FROGS AND TOADS OF UJUNG KULON, GUNUNG HALIMUN AND GEDE-PANGRANGO NATIONAL PARK

fJenis-Jenis Kodok di Taman Nasional Ujung Kulon, Gunung Halimun dan Gede-Pangrango]

Hellen Kurniati

Bogor Zoological Museum, Widyasatwaloka Building-LIPI,
Jalan Raya Cibinong Km 46, Cibinong 16911, West Java, Indonesia
Email: <hkumiati@yahoo.com>

ABSTRAK

Selama survai herpetofauna di Taman Nasional Ujung Kulon yang dilakukan pada bulan Juli sampai September 1990 dijumpai 14 jenis amfibia; yang terdiri dari satu jenis dari suku Megophryidae, tiga jenis dari suku Bufonidae, tiga jenis dari suku Microhylidae, lima jenis dari suku Ranidae dan dua jenis dari suku Rhacophoridae (Kumiati *el al.*. 2001). Survai herpetofauna Iain terutama untuk kelompok amfibia pernah dilakukan Liem (1973) di Taman Nasional Gede-Pangrango. Survai tersebut berlangsung pada tahun 1961-1962, dan lebih intensif lagi dilakukan pada bulan Agustus 1963, Maret dan Mei 1964. Dari survai ini Liem (1973) mendapatkan 19 jenis amfibia; yang terdiri dari dua jenis dari suku Megophryidae, empat jenis dari suku Bufonidae, dua jenis dari suku Microhylidae, tujuh jenis dari suku Ranidae dan empat jenis dari suku Rhacophoridae. Untuk mendapatkan gambaran umum keanakaragaman herpetofauna dari tiga taman nasional yang terdapat di Jawa Barat, maka dilakukan survai herpetofauna di Taman Nasional Gunung Halimun; yang berlangsung intensif sejak bulan Oktober 2001. Dua puluh dua jenis amfibia didapatkan selama survai tersebut; yang terdiri dari dua jenis dari suku Megophryidae, empat jenis dari suku Bufonidae, satu jenis dari suku Microhylidae, sepuluh jenis dari suku Ranidae dan lima jenis dari suku Rhacophoridae. Indeks kesamaan Simpson digunakan untuk membandingkan keanekaragaman jenis antara dua taman nasional. Hasil indeks koefisien Simpson antara Taman Nasional Ujung Kulon dan Taman Nasional Gunung Halimun adalah 0,786; antara Taman Nasional Ujung Kulon dan Taman Nasional Gede-Pangrango adalah 0,786; dan antara Taman Nasional Gunung Halimun dan Taman Nasional Gede-Pangrango adalah 0,842. Berdasarkan kepada nilai indeks tersebut, kesamaan keanekaragaman amfibia di Taman Nasional Gunung Halimun dan Taman Nasional Gede-Pangrango sangat tinggi.

Kata kunci: kodok, katak, Taman Nasional Ujung Kulon, Taman Nasional Gunung Halimun, Taman Nasional Gede-Pangrango.

INTRODUCTION

Ujung Kulon National Park is located at the western tip of Java, has an area of 122.956 hectares, altitude between 0-608 meter above sea level and represents the last lowland rainforest in western Java. Climax tropical rainforest is restricted to the elevated Gunung Payung region in the west of the national park (altitude 608 meter above sea level). The major part of the national park is covered by an intricate mosaic of almost treeless and thorny scrubland of secondary origin, by different types of mature semi-deciduous forest and by intermediates between these extremes. This mosaic is in fact an inheritance from one of the biggest natural catastrophes in history. In 1883 the nearby volcano, Krakatau, erupted and swamped Ujung Kulon, then event obliterated all human settlement and left thick accumulations of volcanic ash in the inland regions. The unusual vegetation patterns that exist in the now uninhabited peninsula are a reflection of a century of vegetation succession (Kurniati *et al.,* 2001).

Research on flora and fauna of Ujung Kulon has been done by Hoogerwerf (1970); but special research on fauna has been done by Mertens in 1955 and 1956 (Mertens 1957). During herpetofauna survey in Ujung Kulon National Park in July to September 1990, 14 species of amphibian were found in the park. They consisted of one species of Megophryidae, three species of Bufonidae, three species of Microhylidae, five species of Ranidae and two species of Rhacophoridae (Kurniati *el al.,* 2001) (see Table 1).

The Gede-Pangrango National Park is only about 15.196 hectares, altitude between 1000-3000 meter above sea level and lies adjacent to the southeastern border of The Cibodas Botanical Garden. The park consists of six types of

ecosystems; they are sub-montana, montana, sub-alpine, lake, swamp and savanna. Comprehensive research on herpetofauna survey especially on amphibian was undertaken by Liem (1973) in the park, the brief field studies were conducted in 1961-1962, and more intensive surveys in August 1963, March and May 1964. In the surveys Liem (1973) found 19 species of amphibian, which consisted of two species of Megophryidae, four species of Bufonidae, two species of Microhylidae, seven species of Ranidae and four species of Rhacophoridae (see Table 1).

The Gunung Halimun National Park lies about 100 km southwest Jakarta, altitude between 500-2000 meter above sea level. Covering 40.000 hectares, this area is the largest plain sub-montana in West Java. The amphibian faunas in the park have never been previously reviewed systematically. To make comprehensive feature herpetofauna diversity especially on amphibian in the three national parks in West Java, the intensive herpetofauna survey has been conducting in Gunung Halimun National Park since October 2001. To maintain the amphibian characters of Gunung Halimun National Park, the ecological aspects of the fauna will be the priority of research activities.

METHODS

Amphibian species diversity

The suitable techniques of collecting of the species are :

a. Catching by hand

This technique is suitable for cryptic frog by searching in micro-habitats such as leaf litter, tree bark and buttresses, low lying vegetation and in or under logs.

b. Lighting

This technique is only used to catch frog in the night using flashlight with six DD batteries. The frog will be blind when the flashlight shines on the frog's eye; in this condition the shining frog is easy to catch.

All specimens were killed by injecting 95% ethanol into the brain and fixed in 10% formalin and preserved in 70% alcohol.

Species richness and relative abundance

This technique is utilized manual sighting in a certain time sequence. It will be applied in different habitat among several sample sites throughout Gunung Halimun National Park. The abundance rating is based on the following scale (Buden, 2000):

a. Common: at least 30 sightings/day in suitable habitat and under optimal weather conditions.
b. Fairly common : 10-30 sighting/day.
c. Uncommon : up to 10 sightings/day on most days.
d. Scarce : up to 5 sighting/day.
e. Rare : under 5 sighting in most of time surveys.

Major taxonomy of the amphibian species was based on Inger (1966), Iskandar (1998), Liem (1973) and Yang (1991).

RESULTS

Twenty-two species of amphibian were found in Gunung Halimun National Park; they consisted of two species of Megophryidae, four species of Bufonidae, one species of Microhylidae, ten species of Ranidae and five species of Rhacophoridae. Details of the species recorded in Ujung Kulon National Park (Kurniati *et al.*, 2001); Gede-Pangrango National Park (Liem, 1973) and Gunung Halimun National Park (Kurniati, present survey) are followed:

AMPHIBIA

ANURA

MEGOPHRYIDAE

Leptobrachium hasselti (Tschudi,1838)

Distribution. Ujung Kulon, Gunung Halimun and Gede-Pangrango.

Ecological Note. *Leptobrachium hasselti* is restricted in the rain forest. In Ujung Kulon, Gede-

Pangrango and Gunung Halimun they are found on forest floor, under shrubs and among leaf litter. In Ujung Kulon the frogs are only found on foreft floor around the lighthouse trail and Cidaun, clo^l[1] to rainwater puddles. In Gunung Halimun they are found on forest floor around Cikaniki Trail and Loop Trail in Cikaniki and Citalahab area.

Abundance Rating. In Ujung Kulon the frog is frequently found (20-50 sightings) and jn. Gunung Halimun they are found fairly common (10-30 singtings) at Cikaniki and Loop Trails.

Megoplnys montana (Kuhl & van Hasselt, 1822)

Distribution. Gunung Halimun and Gede-Pangrango. In Gunung Halimun the frogs can be found at elevation 800 to 1700 meter (Gunung Botol) above sea level.

Ecological Note. *Megophrys montana* is a mountain forest frog, usually it forages on the forest floor. In Gede-Pangrango the frogs never found outside primary rainforest, but In Gunung Halimun the frogs have widespread distribution throughout mainland of the national park, they can be found in primary, secondary or disturbed forest.

Abundance Rating. In Gede-Pangrango and Gunung Halimun the frog is common.

BUFON1DAE:

Leptophryne borbonica (Kuhl & van Hasselt, 1827)

Distribution. Gunung Halimun.

Ecological Note. *Leptophryne borbonica* is a primary forest frog, they are found at slow moving water at Cikaniki and Loop Trails in Citalahap and Cikaniki areas.

Abundance Rating. At Cikaniki and Loop Trails the frog is common.

Leptophryne cruentata (Tschudi, 1838)

Distribution. Gede-Pangrango.

Ecological Note. *Leptophryne cruentata* occurs in the forest along small creeks or streams on boulders and rocks. They found in Cibeureum waterfall, Rawa Denok and the highest elevation recorded, 2250 meter above sea level (Liem, 1973).

Bufo asper (Gravenhorst, 1829)

Distribution. Ujung Kulon, Gunung Halimun and Gede-Pangrango.

Ecological Note. *Bufo asper* occurs along the riverbank or creeks and small stream in primary and secondary forest, but sometimes they found in small stream near paddy field or human habitation. In Ujung Kulon the frogs found at *Nypa* mangroves on riverbanks in Cijungkulon area near the sea. In Gede-Pangrango and Gunung Halimun the frogs usually occur along rivers bank, creeks or small stream in primary and secondary forest. In some places in Gunung Halimun the frog is found at small stream close to paddy field or human habitations.

Abundance Rating. In Gunung Halimun the abundance of the frog depends on altitude; elevation around 800 meters above sea level the frog is common.

Bufo biporcatus (Gravenhorst, 1829)

Distribution. Ujung Kulon, Gunung Halimun and Gede-Pangrango.

Ecological Note. *Bufo biporcatus* is usually found in degraded habitat, never found in primary or secondary forest. In Ujung Kulon the frog found in marshy *Chiysopogon* dominated Banteng grazing area near Cigenter River. In Gede-Pangrango the frog is restricted to Rarahan, along village clearings or footpaths; In Gunung Halimun the frogs found widespread in footpaths along tea plantation, fishpond or in human habitation at elevation 600-1000 meter above sea level, they never found abundant.

Abundance Rating. The frog is rare (under 5 sightings) in Ujung kulon; In Gede-Pangrango and Gunung Halimun the frog is uncommon.

Bufo melanostictus (Schneider, 1799)

Distribution. Gunung Halimun and Gede-Pangrango.

Ecological Note. *Bufo melanostictus* never found in primary, secondary or degraded forest; they usually found in human habitations, that why the frog cannot find in Ujung Kulon. In Gede-

Pangrango the frog is found in Rarahan, but in Gunung Halimun the frogs have widespread distribution.

Abundance Rating. They are common in low elevation (600 meter above sea level), but rare in high elevation (1500 meter above sea level).

MICROHYLIDAE

Kalophrynus minusculus

Distribution. Ujung Kulon.

Ecological Note. *Kalophrynus minusculus* lives under leaf litter near water, they can be found widespread throughout mainland Ujung Kulon.

Abundance Rating. The frog is common in mainland Ujung Kulon (over 100 sightings).

Note. Joko Iskandar has been describing this species as new species. The last name of the species was *Kalophrynus pleurostigma interliniatus* that described by Mertens (1957).

Microhyla achatina (Tschudi, 1838)

Distribution. Ujung Kulon, Gunung Halimun and Gede-Pangrango.

Ecological Note. *Microhyla achatina* in Gede-Pangrango and Gunung Halimun has non been found in primary or secondary forest, but in Ujung Kulon the frog is widespread throughout wet areas, swamps and damp leaf litter. In Gede-Pangrango the frog found in banks of quiet pools or water-filled ditches along the road to Rarahan. In Gunung Halimun the frog found widespread in mainland of the national park, concentrated in banks of slow moving water, fishpond or paddy field. In Citalahab and Gunung Botol the frog occurs in grassy peat swamps close to tea plantation.

Abundance Rating. In Ujung Kulon the frog is found frequently (20-50 sightings) and in Gunung Halimun the frog is fairly common.

Microhyla palmipes (Boulenger, 1897)

Distribution Ujung Kulon and Gede-Pangrango.

Ecological Note. *Microhyla palmipes* is restricted to rainforest. In Ujung Kulon the frog recorded only from the isthmus trail and Karangranjang area, they found under leaf litter, especially near freshwater. In Gede-Pangrango the frog is restricted in the Gajonggong peat bog area close to Cibeureum waterfall.

Abundance Rating. In Ujung Kulon and Gede-Pangrango the frog is common in the restricted area.

RANIDAE

Huia masonii (Boulenger, 1884)

Distribution. Gunung Halimun and Gede-Pangrango.

Ecological Note. *Huia masonii* is restricted to primary or secondary forest along swift or fast-moving mountain streams. They usually sit on rocks, boulders or vegetation along streams. In Gede-Pangrango the species occurs up to 2000 meter above sea level, but in Gunung Halimun the frog occurs at elevation 800 to 1000 meter above sea level.

Abundance Rating. In Gunung Halimun the frog is common in 1000 meter above sea level.

Rana chalconota (Schlegel, 1837)

Distribution. Gunung Halimun and Gede-Pangrango.

Ecological Note. In Gede-Pangrango and Gunung Halimun *Rana chalconota* has not been found in the forest. In Gunung Halimun the frog occurs in slow-moving water, fishpond or paddy field. In Citalahab the frog is found in grassy peat swamp in tea plantation.

Abundance Rating. In Gede-Pangrango and Gunung Halimun the frog is common.

Rana erythraea (Schlegel, 1837)

Distribution. Gunung Halimun.

Ecological Note. *Rana erythraea* usually occurs in inhabits ponds with aquatic vegetation (Alcala and Brown, 1998) or in stagnant water in lakes, ponds or paddy fields at less then 250 -meter above sea level (Iskandar, 1998). In Gunung Halimun the frog is found only in paddy field that harvested once a year in Gunung Wangun area

(Muhara Resort); it found at elevation 700-900 meter above sea level.

Abundance Rating. In Gunung Halimun the frog is uncommon.

Rana hosii (Boulenger, 1891)

Distribution. Gunung Halimun.

Ecological Note. *Rana hosii* occurs restricted to primary or secondary forest along swift or fast-moving mountain streams. In Gunung Halimun the frog lives sympatric with *Huia masonii.*

Abundance Rating. In Gunung Halimun the frog is common in restricted area,

Rana nicobariensis (Stoliczka, 1870)

Distribution. Ujung Kulon, Gunung Halimun and Gede-Pangrango.

Ecological Note. *Rana nicobariensis* in Gede-Pangrango and Gunung Halimun is found outside the rainforest or dense secondary growth, but in Ujung Kulon the frog found in the forest, widespread throughout mainland Ujung Kulon. In Gunung Halimun the frog occurs abundant in paddy field at elevation 600 to 1000 meter above sea level.

Abundance Rating. The frog is common in Ujung Kulon, Gunung Halimun and Gede-Pangrango.

Fejervarya cancrivora (Gravenhorst, 1829)

Distribution. Ujung Kulon, Gunung Halimun and Gede-Pangrango.

Ecological Note. *Fejervarya cancrivora* in Gede-Pangrango and Gunung Halimun has not been found in rainforest; but in Ujung Kulon the ftog, found only at swamps near Jamang and to the south of the mouth of the Cigerter River. This frog is tolerates salinities up to 2,8 ‰ (Alcala and Brown, 1998). They occur in freshwater and brackish pools (Alcala and Brown, 1998). In Gunung Halimun the frog is usually found in paddy field, they live sympatric with *Fejervarya limnocharis.*

Abundance Rating. In Ujung Kulon, Gunung Halimun and Gede-Pangrango the frog is common.

Fejervarya limnocharis (Boie, 1835)

Distribution. Ujung Kulon, Gunung Halimun and Gede-Pangrango.

Ecological Note. *Fejervarya limnocharis* in Gede-Pangrango and Gunung Halimun has not been found in rainforest, but in Ujung Kulon the species is widespread throughout mainland Ujung Kulon, in or near freshwater. In Gede-Pangrango and Gunung Halimun the frog is usually found in roadside ditches, fishponds, paddy fields and in any temporary pools.

Abundance Rating. In Ujung Kulon, Gunung Halimun and Gede-Pangrango the frog is common.

Limnonectes kuhlii (Tschudi, 1838)

Distribution. Gunung Halimun and Gede-Pangrango.

Ecological Note. *Limnonectes kuhlii* is a mountain **frog** and usually found in stagnant or slow-moving water in shaded places. In Gede-Pangrango the frog is restricted in rainforest. In Gunung Halimun the frog occurs in slow-moving water in the primary, secondary or degraded forest or in open area. In Citalahab the frog occurs in grassy peat swamp in tea plantation.

Abundance Rating. In Gunung Halimun the frog is common at elevation 1000 meter above sea level.

Limnonectes macrodon (Dumeril & Bibron, 1841)

Distribution. Ujung Kulon and Gunung Halimun.

Ecological Note. *Limnonectes macrodon* in Gunung Halimun has not been found in rainforest. In Ujung Kulon the frog recorded only along the lighthouse trail and about 5 km south of Cidaun, they occur in freshwater and brackish pools. In Gunung Halimun the frog is found in paddy fields, fast-moving water, slow-moving water or stagnant

pools. They are found abundant at elevation 600 to 1000 meter above sea level.

Abundance Rating. In Ujung Kulon the frog is found occasional (5-20 sightings), but in Gunung Halimun the frog is common.

Limnonectes microdiscus (Boettger, 1892)

Distribution. Ujung Kulon, Gunung Halimun and Gede-Pangrango.

Ecological Note. *Limnonectes microdiscus* is restricted to the rainforest, usually found in a temporary pool or stagnant water. This species is never found in swift moving creeks or streams. In Ujung Kulon the frog is widespread throughout mainland Ujung Kulon, they are found in or near freshwater. In Gunung Halimun the frog is never abundant in one temporary pool or stagnant water.

Abundance Rating. In Ujung Kulon, Gunung Halimun and Gede-Pangrango the frog is common.

Occidozyga sumatrana (Peters, 1877)

Distribution. Ujung Kulon and Gunung Halimun.

Ecological Note. *Occidozyga sumatrana* is usually found in puddles among human habitation, in the forest or secondary clearings (Iskandar, 1998). In Ujung Kulon the frog is found in marshy areas near Jamang and mouth of Cigenter River. In Gunung Halimun the frog is found in muddy pool close to human habitation and in paddy field at elevation 700 meter above sea level.

Abundance Rating. In Ujung Kulon the frog is occasionally found (5-20 sightings) and in Gunung Halimun the frog is rare (under 5 sightings). According to Iskandar (1998), this species has never been found in high numbers, although it is not rare.

RHACOPHORIDAE

Nyctixalus margaritifer (Boulenger, 1882)

Distribution. Gunung Halimun.

Ecological Note. *Nyctixalus margaritifer* **is** a tree frog and usually found in rainforest from the lowlands up to about 1200 meter above sea level (Iskandar, 1998). In Gunung Halimun the frog is found in primary forest, it lives among shrubs that close to water.

Abundance Rating. In Gunung Halimun the frog is rare.

Philautus aurifasciatus (Schlegel, 1837)

Distribution. Gunung Halimun and Gede-Pangrango.

Ecological Note. *Philautus aurifasciatus* is a mountain tree frog, it is only found in the forests and away from streams or pools. In Gunung Halimun It lives among shrubs in mossy forest, and usually found on the leaf about one meter above the ground.

Abundance Rating. In Gunung Halimun the frog is common in mossy forest in Gunung Botol at elevation 1700 meter above sea level.

Philautus vittiger (Boulenger, 1897)

Distribution. Gunung Halimun.

Ecological Note. *Philautus vittiger* has only been found among vegetation in humid shrubby areas (Iskandar, 1998). In Gunung Halimun the frog is only found among shrubs that close to water at Loop trail in Citalahab area.

Abundance Rating. In Gunung Halimun the frog is rare.

Polypedates leucomystax (Gravenhorst, **1**829)

Distribution. Ujung Kulon and Gede-Pangrango.

Ecological Note. *Polypedatus leucomystax* is the most common tree frog in Java. In the lowland, this species is abundant and usually occurs nearrhuman habitations, in cultivated land around fishpond or permanent pools. In Gede-Pangrango the frog is only found in Cibodas Botanical Garden, has non been found in mainland Gede-Pangrango National Park (Liem, 1973). In Ujung Kulon the frog is found widespread throughout mainland Ujung Kulon, they live in low vegetation, especially above or near freshwater.

Abundance Rating. In Gede-Pangrango the frog is rare (Liem, 1973), but in Ujung Kulon the frog is common.

Rhacophorus javanus (Boettger, 1893)

Distribution. Ujung Kulon, Gunung Halimun and Gede-Pangrango.

Ecological Note. *Rhacophorus javanus* is a tree frog that found in rainforest or open area. In Ujung Kulon the frog is found in lighthouse trail near Cidaun, the frog was found among low vegetation in *Arenga* and *Calamus* forest. In Gede-Pangrango the frog is usually found in pools or slow moving water on water plants or shrubs. In Gunung Halimun the frog occurs among shrubs that close to slow-moving water in primary forest; it is also found among shrubs in open area such as tea plantation or peat swamp that close to water.

Abundance Rating, in Ujung Kulon the frog is rare, but in Gunung Halimun and Gede-Pangrango the frog is common.

Rhacophorus reinwardtii (Schlegel, 1840)

Distribution. Gunung Halimun and Gede-Pangrango.

Ecological Note. In Gunung Halimun and Gede-Pangrango *Rhacophorus reinwardtii* has not been found in rainforest; this species is a tree-dweller; it is usually found 2 to 3 meters high in trees or shrubs along quiet pools. In Gunung Halimun the frog is found in degraded forest and also found among tea plantation that close to water at elevation 600 to 1000 meter above sea level.

Abundance Rating. In Gunung Halimun and Gede-Pangrango the species is common.

To measure the association of amphibian resemblance as similarity among species at Ujung Kulon, Gunung Halimun and Gede-Pangrango based on absent and present of the species (see Table 1), Simpson's Coefficient Index was used (Hayek, 1994). The formula of the coefficient is :

$$\frac{a}{a + \min (b,c)}$$

Description of the formula : The proportion of all localities in which both of a pair of species have been found (a) relative to the smallest number of localities in which one species was found (b,c).

The result of Simpson's Coefficient Index between Ujung Kulon and Gunung Halimun National Park is 0,786; between Ujung Kulon and Gede-Pangrango National Park is 0,786; and between Gunung Halimun and Gede-Pangrango National Park is 0,842. The UPGMA diagram among three national park based on Simpson's Coefficient Index was shown at Figure 1.

Table 1. Species list of frogs and toads of Ujung Kulon, Gunung Halimun and Gede-Pangrango National Park (+) species present; (-) species absent.

Species	Ujung Kulon	Gunung Halimun	Gede-Pangrango
Leptobrachium hasseltii	+	+	+
Megophrys montana	-	+	+
Leptophryne borbonica	-	+	-
Leptophryne cruentata	-	-	+
Bufo asper	+	+	+
Bufo biporcatus	+	+	+
Bufo melanostictus	-	+	+
Kalophrynus minusculus	+	-	-
Microhyla achatina	+	+	+
Microhyla palmipes	+	-	+
Huia mason ii	-	+	+
Rana chalconota	-	+	+
Rana erythraea	-	+	-
Rana hosii	-	+	-
Rana nicobariensis	+	+	+
Fejervarya cancrivora	+	+	+
Fejervarya limnocharis	+	+	+
Limnonectes kuhlii	-	+	+
Limnonectes macrodon	+	+	-
Limnonectes microdiscus	+	+	+
Occidozyga sumatrana	+	+	-
Nyctixalus margaritifer	-	+	-
Philautus aurifasciatus	-	+	+
Philautus vittiger	-	+	-
Polypedates leucomystax	+	-	+
Rhacophorus javanus	+	+	+
Rhacophorus reinwardtii	-	+	+

Table 2. Pair wise Simpson's Coefficient Index of amphibian species among three national park, Ujung Kulon, Gunung Halimun and Gede-Pangrango.

Area	Ujung Kulon	Gunung Halimun	Gede-Pangrango
Ujung Kulon	_		
Gunung Halimun	0,786	_	
Gede-Pangrango	0,786	0,842	_

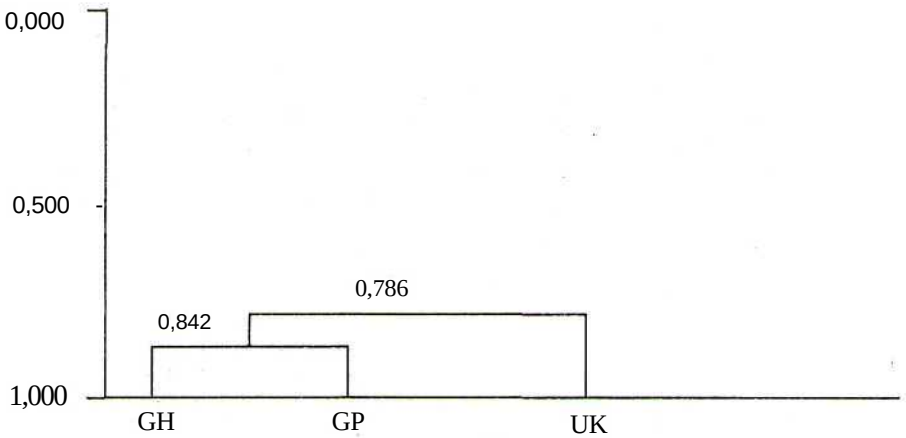

Figure 1. UPGMA diagram based on Simpson's Coefficient Index similarities among three national park (UK=Ujung Kulon; GH=Gunung Halimun; GP=Gede-Pangrango)

DISCUSSION

Twenty-seven species of amphibian are found, nine species are resident on Ujung Kulon, Gunung Halimun and Gede Pangrango National Park, they are *L. hasseltii, B. asper, B. biporcatus, M. achatina, R. nicobariensis, F. cancrivora, F. limnocharis, L. microdiscus* and *R. javanus;* they occur in the forest or open areas from near sea level to highland area. Among of the species, only *L. hasseltii, R. nicobariensis, F. cancrivora, F. limnocharis* and *L. microdiscus* are common on the mainland of the three national parks. The lowland frog *K. minusculus* is only found in Ujung Kulon, this species is restricted in lowland rainforest (Iskandar, 1998). In Gunung Halimun, *H. masonii* and *R. hosii* live sympatric, but in Gede-Pangrango the species *R. hosii* has not been found by Liem (1973); one of the possibility is *R. hosiii* needs specific characteristics of microhabitat that cannot *be* found *in Gede-Pangrango, but to find the* accurate explanation about the absent of *R. hosii* in Gede-Pangrango, more intensive survey is needed.

The result of Simpson's Coefficient Index between Gunung Halimun and Gede-Pangrango National Park is 0,842. According to the index, the similarity of amphibian species in Gunung Halimun and Gede-Pangrango National Park is very high; it means condition of the habitats in the two national parks is very similar compared to the habitat in Ujung Kulon National Park. Ujung Kulon is lowland area, while Gunung Halimun and Gede-Pangrango are highland areas; so in general the amphibian diversity in the two national park is not so different.

More than half of the species that found in the three national parks are numerous in disturbed habitat, including edificarian, ruderal, agroforest, disturbed native forest and secondary vegetation, however only ten species are restricted to primary rainforest. The present management of Ujung Kulon, Gunung Halimun and Gede-Pangrango are essentially non interventionist with respect to forest succession. These are suitable for the maintenance of a diverse herpetofauna especially amphibian and no alterations to this strategy. However, recently the national parks, especially Gunung Halimun has a plan to increase tourist access. Evidence from experienced park guides suggests that this *disturbance has depleted a previously healthy* population of amphibian.

ACKNOWLEDGMENTS

Special thanks were given to Mr. Hiroo Uehara, chief advisor/JICA team leader on LIPI-JICA-PHKA Biodiversity Conservation Project in Indonesia period 1999 to 2001 and Dr. Toshinao Okayama, JICA long term expert on LIPI-JICA-PHKA Biodiversity Conservation Project for the

strong support at the beginning of the project. Many thanks were also given to Mr. Kojiro Mori, chief advisor/JICA team leader on LIPI-JICA-PHKA Biodiversity Conservation Project in Indonesia period 2001 to 2003 in giving excellent administrative support during field works.

The author was also fortunate to have local people in Gunung Halimun National Park whose knowledge, enthusiasm and efforts contributed greatly to the success and enjoyable conduct of the field works.

Research and field works in Gunung Halimun National were supported by Nagao Environment Foundation (NEF), Tokyo, Japan, period 2001-2002.

REFERENCES

Alcala AC and Brown WC. 1998. *Philippine Amphibians. An Illustrated Field Guide.* Bookmark, Inc. Makati City.

Buden DW. 2000. The reptiles of Pohnpei, federal States of Micronesia. *Micronesica* **32** (2), 155-180.

Hayek, Lee-Ann C. T994. Analysis of amphibian biodiversity data. In: *Measuring and monitoring biological diversity, standard methods for amphibian.* Heyer, WR. Donnelly, MA, McDiannid, RW, Hayek. Lee-Ann C. and Foster, MS (Editors). Smithsonian Institution Press. Washington. Him 207-269.

Hoogerwerf A. 1970. *Udjung Kulon. The Land uj The Last Javan Rhinoceros.* EJ Brill. Leiden.

Inger RF. 1966. *The systematic; and zoogeography of the amphibia of Borneo.* Field Museum Press. Chicago.

Iskandar DT. 1998. *Amphibia of Java and Bali. .* Research and Development Center for Biology-LIPI. Bogor.

Kurniati H, Crampton W, Goodwin A, Lockctt A and Sinkins A. 2001. Herpetofauna diversity of Ujung Kulon National Park : An Inventory results in 1990. *Journal of Biological Researches* 6 (2), 113-128.

Liem DSS. 1973. The frogs and toads of Tjibodas National Park, Mt. Gede, Java, Indonesia. *The Philippine Journal of Sciences* **100** (2), 131-161.

Mertens R. 1957. Amphibien und reptilien aus dem ausserten Westen Jawas und benachbarten Eilanden. *Treubia* **24,** 83-105.

Yang Da-Tong. 1991. Phylogenetic systematics of the *Amalops* of ranid frogs of Southeastern Asia and the Greater Sunda Island. *Fieldiana Zoology* 63, 1-42.