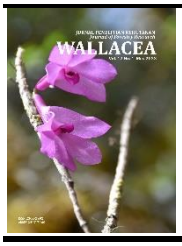

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Editorial Note

The value of Wallacea region: considerations behind the changing scope of JPK Wallacea

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Abstract

The Editorial Board has issued this editorial note in the form of a review to inform contributors about changes to the scope of the Journal of Wallacea Forestry Research (JPK Wallacea) following the transfer of management from Balai Penerapan Instrumen Lingkungan Hidup dan Kehutanan Makassar to Hasanuddin University's Forest Conservation Study Program in 2023. JPK Wallacea is no longer limiting its scope to forestry and is expanded to cover biodiversity in general by incorporating the term Wallaceae, which is a biogeographical area located between the continents of Asia and Australia. This area is well known for its unique biodiversity both on land and in water. The Wallacea region's biodiversity is famed for its distinctiveness yet, it is on the verge of extinction. Thus, the Editorial Board chose to focus on the scope of JPK Wallacea on scientific, technological, and policy conservation features. This scientific publication is expected to make a substantial contribution to the biodiversity conservation effort in the Wallacea region and its surroundings.

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Introduction

JPK Wallacea (Jurnal Penelitian Kehutanan Wallacea) was launched in 2012 and has since grown into a national newspaper with a SINTA 2 reputation. This scientific journal in the forestry sector publishes research findings as well as reviews in English and Bahasa Indonesia. Initially, the Balai Penelitian Lingkungan Hidup dan Kehutanan Makassar (Makassar Environment and Forestry Research Institute) was in charge of JPK Wallacea. The Balai Penelitian Lingkungan Hidup dan Kehutanan changed its name to the Balai Penerapan Instrumen Lingkungan Hidup dan Kehutanan Makassar (Makassar Environmental and Forestry Instrument Implementation Center) in 2021, leading to change of the institution's major tasks and functions. Thus the Balai Penerapan Instrumen Lingkungan Hidup Makassar is no longer having the authority to manage scientific research journals.

For the purpose of JPK Wallacea's long-term viability, the Balai Penerapan Instrumen Lingkungan Hidup Makassar urged the Hasanuddin University Faculty of Forestry to take over the management. Following that, the faculty designated the Hasanuddin University Forest Conservation Study Program as the institution in charge of managing the scientific journal. This is because the Forest Conservation Study Program's objective aligns with the scope of JPK Wallacea. Given the use of the word Wallacea in the title of the journal, as well as the uniqueness and importance of biodiversity in the Wallaceae region, the Editorial Board meeting of the new management decided to broaden the scope of JPK Wallacea from forestry to general biodiversity. Furthermore, given the importance of preserving biodiversity in the Wallacea region, the scope of

this scholarly publication is centered on conservation issues.

The biodiversity of the Wallacea region is unique and important not only to the Indonesian people, but also to the global society. As a result, the JPK Walacea must be active not only at the national level, but also at the international level by accepting submissions from foreign publications. In this regard, the JPK Wallacea will no longer accept articles in Bahasa Indonesia after 2023. This article is a review from the Editorial Board to inform readers that the management of JPK Wallacea has changed. This review provides a summary of the Wallacea area, particularly its biodiversity status, as an introduction to changes in the scope of JPK Wallacea.

From Wallace's Line to the Wallacea Region

Alfred Russel Wallace (1823-1913, henceforth Wallace) began his expedition to the Far East Asian region, encompassing modern-day Singapore, Malaysia, and Indonesia, in 1855 to collect wildlife. Wallace covered about 22,000 kilometers and collected 125,660 bug specimens (Hortal, 2023). This historic expedition made him a biogeography hero for his discovery of biodiversity variations in regions of Asia and Australia that are only separated by a geographical barrier known as the Wallace's line (Fig. 1). Wallace's line is an imaginary line that runs through deep ocean waters with strong currents that hinder the capacity of organisms to spread through them, particularly land mammals and birds. Wallace discovered organisms related to Asian species to the west of the line, while species from Asia and Australia were discovered to the east. The findings of Wallace's first four years provided him with valuable knowledge in developing his theory of biogeography, which he stated publicly in his 1863 publication (Ali & Heaney, 2021).

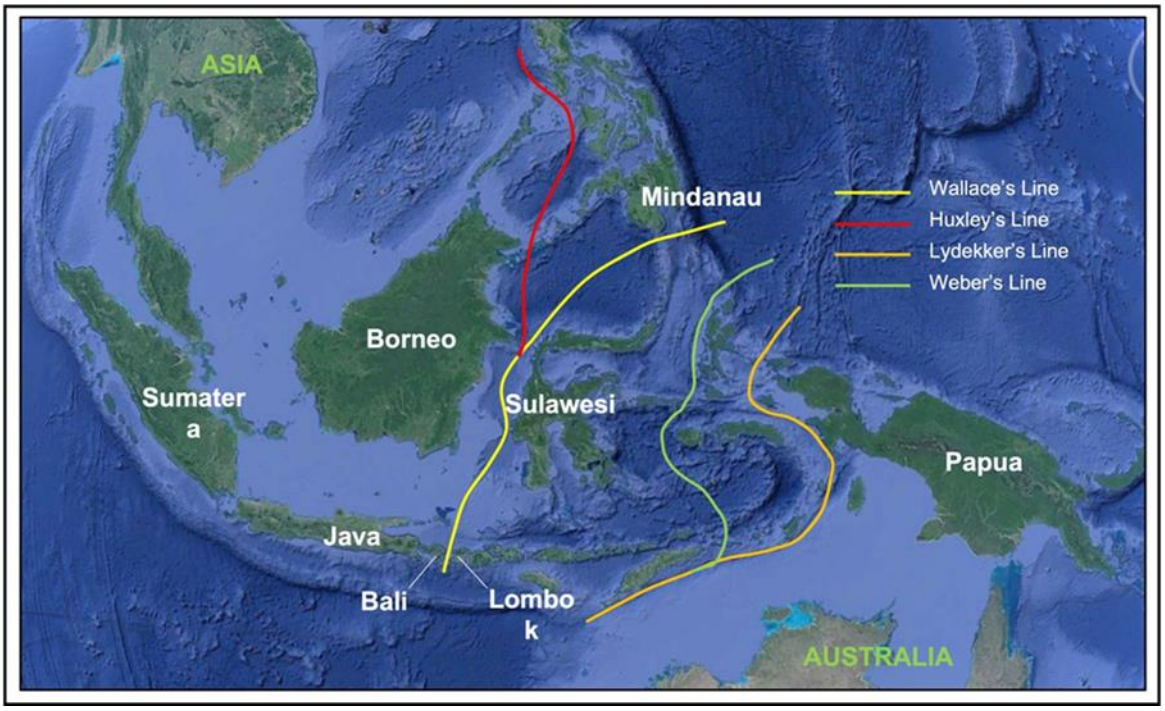

Figure 1. Biogeographic barrier lines in the Indonesian Archipelago

Following Wallace's publication of papers based on his adventures from the Malay Peninsula to New Guinea, Richard Lydekker (1849 - 1915, hereinafter referred to as Lydekker) followed in his footsteps by observing wildlife distribution in the eastern part of the Indonesian archipelago. Lydekker is an English naturalist and geologist who graduated from Trinity College, Cambridge, with honors in Natural Science. In 1874, he joined the staff of the Geological Survey of India and became well-known as a naturalist. In 1894, he was elected as a fellow of the Royal Society. He was in charge of categorizing the Natural History Museum's fossil mammals, reptiles, and birds (Chisholm, 1922). Lydekker postulated a dividing line between the biodiversity of the Sahul Shelf and the western portion of the Indonesia Archipelago based on his experiences in the eastern half of the Indonesia Archipelago (Beron, 2015). Lydeeker's line (Fig. 1) was afterwards given to the line.

Apart from the two lines listed previously, there are other biogeographical lines in the region. Huxley's line, which is a variant of

Wallace's line, is to the west. Huxley changed the northern half of Wallace's line, which runs between the northern regions of Sulawesi and Mindanao, to run northward between Borneo and the Philippines (Fig. 1). In terms of megafauna distribution, the northern Wallace line that runs between the northern island of Sulawesi and the island of Mindanao is true. Some investigations, however, show evidence of microscopically significant variations between individuals of a species whose distribution is divided by Huxley's line. De Bruyn (2004), for example, finds a clear delineation of genetic divergence between the eastern and western Huxley lines in the giant prawn, Macrobrachium rosenbergii (see also Atkins, 2001).

Weber's line runs beside Lydekker's line to the east (Fig. 1). The two lines follow extremely distinct marine routes. Based on the pattern of deep-sea water distribution between the Maluku and Papuan islands, the Weber line appears more reasonable in limiting the spread of megafauna between the Sahul shelf and places to the west. The distribution of megafauna, including Marsupialia and, in particular, kangaroos, is more compatible with Lydekker's line than Webber's. Kangaroos live on the Australian continent and New Guinea island, but have not expanded to the Moluccas Islands. Meanwhile, the Cuscus has moved from the Maluku Islands to Sulawesi.

The Wallacea region was named for the two lines that framed it, Wallace's line and Lydekker's line. The name Wallacea was derived from Alfred Russel Wallace, who was the first to explain the concept of a barrier line limiting an organism's geographical range in the Indonesian Archipelago.

What is the Wallacea Biographical Region?

Wallacea is a biogeographical region in the center of the Indonesian archipelago, bordered to the west by the Sunda shelf and to the east by the Sahul shelf. This biogeographical zone is bordered by two other biogeographical kingdoms, Indo-Malayan and Australasia (Michaux, 2010). Deep-sea currents separate this region from two biogeographical worlds, acting as a dispersal barrier for many animals. Wallace's line is the deep sea waters that constitute the western boundary, running between the islands of Java and Bali, and between the islands of Kalimantan and Sulawesi to the north, bordering the island of Sulawesi with sections of the Philippines.

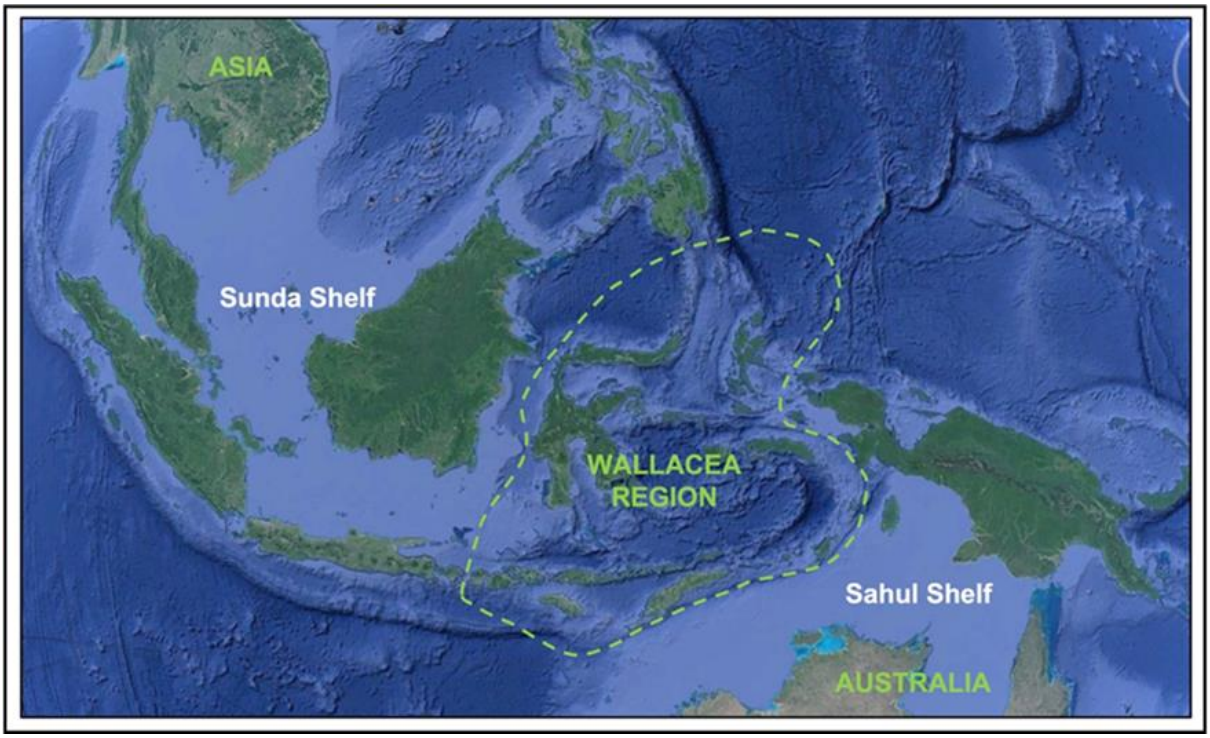

Figure 2. The Wallacea region

Lydekker's Line extends from the oceans surrounding the Australian continent to the island of Timor to the north between the islands of New Guinea and the Moluccas and serves as a barrier to the movement of organisms to and from the Wallacea region. Thus, this biogeographical zone includes the largest island, Sulawesi, the Lesser Sundas or Nusa Tenggara (excluding Bali), and the Moluccas islands (Fig. 2). The Wallacea region is separated into three sub-regions based on the animal species that inhabit it: Sulawesi, Lesser Sundas, and Moluccas.

Uniqueness of the Wallacea Region Biodiversity

Wallacea is well recognized for its diverse biodiversity. In terms of species richness, the Wallacea region probably has less species than other rich biodiversity hotspots throughout the world. However, most of the species, particularly the fauna, that occur in the region are unique in proportion. The fraction of endemic species exceeds 60% in groupings of taxa with poor dispersion capacities, such as mammals, reptiles, and amphibians (Table 1). Sulawesi's seven Macaque species are all unique to the island.

The Wallacea region's biodiversity is unusual not just at the species level, but also at the ecological level. The diversification of short-tailed macaques into seven species on the island of Sulawesi demonstrates the island's environmental variety. Speciation happens in one of three ways: allopatric, sympatric, or parapatric. Although sympatric and parapatric speciation processes are not impossible to occur (Fitzpatrick et al., 2009), evolutionists generally believe that the allopatric speciation process is the easiest. The Wallacea region's biodiversity is unusual not just at the species level, but also at the ecological level. The diversification of short-tailed macaques into seven species on the island of Sulawesi demonstrates the island's environmental variety. Speciation happens in one of three ways: allopatric, sympatric, or parapatric. Although sympatric and parapatric speciation processes are not impossible to occur (Fitzpatrick et al., 2009), evolutionists generally believe that the allopatric speciation process is the easiest.

Table 1. Estimates of the number of species by taxa groups in the Wallacea region

No.	Taxa Group	Total Species	Endemic Species	Threatened Species
1.	Plants	10,000	1,500 (15)	66
2	Amphibians	48	33 (69)	8
3.	Fresh water fishes	250	50 (20)	37
5.	Reptile	188	122 (65)	10
6.	Bird	697	249 (38)	61
7.	Mammals	201	123 (61)	64
8.	Coral	450	Few	176
9.	Marine fishes	2,112	110 (05)	54

Sources: Ngakan (2014); The Ecosystem Profiling Team (2014)

The Wallacea region's physical location between two continents with distinctly diverse biodiversity is also thought to be the reason of the species' distinctiveness and the region's high biodiversity. The biodiversity of the Wallacea region is a combination of Asian and Australian origins, as well as local species. The Cuscus is a species of marsupial taxonomy that is native to Australia and is found on the island of Sulawesi, which is located on the western side of the Wallacea area. Tarsiers from the primate taxon group, which are animals native to mainland Asia, have been reported by the local community to have spread to Halmahera Island, North Maluku. Despite the fact that they have wings and are supposed to have exceptional dispersal ability, 38% of the 697 birds found in the Wallacea region are endemic.

The Need of Biodiversity Conservation in the Wallacea Region

A species, both plant and animal, become endemic because it was developed through a process of speciation after undergoing an evolutionary process in adapting to certain environmental conditions. This means that an endemic species develops in a particular habitat and can only adapt well to the environmental conditions of that habitat. If the environmental condition of the habitat changes, the organism's adaption pattern to its habitat may be affected. As a result, depending on the rate and degree of environmental change, an organism may still be able to modify its pattern of adaptation to changes in its habitat's environmental conditions, or it will become extinct.

The Indonesian government is currently striving for development in the Wallacea region of eastern Indonesia. The acceleration of growth in this region undoubtedly includes infrastructure development, an increase in the pace of urbanization, an increase in demand for natural resources, and an increase in demand for land. The population in the Wallacea region, which is part of Indonesia, in 2022 was 34,565,498 people with a population growth rate reaching above 1%, except for South Sulawesi and North Sulawesi (Table 2). Meanwhile, the population of the Wallacea region which is part of

the territory of the Democratic Republic of Timor Leste in 2022 was 1,341,296 people with a population growth rate of 1.54%. As a result, overexploitation of natural resources, habitat degradation, fragmentation, and conversion, including mining, pose hazards to the region (Conservation International, 2011). Mining activity has expanded considerably in this region during the previous few decades. This is potentially affecting endemic species' habitat circumstances.

Table 2. Total population, population density, and population growth in the Wallacea region

Indonesian Province	Pupulation 2022 (persons)	Density 2021 (Person/ km2)	Average Population Growth 2020-2022 (%)
Indonesia			
North Sulawesi	2,659,543	190	0.82
Gorontalo	1,192,737	105	1.02
Central Sulawesi	3,066,100	49	1.53
West Sulawesi	1,458,606	86	1.58
South Sulawesi	9,312,019	196	0.96
Southwest Sulawesi	2,755,589	70	1.66
Nort Maluku	1,299,177	41	1.61
Maluku	1,881,727	40	1.01
Nusa Tenggara Barat	5,473,700	290	1.64
Nusa Tenggara Timur	5,466,300	111	1.50
Total Population	**34,565,498**		
The Democratic Republik of Timor Leste			
Timor Leste	**1,341,296**	89	1.54*

Sources: Statistics Indonesia; *: data from 2022

Threats to species, particularly those native to the Wallacea region, are becoming more prevalent, necessitating prompt conservation action. Fisher et al. (2020) provide eight examples of emergent concerns related to community conservation in Wallacea as a result of the dissemination of research results in a number of regions throughout the region as a type of local community wisdom in natural resource protection. However, Conservation International (2014) observed a pattern of increasing risks to key species in the Wallacea region based on IUCN data up to 1 November 2013. Conservation International listed 560 globally endangered species in the Wallacea region (35 critically endangered, 108 endangered, and 411 vulnerable). The Wallacea region is home to 64 of a total of 201 species of mammals, 61 of a total of 687 species of birds, and 10 of a total of 188 species of reptiles. The majority of the 560 species listed as globally endangered are indigenous to the Wallacea region.

Ngakan et al. (2008) emphasized the significance of exercising caution while evaluating traditional wisdom in local community culture. The use of natural resources by the community is evaluated not only in terms of anthropogenic factors, but also in terms of the preservation of natural resources in the area. This is because, unlike people who can explain that they have local wisdom values in employing natural resources, natural resources do not have the ability to explain that they are facing threats. According to Ngakan et al. (2008), all anthropogenic characteristics usually employed by social researchers as parameters to gauge people's local knowledge in utilizing natural resources may be found in their research regions. However, the area's forest resources are degrading year by year, despite the fact that the local community's subsistence is dependent on the use of forest resources, particularly rattan.

The community alone cannot save biological resources in the Wallacea region. Scientists, governments, non-governmental organizations, and donors must collaborate to address the issue of threatened biodiversity in the Wallacea region, both on land and in the sea. Humans use biodiversity as a natural resource, yet its demise is primarily caused by human actions, both directly and indirectly, and will ultimately threaten human survival. The conservation movement in Indonesia is currently concentrated in western regions such as the islands of Sumatra, Kalimantan, and Java. The ecological variety of both habitats and species in western Indonesia is obvious, and urgent conservation action is required. However, the issue of biodiversity in

Eastern Indonesia, which includes the Wallacea region, need attention as well.

In comparison to Western Indonesia, the conservation movement in Eastern Indonesia is still small and in its infancy. This region's biodiversity database is currently quite sparse and underdeveloped. Many species of plants and insects, for example, have yet to be described and hence do not have scientific names. This hampers the process of further investigation into a species' potential. The JPK Wallaceae exists as a platform to contribute to the creation of a biodiversity database in the Wallacea region. Starting in 2023, the scope of JPK Wallacea was expanded from initially focused on forest resources to biodiversity in general in order to accept research outcomes in the field of biodiversity. It is envisaged that this scholarly publication will make a significant contribution to the conservation effort in the Wallacea region and its surrounds.

Conclusion

The Wallacea biogeographical region is positioned between two continents, Asia and Australia, and contains significantly varied biodiversity. As a result, the biodiversity of the Wallacea region is unique but threatened with extinction. The biodiversity of the Wallaceae region is currently under threat from a variety of sources. The government in this biogeographical region must pay more attention to biodiversity preservation because it is a natural resource with the ability to assist sustainable development. Conservation movements must be carried out in a coordinated manner with the support of the government and donor agencies, engaging a wide range of stakeholders including scholars, practitioners, and members of the community.

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