

The Diversity of Amphibians in Campus Area of Sriwijaya University Indralaya, Ogan Ilir, South Sumatra

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ABSTRAK

Penelitian yang berjudul Keanekaragaman Jenis Amfibi di Kawasan Kampus Universitas Sriwijaya Indralaya Kabupaten Ogan Ilir Provinsi Sumatera Selatan ini bertujuan untuk mengetahui keanekaragaman jenis amfibi yang terdapat di dalam kawasan tersebut. Penelitian ini dilaksanakan pada bulan Maret sampai dengan bulan Mei 2015, bertempat di kawasan kampus Universitas Sriwijaya, Indralaya. Metode penelitian yang digunakan dalam penelitian ini adalah metode jalur (*Transect*) dengan cara menempatkan 7 garis transek/jalur dengan arah memotong garis kontur. Teknik pengumpulan data dengan menggunakan metode *Visual Encounter Survey* (VES) dan metode *Pit-Fall Trap* yang dikombinasikan dengan metode *Straight Line* dan pagar pembatas (*drift fence*). Hasil dari penelitian ini tercatat 11 jenis amfibi dari 5 suku (famili) dari Ordo Anura. Indeks keanekaragaman rata-rata di kawasan Universitas Sriwijaya Indralaya tersebut adalah 1,70 yang termasuk ke dalam kategori sedang.

Kata kunci : Universitas sriwijaya, amfibi, transek, keanekaragaman

ABSTRACT

The study is diversity of amphibians in campus area of sriwijaya university indralaya, ogan ilir, south sumatra was aimed to determine the diversity of amphibian present in this area. The research has been done in March until May 2015, in the campus of the Sriwijaya University, Indralaya. The method in this study is use the transect method by placing seventh transect line on line with the direction of cutting contour lines. Data collection techniques using the *Visual Encounter Survey* (VES) and *Pit-Fall Trap* method in combination with the *Straight Line Method and Fence (Drift Fence)*. Results from this study recorded 11 species of amphibians from five families of the Anura. Average diversity index at Sriwijaya University Indralaya region is 1.70 which fall into the medium category.

Key words : Sriwijaya university, amphibians, transect,diversity

INTRODUCTION

Indonesia is a country with a very high biodiversity. This is what makes Indonesia as one of the biodiversity hotspots of the world and are known as mega-

biodiversity countries (Suhartini, 2009). One of the high biodiversity in Indonesia are amphibians. Indonesia has recorded two of the three orders of amphibians in the world, namely Gymnophiona and Anura. Order of Gymnophiona very difficult to detect and even considered rare, while the order Anura can easily be found in Indonesia, reaching about 450 species or about 11% of all types of Anura in the world. While the other orders that Caudata an order that does not exist in Indonesia (Iskandar, 1998).

Amphibians are one of the components of the ecosystem which has a very important role, both ecologically and economically. Ecologically some amphibians also possess sensitive to temperature, humidity, and changes in the environment so that it can be used as bio-indicators of environmental degradation as well as act as a primary consumer of prey such as insects or other invertebrate animals (Kusrini, 2013). Kusrini (2007) states that data on the presence and status of amphibians in Indonesia is still very limited

Sriwijaya University as a university that has land and water areas are fairly spacious with overgrown vegetation types is possible to serve as wildlife habitat. Based on research that has been done regarding biological diversity in the campus area Sriwijaya University, found 52 species of birds and 22 species of reptiles and amphibians (Setiawan and Yustian, 2013).

The existence of a variety of green areas such as forests, parks and marsh ecosystems in the region UNSRI campus is very supportive for amphibian habitat. While data and information on the diversity of amphibian in the campus area UNSRI Indralaya still very little and even not well documented. Based on the above, the research on amphibian diversity in the region needs to be done. Thus, it can add a reference particularly to amphibians on the island of Sumatra.

MATERIALS AND METHODS

This study was conducted in March-May 2015. Data collection was performed at Sriwijaya University Campus area, Indralaya South Sumatra Province. Identify the types of amphibians conducted at the Laboratory of Zoology, Department of Biology, Faculty of Mathematics and Natural Sciences, University of Sriwijaya, Indralaya.

The tools used in this study, namely stationery, syringes, manual identification of Amphibians (Iskandar, 1998, Kusrini, 2013 & Kampen, 1923), paint bucket (diameter + 35 cm), GPS (Global Positioning System), headlamp, hours hand / stop watch, frog catcher nets, DSLR cameras, calipers, specimen bags, cotton, paper labels, compass, map, pH meter, plastic the size of 0.5 x 20 m, Roll-meter (100 m), a flashlight, a sample tube, raffia, thermohygrometer, and thermometer. While the materials to be used in this study was 70% alcohol that is used for specimen preservation.

The method used in this research is the method of lines (transects). Namely data collection techniques with methods Visual Encounter Survey (VES) where the manufacturing lines at each observation carried locations purposive consider the type of community that exists, where 200-400 meter habitat for aquatic and terrestrial habitats 800-1000 meters for Kusrini (2009) , Biased observation path length is longer or shorter, depending on the location of the observation.

Table 1. The point coordinates, location, and type of Dominant Plants of 7 transect observation at Sriwijaya University Campus area.

Transect	Coordinate		Transect length (m)	Location / Type of Dominant Plant
	Start	End		
Transect1 (LT 1)	S 03°13.826' E 104°39.103'	S 03°13.571' E 104°39.047'	400 m	Tanjung Putus Swamp (Gelam, Akasia)
Transect2 (LT 2)	S 03°13.824' E 104°39.111'	S 03°13.592' E 104°39.349'	500 m	Swamp east Campgrounds (Gelam, Akasia)
Transect3 (LT 3)	S 03°13.194' E 104°38.582'	S 03°13.183' E 104°38.582'	800 m	Arboretum (<i>Acacia</i> , <i>syzygium</i> , Senduduk, and several other varieties of fruit trees)
Transect4 (LT 4)	S 03°13.268' E 104°39.623'	S 03°13.571' E 104°39.649'	200 m	Swamp near a residential lecturer (Gelam)
Transect5 (LT 5)	S 03°13.128' E 104°38.377'	S 03°13.141' E 104°38.125'	400 m	Oil Palm Plantation Faculty of Agriculture
Transect6 (LT 6)	S 03°13.662' E 104°37.895'	S 03°13.779' E 104°37.882'	400 m	Rubber plantations Faculty of Agriculture
Transect7 (LT 7)	S 03°13.110' E 104°38.859'	S 03°13.226' E 104°38.729'	300 m	Area Lecture Building Zona D (Akasia, Beringin, Sawit)

Data collection is done by exploring the observation path in the morning and evening with 3 repetitions for each track. Observations conducted morning at 8:00 am to 11:00 pm, while the evening observations made at 8:00 pm to 23:00 pm. Observations started from zero on every track length observation path can be longer or shorter, Depending on the condition of the observation path. Pit-fall trap method that is Often used to survey soil insects. Pit-fall Trapping is Generally combined with guardrail (Drift Fence) IS ALSO used to assist in data collection amphibians. Drift fence is a short fence measuring 0.5-1 meters long and is usually between 5-15 meters made of netting or plastic and then made a hole in its center and placed a bucket of paint + 35 cm in diameter in the center of the hole and planted evenly with the surface land and amphibious so useful for direct entry into the Pit Fall Trap (Bismark, 2011).

Marking species used in this study is a modification of the method Fluorescent elastomer or stamp on the skin (tattoo) (Kusrini, 2009) with a way to give color on the body of amphibians with nail polish that is not Easily lost when in the water and made of materials not harmful. With this designation can minimize the chances of any individual counted more than once.

Overall the Data Obtained are recorded and tabulated on a sheet / Data sheet has been prepared in advance. Then the existing data on the sheet / sheet was Analyzed to Determine the diversity of amphibians using Diversity Index of species (species diversity), Shannon-Wiener as follows:

$$H' = -\sum \left[\frac{n_i}{N} \right] \ln \left[\frac{n_i}{N} \right], \text{ atau} \\ -\sum p_i \ln p_i$$

According Fachrul (2007), the magnitude of the diversity index of Shannon defined as follows: Value $H' > 3$ indicate that the diversity of species on a transect is high, value $1 < H' < 3$ indicate that the diversity of species on a transect is moderate and the value $H' < 1$ shows that the diversity of species on a transect is low.

RESULTS AND DISCUSSION

Based on observations in University of Sriwijaya Indralaya South Sumatra from March to May 2015 recorded 11 species of amphibians from five tribes (families) of Anura namely Bufonidae (2 types), Dicroglossidae (3 types), Microhylidae (2 types), Ranidae (3 types), and Rhacophoridae (1 types), Gymnophiona not found during the observation.

Figure 4.1 displays based familia species composition of amphibian were found. Family Rhacophoridae has the smallest percentage is 9.10%, with the Microhylidae and Bufonidae have the same percentage is 18.18%, Ranidae and Dicroglossidae has the highest percentage in comparison with other species that is equal to 27.27% of the total species are found. Amphibians observed by using Visual Encounter Survey (VES) and Straight Line Drift Fence and Pitfall Traps can be seen in Table 4.1.

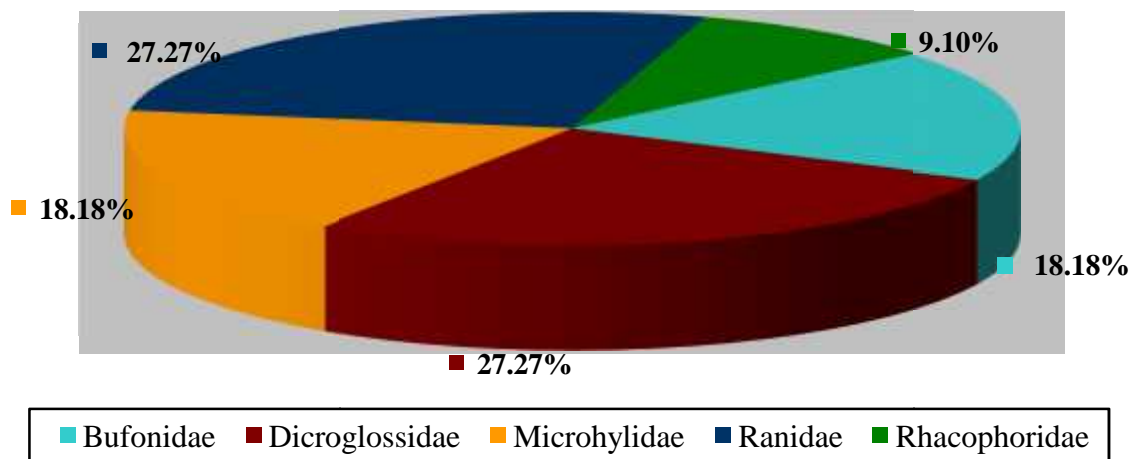


Figure 1. Percentage Composition types based on the family

Table 2. besides amphibians obtained through observation paths (Transect) with Visual Encounter Survey method, there are some types of amphibians obtained by using traps Straight Line Drift Fence and Pitfall Traps are generally a kind that is easy to meet. Besides, the trap that caught the Straight Line method Drift Fence and Pitfall Traps is a type that has the ability to jump low enough so that the species can be blocked by a fence steering that has been made and then fall into the trap. It is an effective way to be able to see amphibians rather difficult encountered such kind Ingerophynus biporcatus not found through direct observation survey methods. Type captured through trap method Straight line drift

fence and Pitfall traps are *Duttaphrynus melanostictus* and *Ingerophrynus biporcatus* of the family Bufonidae and *Fejervarya limnocharis* of family Dicroglossidae. While the other types are not caught by a trap method.

Table 2. Types of Amphibians in Region Sriwijaya University Indralaya

Famili	Species	Methods of Observation		Conservation status (IUCN, 2015)
		VES	Trap	
Bufonidae	<i>Duttaphrynus melanostictus</i> (Asian toad, buduk toad)	✓	✓	LC
	<i>Ingerophrynus biporcatus</i> (Crested frog, Puru hutan toad)	-	✓	LC
Dicroglossidae	<i>Fejervarya limnocharis</i> (Grass frog, Tegalan frog)	✓	✓	LC
	<i>Fejervarya cancrivora</i> (Ricefield frog, Hijau/sawah Frog)	✓	-	LC
	<i>Limnonectes</i> sp. (Creek frog, Bangkok Frog)	✓	-	LC
Microhylidae	<i>Kaloula baleata</i> (Flower toad frog, Belentuk frog)	✓	-	LC
	<i>Microhyla achatina</i> (Javan chorus frog, Percil jawa)	✓	-	LC
Ranidae	<i>Hylarana erythraea</i> (Green paddy frog, Kongkang gading)	✓	-	LC
	<i>Hylarana nicobariensis</i> (Cricket frog, Kongkang jangkrik)	✓	-	LC
	<i>Hylarana baramica</i> (Baram's frog, Kongkang baram)	✓	-	LC
Rhacophoridae	<i>Polypedates leucomystax</i> (Striped tree-frog, Pohon bergaris frog)	✓	-	LC

The amount of amphibians at night more than the number of species of amphibians during the day (Figure 2) can be seen from the number of species in the evening found 11 species, whereas during the day only three types of amphibians. This is because of amphibians, including wildlife nocturnal (active at night), so as to observe amphibians (Anura) should be done at night. *Fejervarya* type is the most common amphibians at noon in the region especially in the watery region.

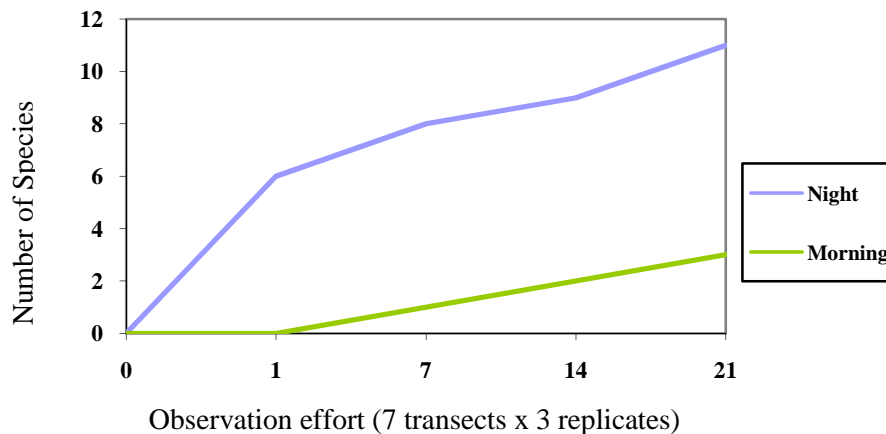


Figure 2. Amphibian accumulation curves based on time of observation

Table 3. The diversity of amphibians found in each transect region Sriwijaya University Indralaya

No	Species	Number of individuals or mark found in each transect							Ti
		Transek							
		1	2	3	4	5	6	7	
1.	<i>Duttaphrynus melanostictus</i> (Kodok buduk)	2	3	3	3	6	3	12	32
2.	<i>Ingerophrynus biporcatus</i> (Kodok puru hutan)	1	-	2	-	3	1	2	9
3.	<i>Fejervarya limnocharis</i> (Katak tegalan)	13	16	2	8	4	9	7	59
4.	<i>Fejervarya cancrivora</i> (Katak hijau/sawah)	23	11	-	12	-	11	-	57
5.	<i>Limnonectes</i> sp. (Katak bangkong)	-	-	1	-	-	-	-	1
6.	<i>Kaloula baleata</i> (Katak belentuk)	-	-	-	-	-	-	1	1
7.	<i>Microhyla achatina</i> (Percil jawa)	1	-	-	-	-	-	-	1
8.	<i>Hylarana erythraea</i> (Kongkang gading)	34	21	-	-	-	12	-	67
9.	<i>Hylarana nicobariensis</i> (Kongkang jangkrik)	-	-	-	-	-	2	-	2
10.	<i>Hylarana baramica</i> (Kongkang baram)	-	-	1	-	-	-	1	1
11.	<i>Polypedates leucomystax</i> (Katak pohon bergaris)	-	-	2	-	-	-	7	9
	Total type (S)	6	4	6	3	3	6	6	240
	Total Number of Individuals (N)	74	51	11	23	13	38	30	
	Shannon Indeks Each Transect (N)	1,24	1,23	1,72	0,97	1,06	1,52	1,45	
	Shannon Indeks Across the region Unsri	1,70							

In the transects 1 to 7 can be seen that there are differences in the diversity indices, namely T1 (1.24 medium category), T2 (1.23 medium category), T3 (1.72 medium category), T4 (0.97 low category), T5 (1.06 medium category), T6 (1.52 medium category) and T7 (1.45 medium category). While the diversity index of the average in the region Indralaya Sriwijaya University is 1.67 which belong to the medium category (Table 4.2). Value index of species diversity is highest at transect 3 with an index value (1,72 medium category) which has a number of 6 types with individual number 11. This is because the 3 transects were in the Arboretum UNSRI which has a diverse plant community types include shrubs, puddles of rain, the water flow because, according to Iskandar (1998) amphibious always live in association with water. Water temperature and air temperature in the Arboretum UNSRI is 21.5 ° C and 25.8 ° C (See Table 4.3.) Which is the lowest compared to other transects. Nevertheless Wells (2007) mentioned that

many amphibians are dependent on the water, but there are some types that are not so dependent on the water, although they require moist microhabitats. Amphibians can be found in terrestrial habitats from tropical rain forests to some of the driest desert on earth. Amphibians can be found in almost any other environment until at altitudes above 4,500 meters above sea level. Amphibians can not live in an environment which is very close to the sea, but they are found in nearly every type of habitat and other water from brackish water in estuaries, rivers, ponds, lakes, swamps, and ditches.

Lowest diversity index contained on transect 4 with an index value of 0.97 (lower category) which only has 3 types with 23 number of individuals. This is because the transect 4 was in the location near the marsh vegetation gelam faculty housing and the high grass. At this location is also disturbed by human activity. Although the water temperature and air temperature in this area from 24.2 to 26.7 ° C and 27.6 to 28.1 ° C (Table 4.3.) And not the highest temperature in the whole transect, however dense grass vegetation can inhibit the movement of amphibians and complicate the search effort. In the transects transects 6 and 7 has almost the same diversity index is 1.52 and 1.45, but transects transects 6 and 7 have different types of plant communities. Of transects 6 and 7 transects encountered 6 species of amphibians. However, not all types of amphibians found in transects 6 well encountered on transects 7, and vice versa. According Yanuarefa et al, (2012) some amphibian are species that live in a particular habitat or in specific regions (microhabitat) unspoiled commonly called amphibian specialist Huaia Massoni living example of natural areas in the fast-flowing river.

Table 4. The physical and chemical conditions at the time of observation

No Transek	Location	Temperature (°c)		Humidity (%)	pH
		Air	Udara		
1	Tanjung Putus Swamp	23,7 – 25,9	26,8 - 29,3	78,2 - 81	4,6
2	Swamp east campground	23,1 – 25,4	27,1 - 28,3	77,9 - 77	4,5
3	Arboretrum	21,5 – 24,8	25,8 - 28,3	77,3 - 89,3	5,0
4	Swamp near a residential lecturer	24,2 – 26,7	27,6 - 28,1	77 - 79,5	5,5
5	Oil palm plantations	24,1 – 26,4	28,4 - 29,1	77,2 - 76,8	5,5
6	Rubber Plantation	24,0 – 27,5	28,5 - 31,2	75- 74,6	5,6
7	7 Lecture building area Zone D	-	27,9 - 28,7	77,4 - 80,7	-

Table 4.4. The range of body size in some types of amphibians are encountered on campus UNSRI during the observation period

No.	Species	N	Minimum (cm)	Maximum (cm)	Mean	Std. Deviasi
1.	<i>Duttaphrynus melanostictus</i>	28	4,35	6,52	5,44	1,05
2.	<i>Ingerophrynus biporcatus</i>	9	5,71	6,15	5,93	0,20
3.	<i>Fejervarya limnocharis</i>	59	2,35	5,25	3,80	1,43
4.	<i>Fejervarya cancrivora</i>	57	4,61	8,90	6,76	2,11
5.	<i>Hylarana erythraea</i>	34	2,92	5,15	4,04	1,08
6.	<i>Polypedates leucomystax</i>	9	4,30	6,35	5,33	0,92

Note: The amount listed in the table just kind of having a number 2, did not do the size difference between the sexes.

The range of body size is expressed in length from tip of snout to the cloaca (Snout-Vent Length). SVL value of some kind exist in the table above. From Table 4 above can be seen that the range of body sizes have varying intervals on the overall species are found. With a range of body size can illustrate comparisons between individuals who are still puppies (juvenile) with adult individuals, in other words, this shows the difference in ecological umurSebaran strata in amphibians generally described with amphibious position when encountered. The position is divided into two, horizontal and vertical position. Horizontal position to see the horizontal spread of the frog on the habitat as there is the middle of the river, on the edge of a dry river, or the distance of the frog to the nearest water body accompanied shade properties. A vertical position in the terrestrial habitat is described as a reference to the position of the sub-surface soil on the surface of an open, shaded soil surface and under ground or water (Kusrini, 2013). Here's a table of the common position of the kinds of amphibians as found when observations:

Table 5. The position of the general types of amphibians when encountered when sighting

No	Name	Position	
		Vertical	Horizontal
1.	<i>Duttaphrynus melanostictus</i>	Above ground, wood and litter	Away from water bodies
2.	<i>Ingerophrynus biporcatus</i>	Above ground, wood and litter as well as under bushes	Usually away from bodies of water, but is also found on the edge of the water which has particularly the bush 5 m dta*
3.	<i>Fejervarya limnocharis</i>	On top of the rock, soil and grass 1m dpa *	1 meter of water bodies dta *
4.	<i>Fejervarya cancrivora</i>	Di atas batu, tanah dan rerumputan 1 m dpa*	2 meter dari badan air dta*
5.	<i>Limnonectes sp.</i>	In twigs near water sources	<0.5 m of water bodies dta *
6.	<i>Kaloula baleata</i>	On stone	<1 m from the water source dta*
7.	<i>Microhyla achatina</i>	In the grass <0.5 m dpa *	<0.5 m of water bodies dta *
8.	<i>Hylarana erythraea</i>	In rock, soil and grass along the waters of 0.5 m dpa *	<0.5 m of water bodies dta*
9.	<i>Hylarana nicobariensis</i>	Above the grass 0.5 m dpa *	<0.5 m from the puddles dta*
10.	<i>Hylarana baramica</i>	In the grass <0.5 m dpa *	<0.5 m from the puddles dta*
11.	<i>Polypedates leucomystax</i>	In shrubs and tree branches <1.5 m dpa *	-

Description: dta = from the water's edge; dpa = from above the water surface

CONCLUSION

Based on the research that has been done, the conclusion as follows:

1. The number of species of amphibians found in the campus area of the University of Sriwijaya Indralaya South Sumatra are 11 species, divided into 1 order Anura consisting of 5 families.
2. Diversity Index (H') amphibian in the campus of the University of Sriwijaya Indralaya South Sumatra is 1.70 which fall into the category of being.
3. Based on the 2015 IUCN red list of 11 species of amphibians found in the campus area of the University of Sriwijaya Indralaya South Sumatera all types have a low risk of conservation status (Least Concern).

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