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MODELING AND MAPPING OF THE ENVIRONMENTAL CARRYING CAPACITY OF THE SEBUKU AND SESAYAP WATERSHEDS BASED ON FOOD AND WATER PROVISION

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ABSTRACT

Agricultural practices and water availability are highly correlated with sustainable watershed management. The Sebuku and Sesayap watersheds have a role to play for water conservation and support for agricultural practices. The research aimed to investigate, assess and map the carrying capacity of the environment in the supply of fresh water and food. The method is carried out using a mathematical model, Simple Additive Weighting to calculate the area of each carrying capacity category using ArcGIS 10.7 programs. This ecosystem service approach is used to measure carrying capacity. The approach is based on the assumption that the higher the performance of ecosystem services, the higher the carrying capacity of the environment. Carrying capacity is the maximum number of populations that can be sustainably supported by a local ecosystem, meaning that it has a carrying capacity and assimilation capacity. The results show that the application of the Simple Additive Weighting model has advantages over the expert-based valuation method which has been widely used, which proves convenience in the investigation and assessment process. Investigations and assessments show that the function of the Sebuku and Sesayap watersheds as a food providers is dominated by high category areas (I_{ecc} 3.41 – 4.20) with an area of 1,178,843.93 ha. Meanwhile, the Sebuku watershed is dominated by the medium category area (I_{ecc} 2.61 - 3.40) with an area of 850,633.60 ha. In addition, the environmental carrying capacity of the downstream watershed area in providing fresh water tends to be low (I_{ecc} 1.81 – 2.60) even though the environmental carrying capacity of the downstream area as a food provider is high (I_{ecc} 3.41 – 4.20), because these areas are generally fluvial plains and coastal plains which are used as pond cultivation areas. Overall, watershed conditions tend to experience a decrease in carrying capacity, both in terms of providing food and fresh water. Therefore, to achieve sustainable watershed management, it is necessary to use a food commodity-based water conservation approach with the application of dry land agroforestry practices in the middle region, and silvo-fishery in the downstream area.

Key words: Sustainable, carrying capacity, environment, food, water, watershed, agroforestry, silvo-fishery

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INTRODUCTION

Good watershed conditions have multiple benefits for the ecosystem such as, reducing the risk of flooding and are for supporting agricultural activities [1]. In addition, the function of watersheds also affects fisheries management practices in the long-term [2]. The benefits of ecosystem services provide regulatory functions, habitat functions, production functions and information functions [3]. An ecosystem services approach (ecosystem services) is used to measure the capacity of the environment (environmental carrying capacity). This approach uses the assumption that the higher the performance of ecosystem services, the higher the carrying capacity of the environment. The carrying capacity is the maximum number of populations that can be supported sustainably by the ecosystem in a certain area, which means that there is a supportive and assimilative capacity. Therefore, carrying capacity refers to the definition of an extreme limit and when the limit is exceeded, negative undesirable effects can occur such as extinction of certain species or organisms, environmental changes or damage, breakdown of food chains, and so on [3, 4, 5, 6, 7].

In its development in the context of macroeconomic policy, the tendency of natural resource management in watershed ecosystems is more oriented towards the role of economic development and ignores negative environmental impacts [8, 9]. This caused the rainy season phase that caused the flooding to continue until the onset of the dry season. However, the flooding still occurred [10]. Higher rates of erosion and sedimentation are conditions that indicate a decrease in the carrying capacity of the Bodri watershed in Central Java Province, Indonesia, and cause problems for economic life. The watershed classification capability is somehow still in moderate level which needs to be improved. Furthermore, it is reported that in recent years, the overexploitation of natural resources in the Aesesa watershed in Flores, East Nusa Tenggara, Indonesia, has led to severe land degradation in the area, with carrying capacity analysis results showing that the upstream area is categorized as having low carrying capacity, while the middle and downstream areas are categorized as having moderate carrying capacity [11]. Furthermore, research shows that in the area of Banggai Island, Indonesia, 75% of the environmental carrying capacity class is moderate and very low in providing clean water which is caused by environmental damage in the location of water sources in this area [12]. A case study on the Xinfengjiang Watershed, identified the optimal agricultural structure and population size based on the Water Ecological Carrying Capacity (WECC). The results showed that the Xinfengjiang Watershed was in a state of unsustainable development from the perspective of the carrying capacity of the water environment [13]. Meanwhile, in Argentina, non-conservation farming practices, deforestation, the use of agricultural chemicals, and land-use changes, especially urbanization, interfere with the balance and quality of water resources [14]. On the other hand, the Sampean watershed covering Bondowoso and Situbondo (Indonesia) has a role in the provision of rice [15]. The development of upstream and downstream activities is classified as very intensive, where changes in land use in the form of increased settlements in the upstream, middle and downstream areas, have polluted this watershed and that can affect agricultural produce. Therefore, the land carrying capacity of Grujugan, Tamanan, Tlogosari and Bondowoso Districts is in decline.

The results of research suggest that the practice of agriculture and fisheries as well as water conservation play an important role on the sustainability of watershed management [8, 9, 10, 11, 12, 13, 14, 15]. This current investigation focused on evaluating the environmental carrying capacity of the Sebuku and Sesayap watersheds in North Kalimantan Province, Indonesia. These areas are currently being used by various parties for various development activities such as agriculture, fisheries, plantations, mining and others. The emphasis of this study is on determining environmental carrying capacity of the watersheds using the mathematical model's approach, simple additive weighting and GIS application to the program ArcGIS 10.7 and typology of the landscape, type of vegetation and land cover as an indicator, with the aim of investigating, assessing and mapping the carrying capacity in the provision of clean water and food.

MATERIALS AND METHODS

The research locations were in the Sebuku and Sesayap watersheds, North Kalimantan Province, Indonesia, as presented in Figure 1.

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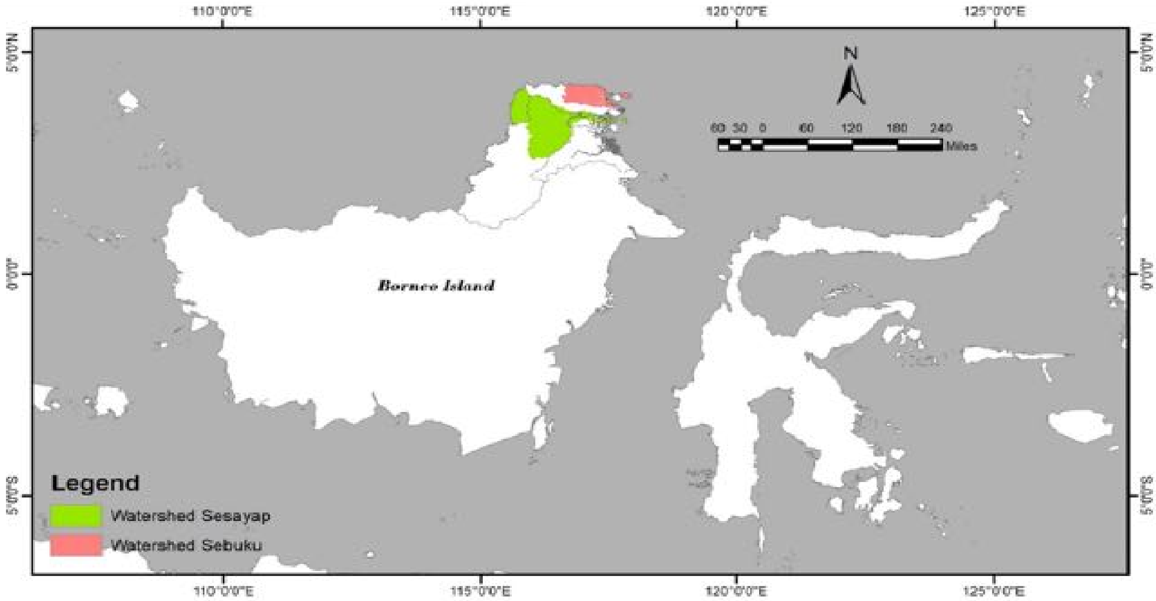

Figure 1: Map of Research location

Determination of the Environmental Carrying Capacity

In Figure 2 was the step of processing the data that has been conducted. This study utilized GIS application with ArcGIS program 10.7, Step 1, which is to configure the administration map, together with feasibility, geographic features, vegetation type and land cover into one spatial information. Steps 2, 3 and 4 refer to the weights and scores of landscape typology, vegetation type and land cover as well as the mathematical Simple Additive Weighting model set by the Ministry of Environment and Forestry Republic of Indonesia. Therefore, in determining the weight and score of the landscape, the type of vegetation and land cover in the study areas, weights are multiplied by the score and the results are added up and stored in Excel. After that, the bearing capacity index of the environment was calculated using simple mathematical models with additive weighting according to the formula as follows:

$$I_{ecc} = f\ \{\text{Landscape, Vegetation, Land cover}\}$$
$$= (w_{ls} \times s_{ls}) + (w_{veg} \times s_{veg}) + (w_{lc} \times s\ I_{ecc})$$

As:

I_{ecc} is the index of the environmental carrying capacity, w_{ls} is the weight landscape, sls is score landscape, wveg is the weight of vegetation, s_{veg} is the vegetation score, wlc is the weight of land cover, s_{lc} is the land cover score.

In Step 5 of Figure 2, the Simple Additive Weighting calculation is classified into the I_{ecc} index (Table 1). It visualizes how the colour on the map is based on the

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environmental carrying capacity category as a provider of food and fresh water can be seen in Step 6.

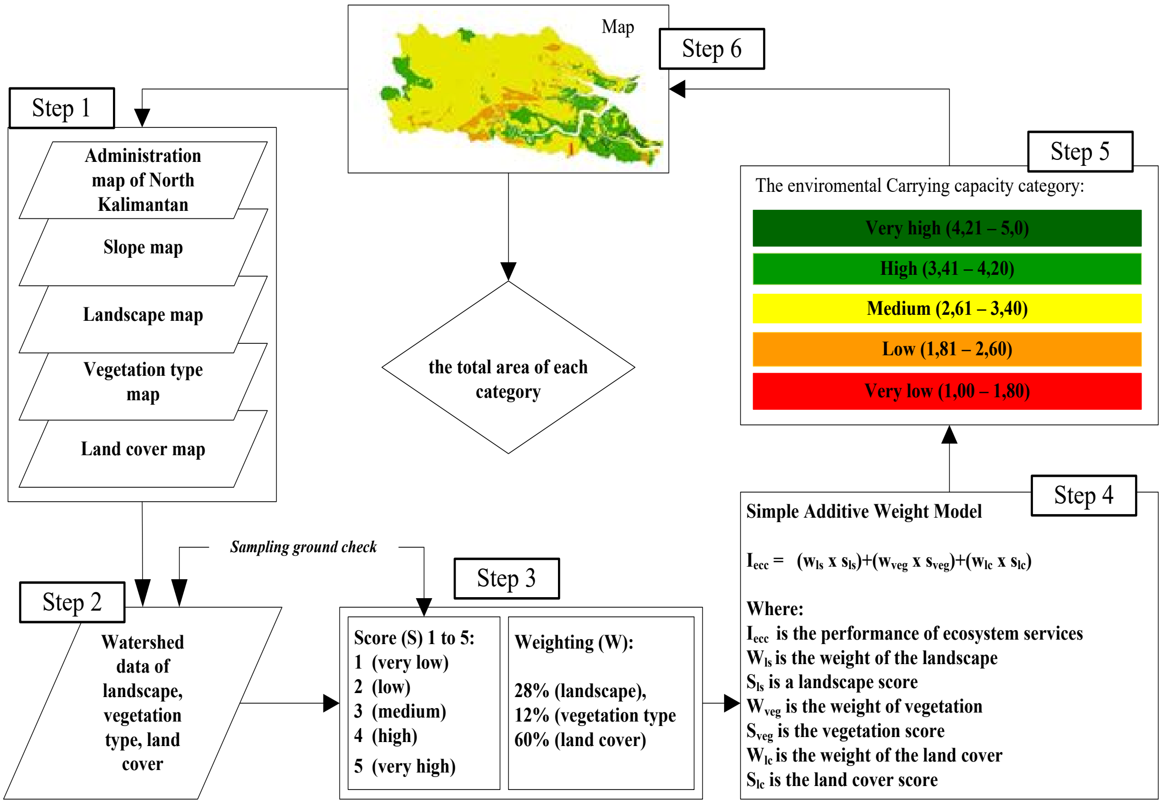

Figure 2: Environmental carrying capacity mapping framework

RESULTS AND DISCUSSION

Based on the results of identification and ground check sampling (investigation), it can be explained that the research area had 4 types of landscape, 7 types of vegetation, and 18 types of land cover as presented in Table 2. It is important to understand from Table 2 that in the structural mountain landscape of the Meratus complex that there are only dipterocarp forest vegetation types and non-dipterocarp forest. Land cover in the form of irrigated primary forest, cleared irrigated secondary forest, irrigated agriculture, irrigated mixed agriculture, shrubs (mixed gardens), landscaping or gardens, paddy fields, and open land. A kind of mangrove forest vegetation was found covering primary mangrove forestland, cut down secondary mangrove forest, primary swamp forest, secondary swamp forest, pond or swamp forest, secondary and secondary cut down swamp forest in this area. In the meantime, open land, bodies of water, mines, settlements or built-up land have been identified in all four landscapes.

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The weights and scores reported are based on the results of the investigation of the landscape, the type of vegetation and land cover are the data for the I_{ecc} calculation. In the case of calculation of the I_{ecc}, values were calculated from the results in Table 2. Then in Table 3, the value of the food I_{ecc} obtained ranged between 1.40 and 4. 76. Value I_{ecc} indicates that the environmental carrying capacity of the territory as a provider of food varies from very low (I_{ecc} 1.00 – 1.80) to very high (I_{ecc} 4.21 – 5.00). Likewise, the I_{ecc} value of water is in the lowest range of 1. 40 and highest 4. 48, which indicates variations in the environmental carrying capacity of the region as a provider of water ranging from very low (I_{ecc} 1.00 – 1.80) to very high (I_{ecc} 4.21 – 5.00), which means that representation of all categories of environmental carrying capacity.

The study results show that the I_{ecc} food supply to high categories varies between 3.44 and 4.16. The high environmental sustainability of food supply is derived from a combination of Borneo coastal plains with a mangrove forest vegetation type and land cover in the form of ponds or a combination of Meratus mountain complex structures, a type of forest vegetation dipterocarpa pamah or non-dipterocarpa forests and primary dry land cover. At the same time, water supply varies more among low categories, with values ranging from 2.00 - 2.60 and height ranging from 3.51 - 4.16. The combination of peat landscape with peat forest vegetation and land cover in the form of scrubland is a water supply ecosystem that is categorized as low. On the other hand, the combination of peat land with peat forest vegetation and land cover in the form of a water body is a water supply ecosystem categorized as high. This means an excellent combination of landscapes, vegetation type, and land cover provides high food and low and high water supply sustainability.

Food and freshwater service providers with a very high category are those with the least varied I_{ecc}. This means that only certain ecosystems are capable of providing very high ecosystem services. In this case, only the combination of the fluvial plains of Kalimantan, the vegetation of the brackish river banks, and the land cover in the form of ponds which have very high environmental carrying capacity (I_{ecc} 4.76) as a food provider. Meanwhile, only a combination of Borneo fluvial plains, river bank vegetation herb or herb brackish marsh, and land cover in the form of bodies of water that the carrying capacity of the environment is very high (I_{ecc} 4.48) as a provider of fresh water.

I_{ecc} score of food and water providers is used for inputs in mapping the delivery of ecosystem services and the resulting map is food provider and fresh water provider presented in Figure 3, 4 and 5 for the environmental support of each DAS. The

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value of I_{ecc} was in accordance with each category visualized in the form of red, orange, yellow, green and dark green at the map. Based on these maps, the extent of polygons was calculated for each category of environmental capacity provision of food and water in unit of hectare (ha) and the results are presented in Table 4.

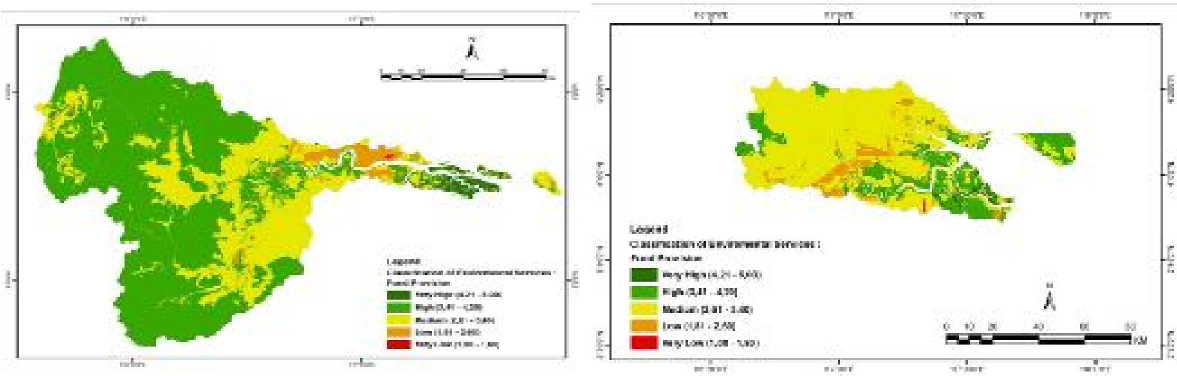

Figure 3: Map showing the environmental carrying capacity of the food provision

Based on Figure 3 and Table 3, it can be stated that the overall function of this watershed area as a food provider is dominated by high category areas (I_{ecc} 3.41 – 4.20) covering an area of 1,178,843.93 ha. (see Table 3). As seen in the map, this area is an area with a complex structural mountain landscape of Meratus, with the type of Dipterocarp forest and non-dipterocarp forest (pamah forest) and with primary dry land forest cover.

However, there are differences between these two watersheds: The Sesayap watershed is dominated by the high category (I_{ecc} 3.41 – 4.20) covering an area of 1,076,281.93ha, while watershed in Sebuku is dominated by the medium category (I_{ecc} 2.61 – 3.40) covering an area of 324,339.83 ha. The high environmental carrying capacity of the Sesayap watershed in providing food is due to the upstream area of the Sesayap watershed which is generally an area with a stretch of land in the form of structural mountains of the Meratus complex, with vegetation types in the form of dipterocarp forest and non-dipterocarp forest with land cover in the form of primary dry land forest. Therefore, this is an area of food sources, both in the form of carbohydrates and protein, such as meat, fish, fruits, leafy vegetables, nuts and seeds that are rich in phytochemicals, micronutrients and simple sugars. On the other hand, the Sebuku watershed area, has a complex structural mountainous landscape of Meratus, vegetation type of dipterocarp forest land cover and non-dipterocarp forest with land cover in the form of secondary dry land forest (ex-logged), dry land agriculture, dry land mixed bush farming (mixed garden) and scrub. The study can only view changes in land conditions to look at

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the environmental services of today's food providers without further investigating the causes of the changes. It can be concluded that the decrease in the capacity of the temperate basin, especially in the Sebuku watershed, where land cover changes from primary dry forest to the secondary dry forest (land clearing), dry land management, the planting of mixed bushes and arable land shrubs.

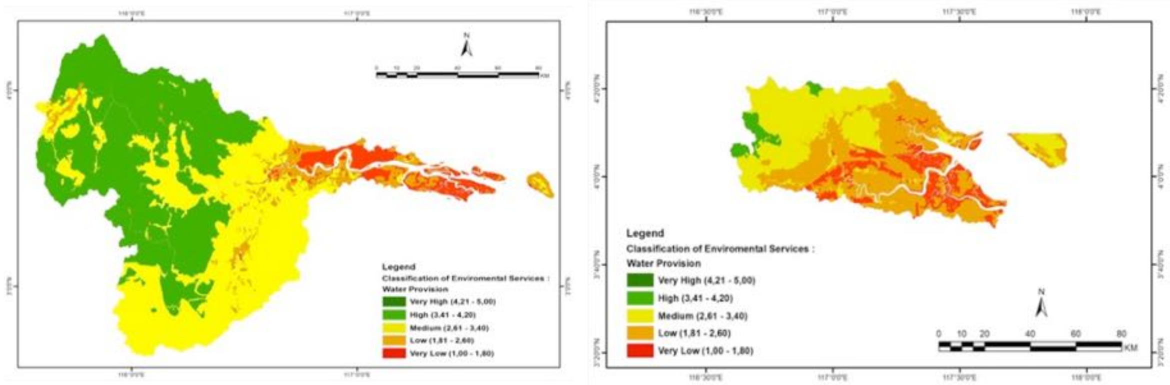

Figure 4: Map showing the environmental carrying capacity of the freshwater provision

The results of the ArcGIS 10.7 data processing for the provision of fresh water are provided in Figure 4 and Table 4, it can be stated that the function of this watershed area as a provider of fresh water is dominated by areas in the medium category (I_{ecc} 2.61 - 3,40) covering an area of 850,633.60 ha. As seen from the map, this area is an area with a complex structural mountainous landscape of Meratus, the vegetation type Dipterocarp forest and non-dipterocarp forest (pamah forest), with secondary dryland forest cover (logged over) and dry land farming mixed with shrubs or bush.

Similar to the provision of food, with regard to provision of fresh water there are also differences between these two watersheds where the Sesayap watershed is more dominated by the high category (I_{ecc} 3.41 – 4.20) with an area of 760,210.91 ha. Meanwhile, Sebuku watershed is dominated by the low category (I_{ecc} 1.81 – 2.60) covering an area of 210,885.08 ha (see Table 3). This condition occurs because the Sesayap watershed has a complex structural mountain landscape of Meratus, the vegetation type is Dipterocarp forest and non- dipterocarp forest (pamah forest), with secondary dry land forest cover. On the other hand, the Sebuku watershed has a complex structural mountainous landscape of Meratus and the coastal plains of Kalimantan, the type of vegetation is dipterocarp forest, non-dipterocarp forest and mangrove forest, with land cover in the form of dry land agriculture, plantations or gardens, shrubs, primary mangrove forest, forest logged-over secondary mangroves, and ponds. Therefore, it can be concluded that the cause of the decrease in the carrying capacity of the watershed environment in the

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supply of fresh water, especially the Sebuku watershed, is the change in land cover from primary dryland forest and mangrove forest to dry land agriculture, plantations or gardens, shrubs, secondary mangrove forest, logs and ponds.

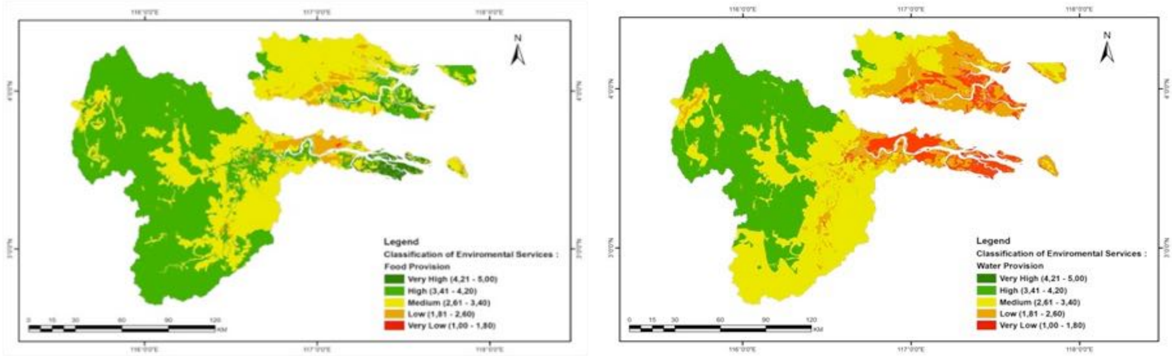

Figure 5: Map showing the environmental carrying capacity of the freshwater and food provision

The conditions of the upstream, middle and downstream areas of the Sebuku and Sesayap watersheds in terms of the environmental carrying capacity category in the supply of food and fresh water can be seen from Figure 5. Based on Figure, 3 these observations can be can be explained as follows:

1) The upstream area of the Sebuku Watershed is more dominated by areas with the environmental carrying capacity of food supply and fresh water provision in the medium category (I_{ecc} 2.61 – 3.40), while the Sesayap watershed is more dominated by high category areas (I_{ecc} 3.41 – 4.20).
2) The middle area of the Sebuku watershed is more dominated by areas with MEDIUM carrying capacity FOR food supply environment, medium category (I_{ecc} 2.61 – 3.40) and low category FOR fresh water provision (I_{ecc} 1.81 – 2.60), while the Sesayap watershed is more dominated by areas with medium category (I_{ecc} 2.61 – 3.40) both in the supply of food and fresh water.
3) The downstream areas (coastal areas or delta areas) of the Sebuku and Sesayap watersheds are dominated by areas with high environmental support for food supply (I_{ecc} 3.41 – 4.20) and low category fresh water provision (I_{ecc} 1.81 – 2.60).

Thus, based on the results of the analysis of the performance of the Sebuku and Sesayap watershed ecosystem services, it can be concluded that the carrying capacity of the watershed environment in providing food tends to decrease in the middle of the watershed, but increases in the downstream area (coastal /delta). The decline in the carrying capacity of the environment in the central region is caused more by changes in land cover from primary dryland forest to secondary dryland forest (logged over), dry land agriculture, mixed dry land farming (mixed

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garden) and shrubs. Furthermore, the increase in environmental carrying capacity in the downstream area is due to changes in the vegetation of mangrove forests and the vegetation of brackish river banks to become ponds and bodies of water, which can be a source of fishery products. On the other hand, the carrying capacity of the watershed environment in providing fresh water tends to decrease in the middle of the watershed and decreases in the downstream area. This occurs due to changes in land cover from primary dryland forest to dry land agriculture, plantations or gardens, shrubs, and changes in mangrove forest to secondary logged-over mangrove forest and ponds. Therefore, it can be concluded that the opposite of this phenomenon is that the environmental carrying capacity of the downstream watershed areas in the supply of fresh water tends to be low(I_{ecc} 1.81 – 2.60), when the environmental carrying capacity of the downstream area as a food provider is high (I_{ecc} 3.41 – 4.20).

Based on the entire description, it can be synthesized that a change in environmental carrying capacity in the provision of food and fresh water in the watershed area occurs when there is a change in land cover in the mountainous landscape of the Meratus complex whose vegetation types are dipterocarpa pamah forest and pamah forest (non dipterocarpa). While in the riverine and coastal plains with the vegetation type on the banks of the brackish water river also changing environmental resilience in food and freshwater supply arises as the land cover is converted from primary mangrove forest to secondary mangrove forest and ponds, this increases the food supply carrying capacity, leads but on the other hand to the fact that the carrying capacity of the fresh water supply decreases. This condition requires a management concept that both conserves water and can provide food which water-conservation-based on food commodities can provide. The approach to this concept is the application of dryland agroforestry practices in the midle stream and silvofishery in the downstream area. With these concepts and approaches, a sustainable supply of food and water will be achieved by the watershed ecosystem.

CONCLUSION

The application of the simple Additive Weighting Model to watershed evaluation has advantages over the Expert-based valuation method which is widely presented in literature, because it provides a rapid assessment with few input parameters the weight and score of the landscapes, vegetation type and land cover of the study area convenience in the investigation process and the assessment of the environmental carrying capacity index. Investigations and assessments show that the function of the Sebuku and Sesayap watersheds as a food provider is dominated by high category areas (Iddl 3.41 – 4.20) with an area of 1,178,843.93 ha. Meanwhile, the Sebuku watershed is dominated by the medium category area (I_{ecc} 2.61 - 3.40) with an area of 850,633.60 ha. In addition, the environmental carrying capacity of the downstream watershed area in providing fresh water tends to be low (I_{ecc} 1.81 – 2.60), even though the environmental carrying capacity of the downstream area as a food provider is high (I_{ecc} 3.41 – 4.20), because these areas are generally fluvial plains and coastal plains which are used as a pond cultivation area. Overall, the watershed conditions tend to show a decrease in carrying capacity, both in the provision of food and fresh water, therefore, to achieve sustainable watershed management, a food commodity-based water conservation approach must be carried out with the application of dry land agroforestry practices in the middle stream, as well as silvofishery in the downstream area.

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AUTHOR CONTRIBUTION

Sutrisno, Adi is the main researcher who conceptualized and collected data. He did data analysis and interpretation, drafted and finalized this manuscript. The co-authors helped the author to collect primary and secondary data, conduct ground checks and analyze data, and assist in compiling the initial draft of the article.

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Table 1: Categories, interval index and visual color capacity of the environment

Category	Interval	Visual colours
Very low	1.00 – 1.80	
Low	1.81 – 2.60	
Mediun	2.61 – 3.40	
High	3.41 – 4.20	
Very high	4.21 – 5.00	

Table 2: Landscape, vegetation type, score and weight of food and fresh water provision

Landscape	Score of food or water	Weight	Vegetation type	Score of food or water	Weight	Land cover	Score of food or water	Weight
The structural mountains of Meratus complex	2/2	0.28	Vegetation of Difterocarpus pamah forest	5/5	0.12	Primary dryland forest	5/4	0.60
The peatland of the Kahayan-Kapuas-Mahakam complex	3/3		Vegetation of pamah forest (non Dipterocarpus)	5/5		Secondary/logged-over dryland forest	3/3	
Kalimantan fluvial plain	5/4		Vegetation of peat forest	2/2		Shrubs	3/2	
Kalimantan coastal plain	2/2		Vegetation of litoral	1/1		Dryland farming	3/2	
			Terna swamp vegetatiom	3/3		Dryland mixed agriculture/mixed garden	3/3	
			Terna vegetation on the banks of brackish rivers	3/3		Plantation/garden	2/2	
			Vegetation of mangrove	2/2		Swamp shrubs	3/3	
						Primary swamp forest	4/3	
						Secondary/logged-over swamp forest	3/2	
						Primary mangrove forest	4/2	
						Secondary/logged-over mangrove forest	2/2	
						Rice field	5/3	
						Pond	5/3	
						Water Body	5/5	
						Settlement/land built up	1/1	
						Airport/port	1/1	
						Mining	1/1	
						Open field	1/1	

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Table 3: Value Iecc according to the ecosystem service category of food supply and fresh water

W_{ls} X S_{ls}	W_{veg} X S_{veg}	W_{lc} X S_{lc}	I_{ecc}	Environmental carrying capacity category
0.28 x 2	0.12 x 2	0.60 x 1	1.40	Very low (1.00-1.80)
0.28 x 3	0.12 x 2	0.60 x 1	1.68	
0.28 x 2	0.12 x 5	0.60 x 1	1.76	
0.28 x 2	0.12 x 2	0.60 x 2	2.00	Low (1.81-2.60)
0.28 x 3	0.12 x 2	0.60 x 2	2.28	
0.28 x 5	0.12 x 3	0.60 x 1	2.36	
0.28 x 2	0.12 x 2	0.60 x 3	2.60	
0.28 x 3	0.12 x 2	0.60 x 3	2.88	Medium (2.61-3.40)
0.28 x 2	0.12 x 2	0.60 x 4	3.20	
0.28 x 5	0.12 x 2	0.60 x 3	3.44	High (3.41-4.20}
0.28 x 3	0.12 x 2	0.60 x 4	3.48	
0.28 x 5	0.12 x 3	0.60 x 3	3.56	
0.28 x 5	0.12 x 5	0.60 x 3	3.80	
0.28 x 5	0.12 x 1	0.60 x 3	3.92	
0.28 x 3	0.12 x 2	0.60 x 5	4.08	
0.28 x 2	0.12 x 5	0.60 x 5	4.16	
0.28 x 5	0.12 x 3	0.60 x 5	4.76	Very high (3.41-5.00)

W_{ls} X S_{ls}	W_{veg} X S_{veg}	W_{lc} X S_{lc}	I_{ecc}	Environmental carrying capacity category
0.28 x 2	0.12 x 2	0.60 x 1	1.40	Very low (1.00-1.80)
0.28 x 3	0.12 x 2	0.60 x 1	1.68	
0.28 x 2	0.12 x 5	0.60 x 1	1.76	
0.28 x 2	0.12 x 2	0.60 x 2	2.00	Low (1.81-2.60)
0.28 x 4	0.12 x 3	0.60 x 1	2.08	
0.28 x 3	0.12 x 2	0.60 x 2	2.28	
0.28 x 2	0.12 x 5	0.60 x 2	2.36	
0.28 x 4	0.12 x 2	0.60 x 2	2.56	
0.28 x 2	0.12 x 2	0.60 x 3	2.60	
0.28 x 4	0.12 x 3	0.60 x 2	2.68	Medium (2.61-3.40)
0.28 x 3	0.12 x 2	0.60 x 3	2.88	
0.28 x 4	0.12 x 5	0.60 x 2	2.92	
0.28 x 2	0.12 x 5	0.60 x 3	2.96	
0.28 x 4	0.12 x 3	0.60 x 3	3.28	
0.28 x 4	0.12 x 5	0.60 x 3	3.52	High (3.41-4.20}
0.28 x 2	0.12 x 5	0.60 x 4	3.56	
0.28 x 4	0.12 x 1	0.60 x 3	3.64	
0.28 x 2	0.12 x 2	0.60 x 5	3.80	
0.28 x 3	0.12 x 2	0.60 x 5	4.08	
0.28 x 2	0.12 x 5	0.60 x 5	4.16	
0.28 x 4	0.12 x 3	0.60 x 5	4.48	Very high (3.41-5.00)

Table 4: Area distribution based on environmental carrying capacity category (ha)

Ecosystem services	Watersheds	Category				
		Very high (4.21 - 5.00)	High (3.41 – 4.20)	Medium (2.61 – 3.40)	Low (1.81 - 2.60)	Very low (1.00 – 1.80)
Food	Sebuku	9,730.41	102,562.00	324,339.83	34,788.05	611.59
	Sesayap	32,245.90	1.076,281.93	477,076.98	52,532.85	1,104.22
	Total	41,976.31	1.178,843.93	801,416.81	87,320.90	1,715.81
Freshwater	Sebuku	6.77	17,928.90	175,348.75	210,885.08	67,862.39
	Sesayap	21.25	760,210.91	675,284.85	117,230.98	86,493.89
	Total	28.02	778,139.81	850,633.60	328,116.06	154,356.28

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