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The First International Conference in Engineering and Technology Development




Universitas Bandar Lampung
20 - 21, June 2012
Lampung, Indonesia

PREFACE

The activities of the International Conference is in line and very appropriate with the vision and mission of the UBL to promote training and education as well as research in these areas.

On behave of the First International Conference of Engineering and Technology Development (ICETD 2012) organizing committee; we are very pleased with the very good responses especially from the keynote speakers and from the participants. It is noteworthy to point out that about 45 technical papers were received for this conference

The participants of conference come from many well known universities, among others: Universitas Bandar Lampung, International Islamic University Malaysia, University Malaysia Trengganu, Nanyang Technological University, Curtin University of Technology Australia, University Putra Malaysia, Jamal Mohamed College India, ITB, Mercu Buana University, National University Malaysia, Surya Institute Jakarta, Diponogoro University, Unila, Universitas Malahayati, University Pelita Harapan, STIMIK Kristen Newmann, BPPT Lampung, Nurtanio University Bandung, STIMIK Tarakanita, University Sultan Ageng Tirtayasa, and Pelita Bangsa.

I would like to express my deepest gratitude to the International Advisory Board members, sponsors and also welcome to all keynote speakers and all participants. I am also grateful to all organizing committee and all of the reviewers which contribute to the high standard of the conference. Also I would like to express my deepest gratitude to the Rector which give us endless support to these activities, such that the conference can be administrated on time.

Bandar Lampung, 20 Juni 2012

Mustofa Usman, Ph.D
ICETD Chairman

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UNIVERSITAS BANDAR LAMPUNG
Bandar Lampung,Indonesia
June, 20-21 2012

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GIS Habitat Based Models Spatial Analysis to Determine the Suitability of Habitat for Elephants

(*Elephasmaximussumatranus*Temminck, 1847)

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Abstract—**Model of geographic about of Sumatran elephant habitat, based on the potential food, water, the pools to determine the suitability of habitat for Sumatran elephants, with the scoring process of spatial analysis and overlay.**
Overlay and analysis of the suitability of our food, our water and puddles and topografi a limiting factor.The importance of the areas of potentially suitable habitat for Sumatran elephants.

Keyword—GIS, Overlay,Elephants, Sumatran Elephants, Suitability of habitat.

I. INTRODUCTION

Under the Law of Wildlife Protection by the Minister of Agriculture Decree, the status of wildlife species are protected species in Indonesia. Further according to CITES (2002) this species is classified into the types of animals that are threatened extinction (Appendix I) and according to the IUCN (1996) belongs to the endangered species (endangered) A1cd criteria.

Sumatran elephant habitat degradation, especially in National Parks, among others, caused by the decline in forest area and elephant habitat has been fragmented due to land use that is not based on the integrity of forest ecosystems.

The era of computerization has opened a new paradigm of discourse and in information technology as well as one new breakthrough in solving spatial problems in Indonesia. In decision-making and dissemination of information data can be presented in such a way as to represent a real world. The common denominator in dealing with the manipulation and representation of data that are related to the geographic location of the surface of the earth is a Geographic Information System. In further development of Geographic Information Systems can handle spatial data and non-spatial and spatial operations. One area of application of the sig is based spatial analysis models to determine the suitability of habitat for elephants. determination is based on the aspect of feed, water, puddles and human pressure. With the SIG is expected to bring new information that could handle the Sumatran elephant habitat management issues

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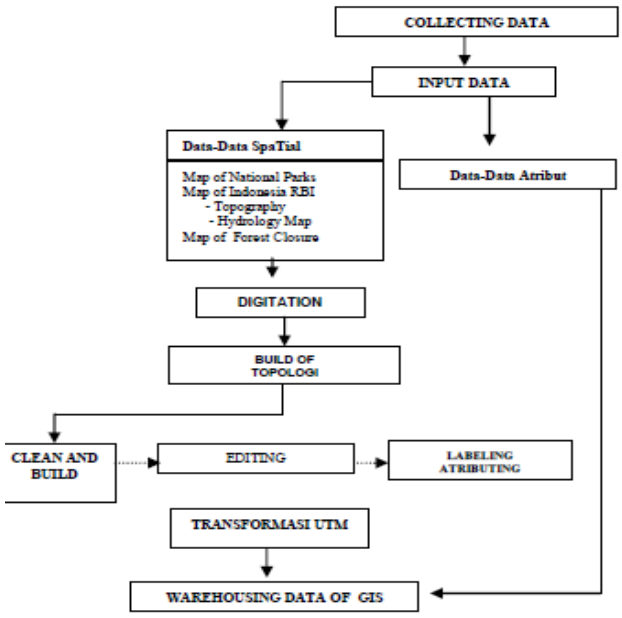

Fig. 1 Frame Work warehousing data of GIS

Stages in GIS analysis in the determination ofSuitability Sumatran elephant habitats as shownbelow :

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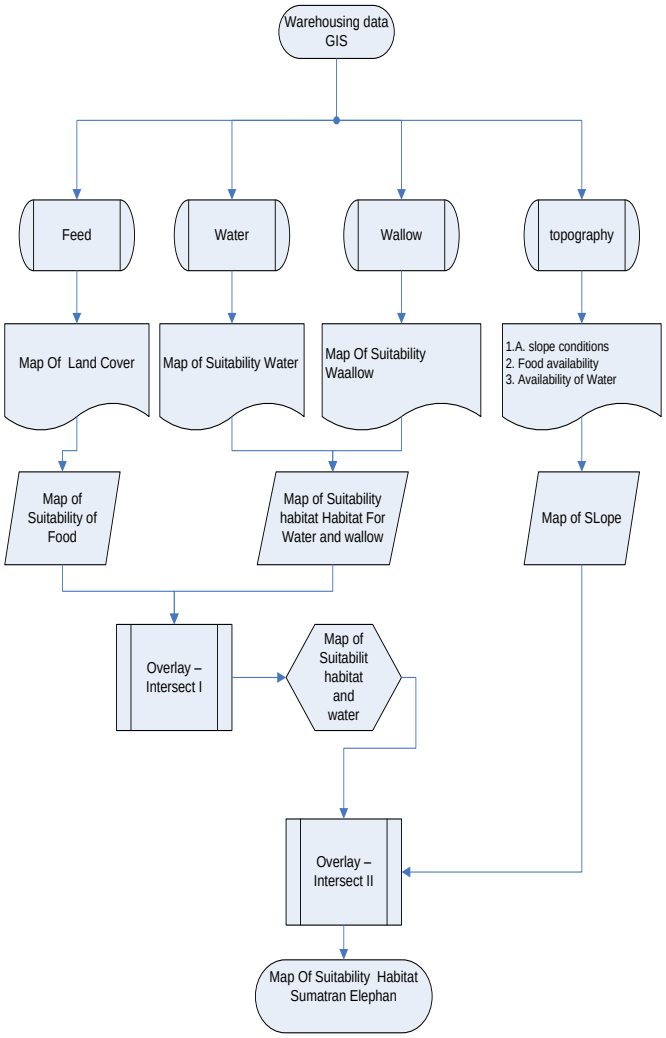

Fig. 2 Stages in GIS analysis

III. Processing of Thematic Map

Thematic map is a map that shows the data orqualitative or quantitative information of atheme, purpose, certain concepts, and relate tospecific elements of topographical detail, inaccordance with the relevant themes.Preparation of thematic maps is an effectivemeans of processing, and storage of spatial database that is (spatially). The results of processingthematic map .

Sumatran Elephant Habitat Map Top Feed

Suitability of habitat for Sumatran elephants feed is determined by several parameters, is: Land Cover maps and topographic become a benchmark for Sumatran elephants Feed Suitability Map.

Habitat map of Sumatran elephants and pools on Water

Sumatran elephant habitat suitability of the water is determined by water sources, such as: river, pool, swamps. Reasons, including the Sumatran elephant species that depend on large amounts of water (Water Dependent Species). Other than water for bathing and drinking, as well as the media plays in building social relationships among elephants (Widiowati, 1985).Needs of elephants drink per day for an estimated 200-250 liters of elephants weighing 3000 kg - 4000 kg. Parameters used to determine the habitat map :

TABLE 1SUMATRANELEPHANTHABITATSUITABILITYFOR THE AVAILABILITYOF WATERANDPOOLS

Variable	Criteria	Indicator
waterandpools	topography	easily accessible
		Difficult to accessible

Topographic map of suitability

Sumatran elephant habitat suitability based on topography based surface analysis by using the slope-class manufacturing (slope), with the following criteria:

TABEL2SUITABILITY OF TOPOGRAPHIC

No.	Slope Class (%)	Clasiffication
1.	0 – 8	Suitable
2.	8-15	Suitable
3.	15 - < 25	Not Suitable
4.	25 - < 40	Not Suitable
5.	≥ 40	Not Suitable

TABLE 3
FEEDING HABITAT SUITABILITY SUMATRAN ELEPHANTS

No.	Type of Vegetation	Conclusion
1	The SecondaryNatural Forests	Suitable
2	The Acaciaof forest	Not Suitable
3	Societyof Agricultural Land	Suitable
4	LandOil Palm Plantation	Suitable
5	Outdoorfield	Suitable

From the results of GIS analysis of habitat types in the area one of national park :

TABLE 4
AREA OF HABITAT TYPES

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No.	Type of Habitat	% Area	Large (Ha)
1	Outdoorfield	5	1804
2	The SecondaryNatural Forests	78	29914
3	Societyof Agricultural Land	1	269
4	LandOil Palm Plantation	10	3770
5	The Acaciaof forest	7	2818
Total		100	38,576

if it is assumed from table 4, the corresponding area as potential habitat in terms of feed as follows:

TABLE 5
SUITABILITY of FEED ELEPHANT of SUMATRAN

No.	Classification	% of Large	Large (ha)
1	Suitable	93.6	36093.47
2	Not Suitable	6.4	2482.53
Total		100	38576

Fig. 1. Map of Suitability of Feed Elephant of Sumatran based Type of Forest.

Based on the feed and topographic map overlay area of the region as a potential habitat of Sumatran elephants are:

TABLE 6
SUITABILITY FEED BASED ON OVERLAY TOPOGRAFIC

No.	Classification	% of Large	Large (ha)
1	Suitable	52	20,236.5
2	Not Suitable	48	18,339.5
Total		100	38,576.0

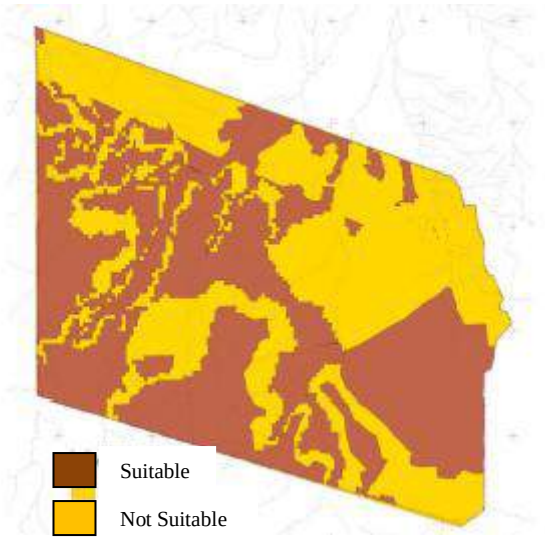

Fig.2 Map of Suitability Feed based on overlay Topografic.

Suitability of topography and slope

Existing topography of the Park in the west are generally dominated by a rather steep hills to steep and bumpy, with a height ranging between 50-100 meters above sea level, which led to the location manager is appointed by the National Park as the core zone for hydrology. As with the eastern part of the National Park, this area has a gently sloping to flat topography with an average altitude of 50 mdp. GIS analysis of the results obtained the following results:

TABEL 8
SUITABILITY OF TOPOGRAFI

No.	Classification	% of Large	Large (ha)
1	Suitability	67	25,877
2	Not Suitability	33	12,699
Total		100	38,576

Water Suitability and pools

Including the Sumatran elephant species that depend on large amounts of water (Water Dependent Species) In addition to river water, elephants also use a pool for bathing and drinking. Sumatran elephants in the selection of the preferred water source with somewhat sloping topography. That is because the morphological elephant relatively large and heavy, so it will be difficult in steep areas. Sumatran elephants generally prefer water sources located in areas with a canopy closure of the meeting. This is presumably because the elephants but will not stand the heat of the sun, elephants also before or after drinking or bathing activities also make feeding activity. From the results of GIS analysis of data obtained as follows:

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TABEL 9
SUITABILITY WATER ANDPOOLS

No.	Classification	% of Large	Large (ha)
1	Suitability	42.9	16537.9
2	Not Suitability	57.1	22038.1
Total		**100**	**38,576**

Habitat suitability of Sumatran elephants

Sumatran elephant habitats are quite varied, it is seen from the types of vegetation where elephants can be found, namely in the secondary forest vegetation type, vegetation type acacia forests, agricultural land vegetation type, type, vegetation oil palm plantations. Elephant habitat variation is supported by the nature of the elephant that require a very extensive cruising area for daily activities of the group, such as finding food, and drink. Besides elephants also need space to rest and to develop social relationships. The results of the overlay between maps as well as feed and water puddles - using Arc View Intersect result in multiple habitats of Sumatran elephants. Of the overlay between map suitability of feed, and pools of water and the topography of the data obtained as follows:

TABLE10
SUMATRAN ELEPHANT HABITAT SUITABILITY CLASSIFICATION

No.	Classification	% of Large	Large (ha)
1	Suitable	3.15	1216.72
2	Suitable	0.55	212.06
3	Suitable	0.00	1.36
4	Suitable	0.71	273.98
5	Suitable	0.97	374.58
6	Suitable	0.00	0.62
7	Suitable	3.37	1298.96
8	Suitable	2.71	1045.50
9	Suitable	2.52	970.23
10	Suitable	5.76	2222.92
11	Suitable	3.94	1520.24
12	Suitable	1.00	386.11
13	Suitable	2.33	899.42
14	Suitable	5.10	1966.83
15	Suitable	1.50	579.68
16	Suitable	5.73	2208.77
17	Not Suitable	0.00	0.36
18	Not Suitable	0.02	6.44
19	Not Suitable	0.02	7.34
20	Not Suitable	60.62	23383.89
Total		100	38,576

From table 10 there are 16 points elephant habitat suitable as a habitat for Sumatran elephants, seen from the factor of feed, and pools of water and topography as a limiting factor

. TABEL 11
SUITABILITY OF HABITAT ELEPHANT OF SUMATERA

No.	Classification	% of Large	Large (ha)
1	Suitable	39.35	15.178
2	Not Suitable	60.65	23.398
Total		100	38.576

Seen from table 11, the total area covering 15 178 ha are suitable and not suitable areas covering 23 398 ha. Habitat Suitability validation of Sumatran elephants Validation results anatara Map overlay and WWF elephant habitat, there are some similarities, namely in the area of the Black Water River, River Nillo, river water Hutam. Although there are several sites that are not found to overlay the Sumatran elephant.

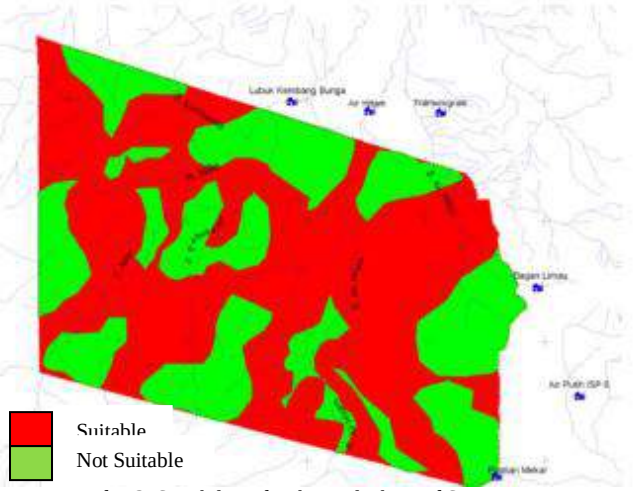

fig. 3 Suitability of Habitat Elephant of Sumatran

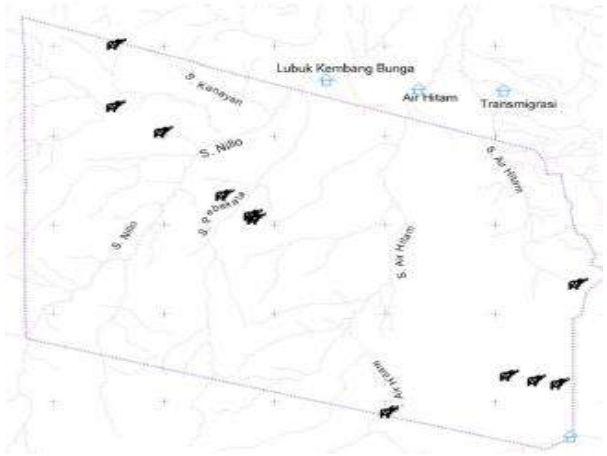

Fig. 4 Distribution Elephant of Sumatran

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Habitat Suitability validation of Sumatran elephants

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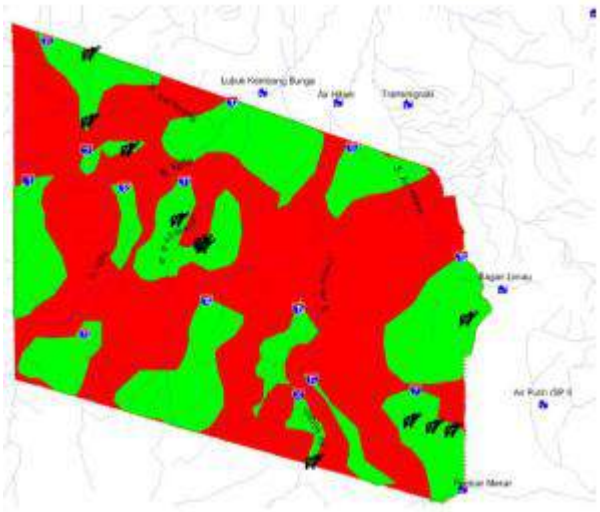

Fig.5 Map Habitat Suitability validation of Sumatran Elephants

GIS validation of the results obtained with the WWF the following results:

TABEL 12SUITABILITY VALIDATION OF SUMATRANELEPHANTS

No. Id Poligo	Result FromGIS	WWF
1	1	0
2	1	1
3	1	0
4	1	1
5	1	0
6	1	0
7	1	1
8	1	1
9	1	0
10	1	0
11	1	1
12	1	0
13	1	0
14	1	0
15	1	0
16	1	0
Total	16	5

From the results of GIS analysis contained 16 Id-polygon is assumed to be homerang Sumatran elephants, among 16 home range according to the results of WWF No 5 home range that has been identified as the distribution of Sumatran elephants. Thus, according to GIS analysis and validation WWF then 100%. For areas that are not terdientifikasi by the WWF, but by the GIS analysis found that the region is possible as the area that has potential as a bag of elephant

CONCLUSIONS

Based on the results and discussion, can be summarized as follows: (1)The suitability maps by overlaying maps of habitat types and topography The limiting factor is the ease of accessibility elephants, obtained the corresponding area of 20,236.6 ha and the area is not suitable covering 18,339.5 ha; (2) Suitability in terms of topographic information has been obtained for the corresponding region in that it can be passed by an area of 25.877 ha of Sumatran elephants while the hard to reach area of 12.699 ha.; (3)Suitability in terms of water and there are puddles of water sources of water that can be used by the Sumatran elephant area of 16,537.9 ha or about 42.9%. While the source of water not suitable covering 22,038.1 ha.; (4)Result from overlay feed, water, puddles and topography total area covering 15 178 ha are suitable and not suitable areas covering 23 398 ha ; (5) From GIS analysis contained 16 Id-polygon is assumed to be homerang Sumatran elephants, among 16 home range according to the results of WWF No 5 home range that has been identified as the distribution of Sumatran elephants. Thus, according to GIS analysis and validation WWF then 100%.

FURTHER RESEARCH

1. Field verification is required for validation of data accuracy.
2. Another analysis is required as a comparison the accuracy of the data

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