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Replotting and Revitalization of Sentrum Agraris Lotta as Sustainable Agriculture and Eco-Education Site

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Abstract

Sentrum Agraris Lotta (SAL) is a centre for agricultural training developed by the Catholic Diocese of Manado, under the Social and Economic Development Commission of the Diocese, aimed at educating farmers and agriculture practitioners of North Sulawesi. 6 Ha of agricultural site is currently underutilized and requiring a remapping of land utilization for long term revitalization program for site optimization. In accordance with the Diocese's strategic planning for SAL, the agricultural facility is expected to be productively income generating and self-sustainable. Therefore, this community development activity was conducted to remap and replot the SAL site area to a multifunction agriculture complex that is income generating and self-sustaining, becoming a productive reflection for eco-education, agrotourism and sustainable agriculture educational. Replotting resulted a masterplan with 6 plantation demplots, apothecary demplot and permaculture demplot, along with lodging facilities.

Keywords agriculture; eco-education; replotting; revitalization; sentrum agraris lotta; sustainable agriculture.

1. Introduction

Agriculture practices has had significant impacts on ecosystems and the biodiversity within. The existence of peri-urban landscapes and urban agriculture would have strong benefits towards the nearby towns and cities, providing food security and sustainability, but the practices and management would also have consequences and ramifications towards the biodiversity and ecosystem services such as pollinations and nature-based recreations (Granata et al., 2023). Agricultural landscape management and expansion managements in a peri-urban setting has an important role in characterizing the agroecosystem, thus the more environmentally friendly organic practices are important for sustainability (Granata et al., 2023 ; Ma et al., 2023).

Sentrum Agraris Lotta (SAL), is an agriculture training site founded by Social Economic Development Commission of the Catholic Diocese of Manado, was also a site that was intended for the education and training of local North Sulawesi farmers and agricultural practitioners. SAL farmer graduates expands from North Sulawesi in regencies of Minahasa, North Minahasa, and South Minahasa, all the way to Central Sulawesi (Palu). Covering over 15 farmer

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Figure 2. Google earth image of SAL land site from the main service road (source : Google earth website).

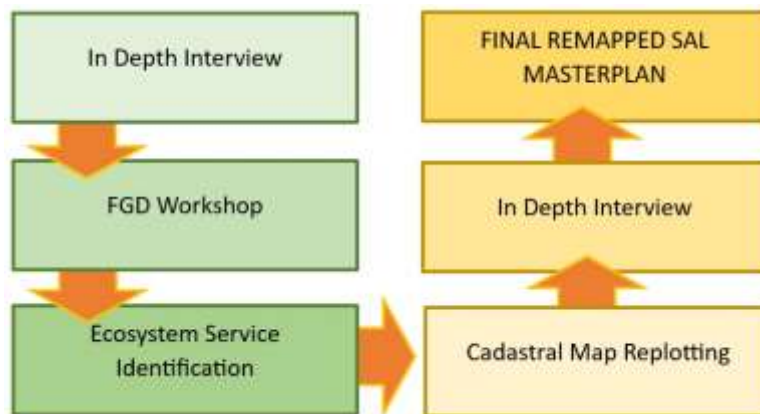


Landscape structure of the SAL site is currently a good balance of natural and semi-natural overgrowth vegetations and trees and agricultural fields. Agricultural practices causes homogenization and intensification, especially monoculture expansions, are a threat to habitat biodiversity and species heterogeneity (Sanchez et al., 2022). Landscape structure and composition would be important consideration factors in the process of remapping and replotting the SAL site land structure and in the determination of cultivations on their demplots. Natural land structures such as trees, natural vegetations and certain terrain elevations must not be eliminated entirely but maintained to a certain degree to maintain ecological balance of autotrophs, decomposers, natural enemies, pests, and pollinators. Meanwhile positioning of flowering horticulture and apothecary plants in apothecary demplots and permaculture demplots must be centered in the land site to manage and maintain the population of pollinators and ecosystem services (Granata et al., 2023 ; Sanchez et al., 2022). Diversification in organic farming systems has been noted to increase overall beneficial species richness in the land biodiversity to 26% while reducing pest abundance (Sanchez et al., 2022). Proper land management and strategically planned planting-harvesting cycles on the SAL site would enhance productivity and long-term sustainability, while maintaining a good ecological structures. This natural ecological structure will have beneficial ecotourism features providing SAL with tourism added values. Incorporating the natural land structures and managing the land structures while maintaining a properly mapped demplot of diversified agriculture in a strategically managed masterplan would be beneficial for SAL's future productivity and sustainability.

3. Research Method

This program was carried out in Sentrum Agraris Lotta (SAL) which is located on 1°24' 55" North and 124° 50' 32" East, a 6 ha land site owned by the Diocese of Manado in a peri-urban setting on the outskirts of Manado city bordering with the Minahasa Regency of North Sulawesi. The program was to remap SAL which was currently underutilized to a self-sustaining agriculture center for sustainable agriculture training local farmers. Figure 3 explains the cycle process of developing the SAL site, which began with an in-depth interview (IDI) with SAL's Director and continued to an FGD with the SAL team for the Requirement Gathering Process.

Figure 3. Process flow of SAL masterplan development



Vegetation Plotting (Based on SAL Cadastral Map & Google Earth Visualization). Using the original cadastral map and a visualization from Google Earth borders of the site map was determined. Locations and density of the original vegetation was identified. Identification the original vegetation positionings was essential to preserve the original biodiversity and ecosystem services.

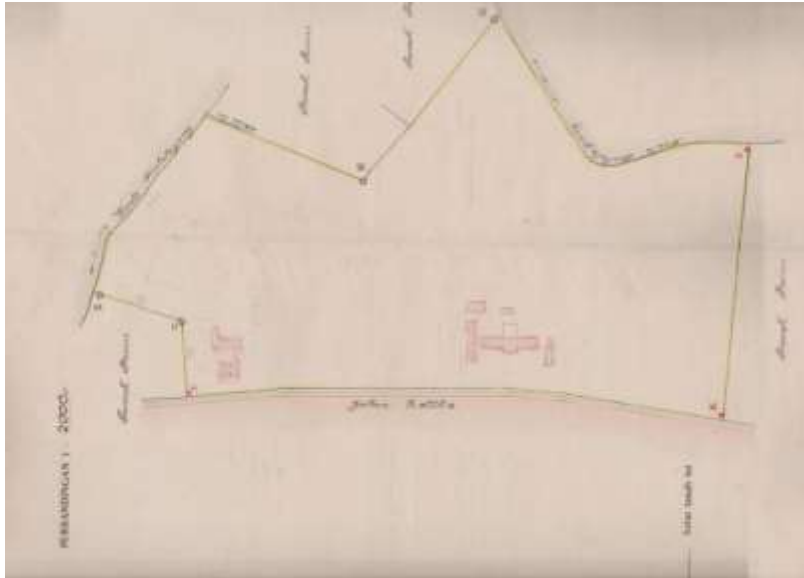
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Figure 4. Original cadastral map of the SAL site



4. Finding and Discussion

Topographical situation of the SAL site was slightly hilly, positioned at 234m above sea level, therefore the vegetation composition type of the height would comprise mostly of medium and tall woody pollen trees, herb pollen plants and sporing fern plants that would be seen in tropical 200-300m above sea level topographies (He et al., 2019). Therefore, the diversity of vegetation on the site can be categorized to Dense Tropical Forest, Tropical Forest, Utilized Agriculture Sites, Mixed Shrubs & Grassland, Wetland Shrubs and Wetland Dense Vegetation. Identification and mapping of the site vegetation can be seen in figure 5.

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Figure 5. Vegetation types of SAL site



SAL site borders closely to a river that is wet all year round even in the drought season. This allows for growth of wetland freshwater plants alongside the river. Vegetation was observed to dense up further closing to the riverside. While further away from the river shrubs and grasslands were more apparent. This is due to the condition that furthering away from the river and closing to the roadside was previously cleared up land which was utilised for agricultural purposes. Some of these plots are still used for agricultural purposes. Thus, the soil are still ploughed and fertilized to provide as growth media.

Replotting of SAL site resulted in a layout of the SAL site as seen in Figure 6. The site consists of the central area for the main office, parking lot and SAL Café. This main area would be surrounded by plantation demo plots which will be laid out in considerations of the ecosystem services of the natural biodiversity and habitat of SAL site. Areas of natural rainforest will be preserved to maintain the ecosystem balance of the site. Furthering deeper to the site would end at the Kali River. This area will be optimized for a tourism lodging facility for guest overnighting in SAL site for an agro-eco-educational experience. While to one side the SAL site will be dedicated to also outdoors tourism activities and camping activities, and to the other farther side of the site will be dedicated to a pilot plant and R&D laboratory for SAL agro products. Positionings of the two are plotted on opposite locations at a considerably far distance that one would not interfere with one another. Pilot plants (small manufacturing plants) would incorporate machineries with potential noise pollution

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Figure 6. Replotting and remapping results of SAL site for Agrotourism purposes



Plantation demplots has the functionality for commodity cultivations that would provide SAL with a solid income stream, while also providing farmer groups under SAL demo sites for practicing organic farming and sustainable farming. The positioning of the demplots are essential to maintain the harmony of the ecosystem, especially to keep the natural biodiversity of the site that sustains the pollination systems and natural food chain, including the natural biodegradative cycle of the microbial composition and organic contents of the soil. Therefore, positioning demplots with short harvest cycle and high flowering rate in the centre of the site is important to keep the natural pollination biodiversities in check. Thus are the main functions of the permaculture demplots and apothecary demplots. Positioning the permaculture demplots and apothecary demplots at the centre of the site, near the main building and café is also for an easier access to quick consumable vegetables and herbs for the café menu and the lower plant heights of permaculture cultivates and apothecary vegetations would not block the view for the treelines of further demplots of larger plantation cultivates. Furthermore, plantation demplots 1-6 would be cycled in a plantation rotation of bulk commodities such as corn and cassava, which would also supply raw material to the pilot plant.

The pilot plant and the Food R&D laboratory are plotted to take space further away from the main office and tourism lodging facilities. This is to keep the lodgers in peace from all the buzzing and vibrational pollution of the machineries and of the disturbing odours generated by any processing steps. The pilot plant is initially a small manufacturing facility to produce flour products and extracted starch products, with future potential for the expansion capacities to other products, down streaming the various commodities SAL plantation demplots has to offer. Spaced right beside the pilot plant is the R&D laboratory. A laboratory prepared to design the products/food products to downstream the commodities of SAL plantation demplots. The pilot

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plant consists of machineries developed in local workshops and designed specifically for local Indonesian starch producing commodities.

The chicken battery for the SAL hen farm is also placed behind the permaculture demplots separated by a cluster of treelines functioned also as a barrier and filter from the foul odours of the hen farm and the reek odours of the composting process from the collected hen droppings. Keeping them away from the mainbuilding, café and any open aired lodging such as the camp area. In tourism, food provision is one of the basic needs that must be taken into account as it would affect the overall satisfaction of visitors as well as their intentions to revisit (Rousta and Jamshidi, 2020). As a tourism destination, SAL caters this necessity by establishing an onsite dining facility named SAL Café. The location selection of a dining facility in a tourist destination is a crucial part of its strategic formulation process. A poor location selection affects the destination's competitiveness, which may lead to a decrease in the ability of the destination to attract visitors (Chen and Tsai, 2016). SAL Café is intentionally positioned near the main gate and is clearly visible from the parking lot as accessibility and visibility are two of the main criteria that must be considered when selecting the best site for a dining facility (Alonzo, 2007; Walker, 2021). This café is also conveniently located right next to the auditorium and gift store, which would act as traffic generators for the café.

The presence of a tourism destination would attract visitors who are willing to stay overnight or more within or as near as possible to that destination (Navrátil, 2012). To anticipate this, the management of SAL provides two different types of lodging facilities in the form of several bungalows and a campsite. A bungalow is a small one-story self-contained accommodation establishment that is often built in traditional style. At SAL, the bungalows are secludedly located along the Kali River to create a more private and serene atmosphere for visitors. Accommodations located at a waterfront are preferred by many people (Baye and Nega, 2020 ; Tadesse and Satyanaryana, 2015). Moreover, a lodging facility that provides natural and serene environment has been perceived to be the most aspirational for its occupants (Zainal and Aziz, 2021). Camping is a popular leisure activity for tourists who are looking for a less expensive accommodation, a more sociable environment, and more outdoor experience (Baye and Nega, 2020). A dedicated camping ground has been preferred as it provides a safer natural environment for visitors of all ages (Choi and Jang, 2022). Moreover, a campsite should provide good infrastructure for the convenience of its visitors, such as ample parking, access to public restrooms, and proximity to dining facilities (Xu et al., 2022). SAL provides a campsite right next to its parking lot and by the main road with easy access to the main buildings and café.

Outward bound activities (also known as outbound) use nature to replace the functions of a classroom and utilize experiential learning as a tool to improve individual and group skills and emotional competencies, such as motivation development, concentration building, and awareness creation (Leon et al., 2021). As a training site, SAL provides an outbound area to hold outdoor training activities for all ages. The location of this site is close to some plantation demplots as well as the campsite. For a more complete and effective learning process, an outbound area should be remote with wildlife surroundings to avoid as many disturbances as possible (Arachchige and Satshara, 2020). However, it is also important to note that the location

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should have easy access to dining and lodging facilities as well as to public amenities, such as restrooms.

5. Conclusion

SAL site is a partially utilized for agricultural purposes and demo plots but hasn't been optimized to its true potentials. This work was to transform the SAL site to a self-sustaining site which is still viable for demo plots to train local farmers and farmers groups on green sustainable practices in the agrocomplex field, and eco-education practice site for local schools and universities. This program begins by remapping and replotting the SAL site to revitalize the site with income generating venues such as tourism venues to attract tourist and visitors, while developing agro-comodities that can be transformed to SAL sellable products and usable for SAL's very own café menu. The whole process of developing SAL masterplan to this purpose requires to maintain a good balance in refraining from total site clearing and keeping the authenticity of the vegetation and biodiversity. Therefore, optimize the use of the clearings for demo plots, without losing the natural ecosystem services.

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