigations aimed at documenting and understanding Philippine botany. Colonial institutions such as the Bureau of Science were important in understanding how Quisumbing had imbibed the ideals that linked science with nation-building.

Apart from numerous articles on the new genera and species of Philippine flora, he undertook monumental publications that became forerunners in the field. Quisumbing researched poisonous, medicinal and ornamental plants, the results of which were later transformed into the 1,234-page *Medicinal plants of the Philippines*. He personally worked with the eminent Merrill who, after his tenure in the colony, continued to communicate with Quisumbing on several endeavours, including the revised and illustrated version of Merrill's 1912 classic, *A flora of Manila*. The Japanese Occupation, however, halted many of these projects. The Pacific War, furthermore, destroyed the Bureau of Science building, including its priceless natural history specimens.

After the War, Quisumbing prioritised the rebuilding of the National Herbarium and the Natural History Museum, aligning his campaigns to rehabilitate these scientific institutions with the rationale of national recuperation.<sup>70</sup> By reinstating the Natural History Museum despite rehabilitation problems, Quisumbing demonstrated that the promotion of science education to the Filipino public was a fundamentally important endeavour for a recovering nation. Writing to Merrill, the museum director expressed his travails in rebuilding the scientific collections:

I am very much interested in rebuilding our herbarium. We will need plenty of money to conduct botanical explorations throughout the Philippines. It took you over twenty years, with the cooperation of bureaus and friends, to build such as great herbarium.<sup>71</sup>

*Governor-General during the year 1934* (Manila: Bureau of Public Printing, 1935). The other members of the committee were Leon Ma. Guerrero, Luis J. Reyes, and Eulogio B. Rodriguez.

69 Anderson and Pol, 'Scientific patriotism', p. 103.

70 See Kathleen Gutierrez, 'Rehabilitating botany in the postwar moment: National promise and the encyclopedism of Eduardo Quisumbing's *Medicinal Plants of the Philippines* (1951)', *Asian Review of World Histories* 6 (2018): 33–67.

71 Eduardo Quisumbing, Letter to Elmer Merrill, Manila, 7 Mar. 1945, Elmer Merrill Papers, Archives of Arnold Arboretum, Harvard University.

Quisumbing linked the rebuilding efforts as tantamount to the salvaging of the national culture:

It cannot be strongly recommended that the establishment of such an institution [Natural History Museum] be made a primary concern of the Commonwealth of the Philippines. It is a phase which our government should not neglect to consider. The Natural History Museum is a *repository of Philippine culture* and its main function consists in research in the natural sciences and the exhibiting of natural science specimens.<sup>72</sup>

After his retirement at the Natural History Museum in 1963, Quisumbing embarked on what he planned as the 'definitive' ten-volume 'Flora of the Philippines'. Though he went to the United States, Britain and Spain to visit various herbaria and archives, the work was not completed because 'time simply ran out'.<sup>73</sup> His students remembered him for his patriotic reminder about devoting their scholarly attention to the study of the country's plants. Quisumbing often reminded his students who went abroad for graduate training to render service back to the country, and continue what he and others before him had started because 'the project of the Philippine Flora must be completed'.<sup>74</sup> The scripting of Philippine nature which the Bureau had initiated provided a template for Filipino scientists to align their works with nation building. Local scientists understood that a great deal of the biological projects initiated by American specialists who had mentored them remained incomplete. They viewed the documentation of the country's natural environment as a task not only of scientific importance but also of national necessity.

Much of the contemporary construction of the Philippine natural environment has its roots in the Bureau of Science's research in the early twentieth century. These investigations, however, were heavily tied with the state's objectives of understanding and maximising the economic use of the colony's tropical environment. While its biological research was a commendable pursuit of objective understanding of Philippine flora and fauna, much of what the Bureau pursued was aligned to imperial science. The ultimate indication of the Bureau's scientific conquest of the Philippine tropical environment was the publication of various scientific catalogues and papers. These publications, while showcasing the imperial triumph of modern science over what Americans previously considered as the colony's wild, untamed tropical environment, laid the epistemological foundations for what is now known as 'Philippine biodiversity'.

By the mid-twentieth century, as the Philippines transitioned to self-government, colonial institutions were clearly incorporating ideas of civic nationalism. On the part of the Bureau of Science, part of the process was ensuring the continuity of scientific investigations in the hands of educated native elites. The Bureau was a training ground for junior Filipino scientists, such as Quisumbing, who worked with American technical staff. Such interactions allowed for the continuation of scientific projects in the postcolonial Philippine republic.

72 Eduardo Quisumbing, 'A proposed plan for the rehabilitation of the Natural History Museum', c. July 1946, Elmer Merrill Papers, Archives of Arnold Arboretum, Harvard University. My emphasis.

73 'Tribute to National Scientist Eduardo Quisumbing, PhD', *A directory of academicians* (Manila: National Academy of Science and Technology, 1981).

74 Barroga-Jamias, 'Eduardo A. Quisumbing', p. 172.