ADAPTING SUSTAINABLE LIVELIHOOD FRAMEWORK FOR HUMAN WELL-BEING ASSESSMENT IN BANTUL REGENCY

Nadia Paramitha Kusumawardhani[1,2], Tomohiro Ichinose [2], Bakti Setiawan[1]
[1,] Master Program in Urban and Regional Planning, Universitas Gadjah Mada, INDONESIA
[2,] Graduate School of Media and Governance, Keio University, JAPAN

Abstrak

Analisis mengenai pengaruh jasa ekosistem terhadap kondisi human well-being (kesejahteraan masyarakat) merupakan subjek yang masih terus berkembang hingga kini, namun variable dalam HWB yang sukar untuk diukur menjadikan proses pengintegrasian HWB dengan valuasi jasa ekosistem dan rencana tata ruang susah dilakukan di Indonesia. Penyediaan jasa ekosistem yang berkelanjutan, terutama bahan pangan, merupakan tantangan bagi Kabupaten Bantul karena daerah ini mengalami penurunan jumlah produksi beras yang signifikan dan akan mengancam kondisi kesejahteraan masyarakat ke depannya. Hal ini bertujuan untuk mengetahui sebaran kondisi human well-being sekaligus menganalisis kapital mana yang menjadi modal dasar dalam pembangunan manusia di Kabupaten Bantul. Penelitian ini mengevaluasi dan memetakan kondisi HWB menggunakan Sustainable Livelihood Framework berdasarkan perspektif pakar dan stakeholder, kemudian menganalisis variasi pola landscapenya dengan memetakan area penelitian, dan mendiskusikan bagaimana cara mencapai tingkat kondisi HWB tertinggi melalui perencanaan lingkungan. Questioner disebarkan kepada stakeholder yang terlibat dalam pengambilan keputusan pembangunan di kabupaten Bantul dalam bentuk likert scale, selanjutnya dianalisis untuk mengetahui score masing-masing indicator di tiap kapital. Kemudian analisis regional boundary shapefile di ArcMap dilakukan untuk memetakan tingkat kondisi human well-being. Berdasarkan hasil analisis, Human Capital merupakan modal terbesar dalam kesejahteraan masyarakat Bantul, kondisi tertingginya terletak di Kecamatan Dlingo dan Srandakan. Namun, financial, physical and social capitals terletak di daerah yang sama, sehingga menjadikan wilayah Kecamatan Banguntapan, Sewon dan Bantul memiliki kondisi human well-being terbaik di seluruh Kabupaten Bantul. Penelitian ini juga menemukan bahwa selain kondisi geografis dapat menghasilkan tipe jasa ekosistem yang berbeda-beda, social-ekonomi mejadi factor terpenting dalam penentuan beragam nilai dari setiap kapital dalam HWB. Perencanaan penataan ruang harus mempertimbangkan pola-pola spatial tersebut.

Kata kunci: Kabupaten Bantul, Jasa Ekosistem, Human Well-being, Sustainable Livelihood Framework

Abstract

There is broad subject that ecosystem service influence human well-being (HWB), however HWB are unmeasurable variable, therefore it still not been integrated fully into ecosystem service assessment and spatial planning document in Indonesia. Provision of sustainable ecosystem services, especially food provisioning, is a challenge for Bantul Regency as it faces huge production deficits because of land conversion and urbanization, therefore, it will threaten the condition of its human well-being. It aims to determine the distribution of human well-being conditions as well as analyzing which capital is the basic capital for human development in Bantul Regency. This study evaluates and maps human well-being by using Sustainable Livelihood Framework (SLF), based on perspective of experts and stakeholders, then analyzed the spatial variation on landscape by mapping the area, and discussed how to achieve human well-being conditions by maximizing services from the ecosystem. Questioners were distributed to stakeholders that involved in development decision making in Bantul regency in Likert scale, then it was analyze to determine the scores of each indicator in every capital. Then regional boundary shapefile analysis in ArcMap was carried out to map the level of conditions of human well-being. Based on the analysis, Human Capital is the largest capital in the people's welfare of Bantul, the highest condition is located in the Dlingo and Srandakan Districts. However, financial, physical and social capitals are located in the same area, which makes the Banguntapan, Sewon and Bantul Districts have the best human well-being conditions in all of Bantul Regency. This study also found that besides geographical conditions play an important role in producing different types of ecosystem services, social-economic factors is the most important factor in determining the difference in value of each capital in human well-being. Optimizing planning regulation has to consider these spatial patterns.

Keywords: Bantul regency, Ecosystem service, Human Well-being, Sustainable Livelihood Framework

1. Introduction

Previous studies on ecosystem services have highlighted the importance of direct value human benefit from ecosystem service. Studies on the ecosystem service are studies to learn about direct and indirect benefits that affect the human well-being (HWB) condition [1]. Sen [2] concept about capability theory is that assets in a place have a substantial impact on capability and well-being of a community. The MA [3] stated that human well-being has multiple constituents and examines how changes of ecosystem services influence community, then examines how changes of ecosystem services influence human well-being. However, there was no description given by the MA of the method how to determined and measure the linkages. NEF [4] launched the National Accounts Well-being, however, this theory only concentrated on the social and economic aspects of well-being and neglected the interaction between humans and ecosystems. The How's Life report by OECD [1] is a framework that distinguish current and future well-being. This method can be measured through indicators of different forms of capital. Moreover, determining the method for calculating HWB is not an easy matter. Researchers have a variety of views, ranging from subjective calculations based on community views, as well as uniformity of calculations taken from secondary data. Dương [5] uses the farmer's perspective as a method in determining the importance function of ecosystem services for welfare, while Giesecke et al [6] develops the SLF concept that applicable USA.

The conflict from natural capital and the utilization of natural resources in Bantul arises and makes the condition of ecosystem services currently under pressure. This condition is aggravated by global drivers, such as rapid development of urbanization, population growth, industrialization policy and unsuitable spatial plan. Population growth and population density is a critical factor behind the increase in the level of stress imposed on natural systems, and the consequent loss of resilience by that systems. Half of the world's poor live in ecologically fragile rural areas– tropical forests, upland areas, arid and semi-arid regions [7]. According to Bantul Regency in figures [8], population growth in Bantul is the second highest in Yogyakarta Province at 1.56% and higher than the national average. In addition, in the past 10 years, the population growth and its activities have an impact on the need for extensive land. Spatial Planning failures frequently contribute to worsen the picture. This happens whenever policies usually aimed at objectives different from environmental protection (for instance, assigning responsibility to farmers over the land) introduce perverse incentives to overuse or mismanage natural resources. Bantul is currently experiencing land use change issues. The unsuitable spatial planning with the existing condition in Bantul reaching 54% of the total area [9].

This pressure lead to the importance of analysis on an ecosystem service relationship, on human well-being. If as predicted, global drivers give an impact to the environment would include both direct and ripple effects to ecosystem service, from that indication, the main supply of ecosystems, namely food provisioning could decrease their output and would reduce the amount rice production as the main income of residents. For these reasons, this paper surveyed both the condition and the perspective of stakeholders, as representatives of policy regulators, on capital that they considered could improve the condition of human well-being. Perspective on human well-being is measured using the framework from sustainable livelihood towards the government official. The characteristics of the regency make these data collection and approaches are useful in the analysis of the situation.

Recognizing the important role of nature for human well-being can provide a clear description of two opposing sides, economic and environment, could go hand in hand to achieve the welfare of society. It examines how the performance of ecosystem services in providing supplies to humans, how humans view the role of nature in achieving well-being and will also attempt to provide varieties of practical methods in conducting analysis of development and spatial planning.

2. Literature Review

Numerous frameworks that link human well-being with the provision of ecosystem services have been developed during the past two decades and rapidly evolving [10][11][12][13][14][15][16][17][18]. Definition of well-being vary and many terms are used to determine it. Butler and Oluoch-Kosura [19] stated that HWB is a multidimensional concept that is measured along a quality-of-life gradient that reflect the spatiotemporal variability of material (food, water, shelter) and nonmaterial needs (good health, social cohesion, security) [6]. Elaborating a measurement standard that can be used across diverse landscape that scale changes in HWB in response to biophysical and social economic is challenging. The indicator needs to be adaptable, so it can be applied to other area with different characteristics, but it have to be consistent enough to allow comparisons.

Therefore, a myriad institution and researcher have developed human well-being indicator to improve the live quality of people, such as the Better Life Index by OECD [1], the Global Well-being, the

Happy Planet Index (HPI), the Human Development Index (HDI) [20], and Sustainable Livelihood Framework [21]. SLF was created in the late 1990s by the United Kingdom Department for International Development [21]. This framework was made to link local well-being perspectives to policy to make management decision in an international development context [22]. This tools comprises five equally-weighted capital components and defines capital as the range of available assets that provide the building blocks for livelihood and well-being, including human, social, financial, physical and natural capitals [6]. This paper used an adapted version of Sustainable Livelihood Frameworks that have been developed by Giesecke et. al [6]. in Albemarle-Pamlico Basin, USA, then accompanied by changes that are adapted to the characteristics of the landscape and social communities in Bantul Regency to measure human well-being condition for a better planning.

3. Methods

This paper used stakeholder perception to map HWB in Bantul regency, the indicator was analyzed with questionnaire and interview based on Sustainable Livelihood Framework. The framework was built to linking HWB into policy level to make management decision. There are five capital with its own indicator. The SLF comprises five weighted capital components and defines capital as available for assets and livelihoods. The capitals are human, social, financial, physical and natural. First, to identify the best indicators that suitable for Bantul regency, stakeholder participant was selected as a key personal and rated the importance to HWB from the five types of capital and the contribution of potential indicators to modal capital. Respondent rated the types of capital and the potential indicators on a likert-scale from 1-5, with 5 being the most contributed and strong to HWB. If the data from the selected indicator is not available, then equivalent data is used instead, but if suitable substitute is not available, secondary data from the indicator that has the next highest score will be used. Questionnaires and interviews were spread in this research with the scope of local government officials and farmers. 20 people from government office became the key persons of questionnaires and interviews in terms of some aspects. The contents consisted of they input and perception, as a stakeholder, towards human well-being condition in their government area, which capital must be strengthened and becomes asset of the people's welfare, their outlook on agriculture sector a basis sector to support community welfare, and their idea to improve ecosystem service condition to sustain development in Bantul regency

Next, from the questionnaire respond, partial weight was included for two indicators within each capital and for the capital asset's that contributed to overall HWB (equation 1). This equation reflects the contribution of each capital asset (financial, human, physical, social and nature) to HWB and weights each capital indicator by dividing the mean (unscaled) rating by the sum of mean (unscaled) ratings (equation 2). This calculation enabled assessment of the condition of each capital asset individually as a composite measure of HWB.

$$HWB = \sum_{i=capitals} Xi[(xi \text{ x } Wxi1) + (xi2 \text{ x } Wxi2)] \tag{1}$$

$$Wxi1 = \frac{rating\ xi1}{(ratingxi1 + ratingxi2)} \tag{2}$$

To map the regency level indicators, a comparison of standardized data is made for each indicator with a scale of 0-1, based on the equation:

$$Scaled\ indicator\ value = \frac{value\ observed - minimum\ observed\ value}{(maximum\ observed\ value - minimum\ observed\ value)} \tag{3}$$

The data was calculated using Microsoft Excel, then joined to a regency boundary shapefile in ArcMap 10.5 (ESRI). The value indicator rescales are also used to compile radar plots by dividing areas based on the characteristics of their ecoregions. Rescaled value indicators make it possible to compare capital assets and overall HWB conditions across regency.

4. Result and Discussion

The sort list of potential indicators was identified for each capital group that provided insight into the condition of each capital and for which data might be available at the regional level.

Table 1. Human Well-being component and indicators

Capital asset and indicator	Data Sources	Mean rating	Sd
Human Capital: The collection of knowledge, skills, and ability to contribute to society		**4.75**	**0.44**
Live Expectancy	Total population number, population current age and gender (individual analysis: 2017)	**4.35**	**0.75**
Number of healthy days per person	No available data	**4.35**	**0.59**
Happiness Index	No available data	4.35	0.67
Infant Mortality	% infants with death under the age of 1 (Bantul regency Public Health Report: 2016)	4.10	0.72
Participating in training or education		3.95	0.69
Commute Time		2.75	1.80
Social Capital: Social relations and networks that provide benefits; can include normal and informal groups		**4.45**	**0.69**
Farmer groups for food productivity involvement	% of farmers per district with involvement to agriculture group (Bantul's agriculture statistic report: 2016)	**4.25**	**0.55**
Social organization involvement (i.e. gotong royong)	% of communities per district with involvement to social group (Bantul's village potential report: 2016)	**3.90**	**0.79**
Participation in community group		3.65	0.88
Recreation opportunities		3.55	0.83
Divorce rate		3.45	0.69
Education attainment		3.30	0.86
Civil involvement		3.15	0.88
Financial Capital: Financial assets		**4.40**	**0.68**
Income	Income: median household income (Bantul in figure: 2017)	**4.50**	**0.61**
Poverty rates	Population poverty rate (Bantul regency people's welfare report) (2017)	**4.45**	**0.69**
Employment		4.30	0.57
Low number of unemployed		4.25	0.72
Consumption		4.15	0.75
Living cost per month		4.00	0.73
Development of the local industry		3.85	0.88
Access to Credit		3.530	0.83
Physical Capital: Manufactured, nonhuman assets.		**3.90**	**1.17**
Affordable Housing	% household owning primary residence (Bantul in figure: 2017)	**4.35**	**0.59**
Irrigation Scope for Rice Production	% of rice field (Bantul in figure: 2017)	**4.35**	**0.59**
Affordable Electricity		4.30	0.80
Clean Water		4.30	0.66
Road Infrastructure		4.20	0.83
Access to hospital and health care facilities		4.11	0.66
Public Transportation Options		4.05	0.69
Natural Capital: Stock of natural ecosystems that yields a flow of ecosystem goods or services		**4.40**	**0.60**
Environmental Quality Index	No available data in district level	**4.15**	**0.81**
Food security	Paddy field area (Bantul in figure, Bantul's land use map: 2017)	**4.20**	**0.70**
Soil, water and air pollution	Number of pollution (Bantul environmental status: 2014) and (Bantul's village potential report: 2016)	**4.15**	**0.81**
Access to green space or open land		3.90	0.72
Number of disaster events		3.90	1.02
Forest Cover		3.60	0.88
Proximity to rivers or lakes		3.25	0.79
Settlement and agriculture location (lowlands)		3.20	0.83

Indicator data comes from tabular and spatial data from various sources. Indicators included in this assessment are noted in bold. Original sources of Bantul in figure https://bantulkab.bps.go.id. Based on these calculations, the level of representative each capital assets towards the condition of the Human Well-being shows in following maps:
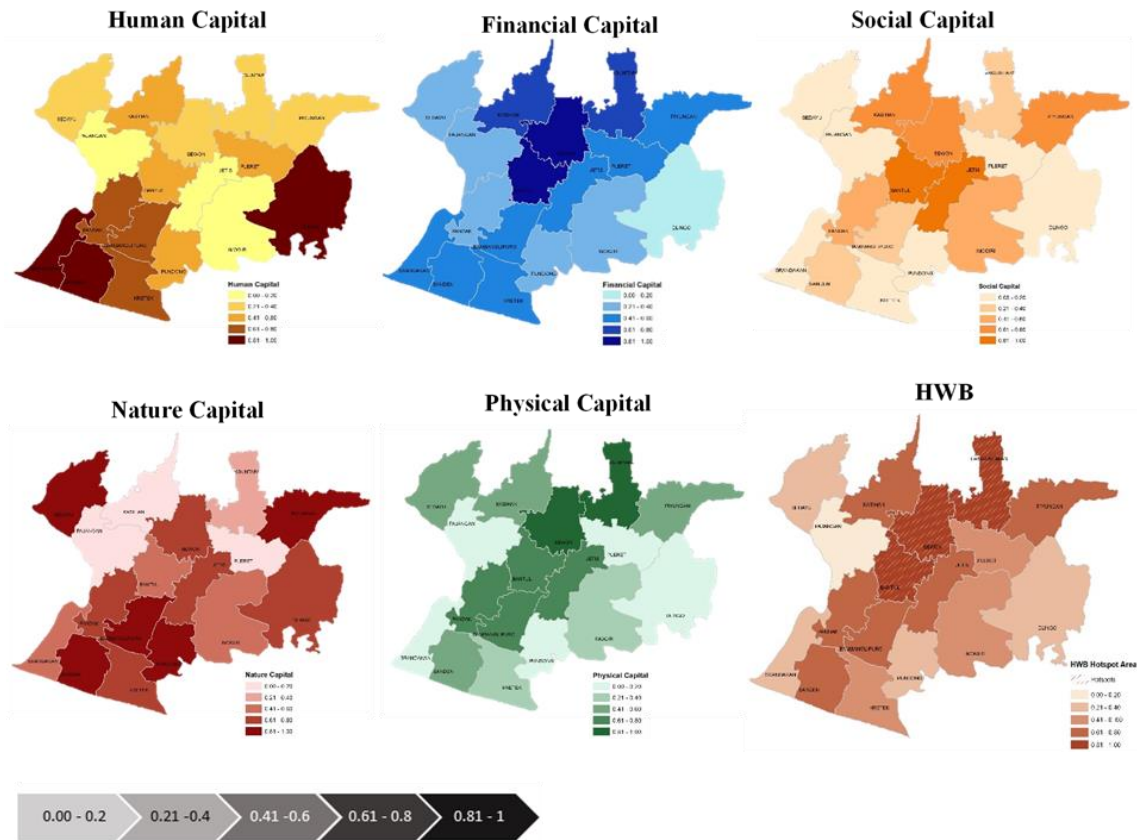
Figure 1. Capital asset conditions and the composite measure of HWB based on equally weighted capitals and indicators

Sustainable Livelihood Framework is a method of calculating Human Well-being that is commonly practiced in various parts of the world. Various changes have been adopted by numerous studies. In this thesis, the initial Framework was developed on research that conducted by Giesecke et al [6]. There were a number of indicators changes due to different regional characteristics and data availability. Almost all indicators in Human Capital used in previous studies, the official data was cannot be found for the district level. So for the highest indicator, i.e. Life Expectancy, a separate calculation must be done using the age-wised method. While the data for indicators 2nd and 3th are not available in Bantul regency, the 4th indicator, the Infant Mortality is applied.

Furthermore, the value of gotong royong (cooperation by members of a community to achieve a common goal) was added to the Indicator in Social Capital because it is part of the social life pattern of the Javanese community in rural society. In addition, the Environmental Quality Index (measurement of environmental quality consisting of forest cover, water and air pollution) that is used in almost all districts in Indonesia to measure environmental sustainability is also added to indicators at Natural Capital.

Human capital that consist of life expectancy and infant mortality had the best conditions area in Dlingo and Srandakan districts, which when compared to physical capital, are not supported by adequate infrastructure and located in remote area. Whereas visualization of financial capital appeared clustering in Yogyakarta agglomeration area. This may be influenced by commuter residents who have a job in Yogyakarta city but owning a home in Bantul. As for social capital, Bantul and Jetis districts are categorized as having very good community relations due to a huge number of members in their social organizations. Furthermore, compared to other capital, Human Capital is the most important asset (4.75 rates) for the livelihood in Bantul Regency. The productive age population is seen as the initial capital of

community's welfare. However, Financial, Physical and Social are linked together and share the same location. It can be concluded that the best capital condition of human well-being is in the Banguntapan, Sewon and Bantul districts which are located close together, and based on the regression output, Ecosystem Service could increase one and a half of Human Well-being, so that the research hypothesis is answered.

5. Conclusion

The capital that have most influences to Human Well-being status is Human Capital, namely the large number of productive age people. So that the future development plan must be able to prevent urbanization, the government must be able to accommodate facilities for them to be able to study and work in Bantul, so the "rural aging population" can be avoided. Therefore, implement of education about sustainable environment have to be started as early as possible. In addition, to develop agriculture, the high level of human capital is also needed to transfer technology to increase crop productivity, which lead to improving welfare. In contrast, accessible credit for local farmers to increase agriculture product apparently considered not as the main capital in financial capital by stakeholder point of view.

Proximity to the urban area of Yogyakarta makes the results of calculations from human well-being in Bantul Regency somehow biased. The high area of human well-being is located in the agglomeration area, so that access to infrastructure, social communication, and finance in the central region is easier than the remote area that has a low human well-being. This also proves that there is an inequality within regions, so that the level of welfare in Bantul Regency is still uneven.

This analysis helped the decision spatial planning to highlight important geographic patterns in individual HWB measures and illustrate the excellence of the HWB. By examining maps of HWB pattern and stakeholder indicators, obvious tendency among financial, social, human, emerges within Bantul regency landscape physical and natural capitals. The framework used in this study and has been tested on data-poor regions, it can be recommended for community-based participatory planning in the future. However, there are several indicators that must be replaced, especially in the Human Capital section due to the data availability.

Based on the results from observation and findings previously explained, this research suggest some recommendations, especially for spatial planning as follows: Local strategies that increase "pride in place" by enhancing the implementation and effectiveness of Food System. Food system is a complex activitiy involving the production, processing, transport, and consumption. This innovation requires a strong governance system, but can advance the local economy, maintain environmental sustainability, open employment opportunities, and have an impact on food on individual and population health.

Bantul is a region that largely agrarian. Beside rice products, this regency is also able to grow a large range of crops such as shallot, dragon fruit, cassava, mango, durian, etc., hence the development of a food system-based economy is one of the accurate innovations in improving people's welfare and at the same time preventing urbanization. To achieve these goals, several steps are needed, namely: (1). Establish Collaborative Food Alliance (CFA) between the City of Yogyakarta as a consumer and Bantul Regency as a producer, to coordinate transactions between the two regions; (2) Develop "food hubs" that connect rural areas (food suppliers) and city areas. This is also to maintain the supply of fresh products at low prices; (3). Promote local branding, the one village one product policy can protect the availability of goods in the market while at the same time increasing buyer interest in the uniqueness of local food.

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