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Water Usage Pattern on Different Group Residing In Vicinity Harapan Rainforest

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Abstract

This study was aimed to investigate water usage behavior on different group who residing in vicinity Harapan Rainforest. The qualitative and quantitative information was collected from 101 respondents by using semi-structure questionnaires. Respondent consist of three groups of people who residing in vicinity rainforest; indigenous people (*Suku Anak Dalam*), local people (*Malay*) and migrant (*Javanese, Batak and Sundanese*). Data was analyzed by using SPSS to describe the distribution pattern of different group on water usage (drinking and sanitary). Data was revealed, the average drinking water is 2.8 L/d/person, cooking sanitation and other is 21.7 L/d/person and total water consumption is 24.5L/d/person. Most of indigenous people were more dependent on river compare to other groups. Meanwhile, local people were dependent on using well as their sources of drinking water. Furthermore, migrant group is mostly dependent on well and commercial drinking water. In conclusion, during drought season local groups prefer to use well compare to others. Most of the households prioritized drinking water from the well in the drought season, where river were only used as sanitary purposes.

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Keywords: Water usage pattern, Harapan Rainforest, Suku Anak Dalam, Local Group, Migrant Group, Jambi

1. Introduction

Water scarcity remains as one of the most driving forces behind poverty, especially community who lives in vicinity secluded forest. The main problem of water scarcity is mainly lack of social power to access water resources and the climate changes. Water scarcity contributes too many symptom of poverty, the most critical of which food

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insecurity (Ahmad, 2003). Two-third of world population would be living in water stressed countries by 2025 (Arnell, 2004). According to FAO (2012), agricultural water withdrawal accounts for 70 % of the total global water. Furthermore, FAO (2012) forecast approximately 2.8 billion – 40% of the total population- lives in river basin water impacted by water scarcity. WHO (2014) also reported it is estimated that748 million people are lack access to drinking water and more than 2.5 billion of people who live without basic sanitation facilities.

To solve the water scarcity, several scientific meeting agreed that forest sustainable plays a role to help moderate soil, hydrological and aquatic systems. These including to maintain clean water including e.g. healthy fish populations, as well as to reduce risks or impacts of floods, avalanches, erosion and droughts. Protective functions of forest resources also contribute to ecosystem conservation efforts. Protective functions of forest resources have strong cross-sectorial aspects, as the benefits to agriculture and rural livelihoods are high. Climate change will very likely have an important adverse impact on the availability and quality of water in many regions of the world. The Fourth Assessment Report of the Intergovernmental Panel on Climate Change (IPCC) forecasted considerable changes in the amount, the temporal and the spatial variation of precipitation in every region.

Furthermore, forests are crucial to the sustainable management of water ecosystems and resources, while water is essential for the sustainability of forest ecosystems. Policy-makers should be aware of the important interactions between forests and water (FAO, 2013). Forest not only provides woods and other resources but also water resources. The basic identification of forest sustainability can be assumed by water availability. As the basic reliance of society on water resources, the sustainability forest can be identifying by determination of water usage pattern. The high of water resources available the more sustain forest and well managed.

Harapan rain forest (HRF) was a production forest area of timber concession. In 2007 HRF is taken over and managed by Restorasi Ekosistem Indonesia Corporation (PT. REKI). HRF is located in Jambi and South Sumatera which covering an area of 46.385 ha. HRF is ranked amongst of the most biological diverse forest, but also one of the most threatened. Sumatra dry low land rainforest occupied almost 16 million ha in 1900 and nowadays only 400.000 – 600.000 ha remains. Vegetation cover has dramatically changed in Sumatra within only few decades (Holmes, 2002). The annual deforestation in Indonesia is 0.5 % a year and equal to 0.49 million hectares per years (FAO, 2010). Global scale conversion of tropical rainforest and agriculture intensification are the major threat of biodiversity and water resources (David et al., 2002; David et al, 2013; David & Ploeger, 2014; Chapin et al., 2000; Withanachchi et al., 2014).

One of the food security indicators on society lives in vicinity rainforest is water resources sustainability. Under conditions of water scarcity fresh water resources are reserved for domestic use both drinking-cooking and sanitation, recently many of people who lives in vicinity rainforest are not able to access fresh water economically. Addressing MDG1 as part of a larger global nutrition effort, the immediate causes – inadequate dietary intake, water and sanitation and related diseases, lack of necessary knowledge – directly affect the individual, with disease perpetuating nutrient loss and poor nutritional status (Fanzo & Mettei, 2010). Early days drinking water supply in HRF are perceived outside of government concern. The traditional sources of drinking water in HRF were namely, wells and rivers. Recent research indicates that the time spent walking to water is significantly associated with health outcomes (Wang & Hunter, 2010; Pickering & Davis, 2012).

Some studies have documented the effect of lengthy walks to water sources on the risk of gender-based violence (Shah, 2002; Kirchner, 2007; Ivens, 2008; Sorenson et al., 2011; Thompson et al., 2011), as well as of injury from physical stress to joints and from accidents (Ivens, 2008; Sorenson et al., 2011). Taken together, these findings suggest that incorporating time and/or distance considerations in the definition of access to improved water would better reflect the public health goals of the sector.

All the previous aspect underline, therefore, this study aims to investigate water usage behavior on different group who residing in vicinity HRF, ensuring the water security for the society. The outcome of this study can answer the phenomenon of water scarcity.

2. Materials and Methods

A survey was conducted in vicinity of HRF area, Jambi, Sumatera, Indonesia. Total Area of HRF is 98.555 ha. Stratified sampling method was applied. The total of 101 households participated in this survey. List of questions were intended to determine their access to water resources. These questions include number of family member,

sources of income, and ages. Respondent are spreading in ten locations; *Sepintun (trans unit III), Kunangan Jaya I, Simpang Macam Dalam, Simpang Macan Luar, Pagar Desa, Kapas Tengah, Sakosuban, Tanjung Mandiri, Bungkal and Mangkubangan* as shown in Figure 1. Respondent are divided into three groups. First group is indigenous people were called Suku Anak Dalam (SAD) this group consist of 34 households. Second group is the local people where consist of Malay descent, this group has 37 households. The third group is a migrant descent (Javanese, Sundanese and Batak); this group consists of 30 households. Figure 1Map of study area (the red circle is where the research carried out). Respondents were asked about how they get/access their daily water sources. Data was collected and analyzed by using SPSS Version 20 and statistic descriptive by using MS. Excel.

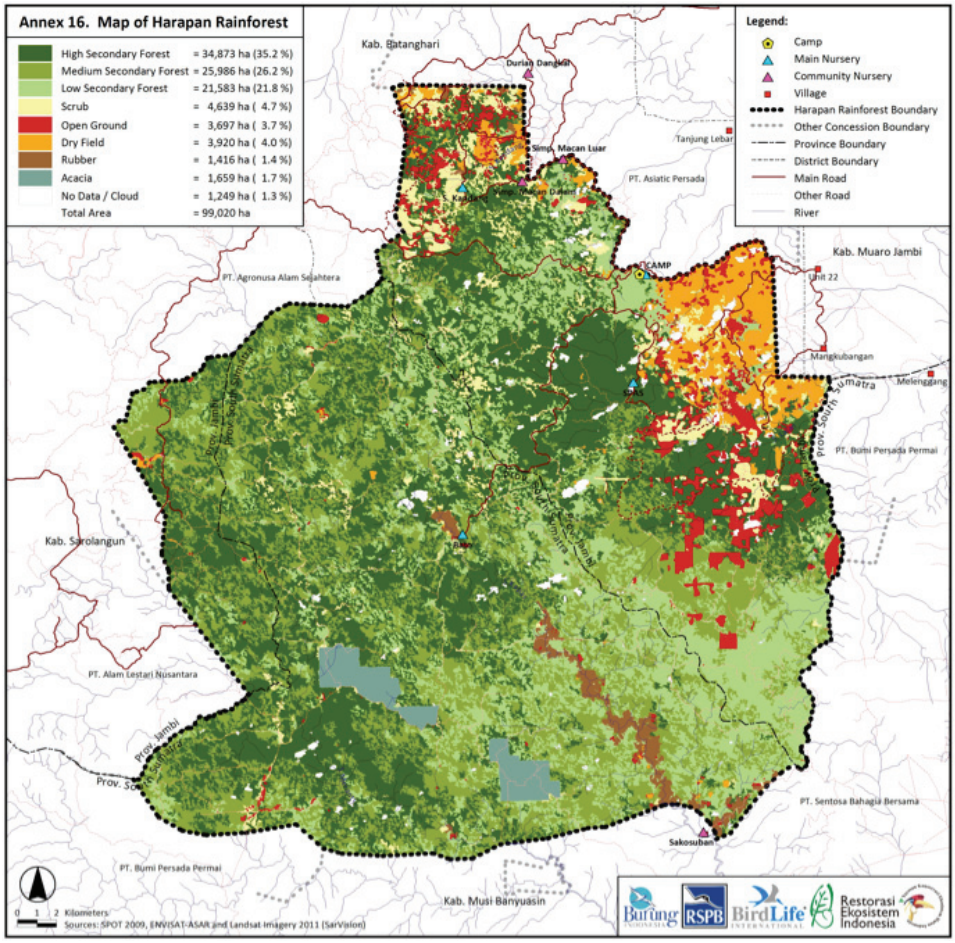

Figure 1. Map of study area

3. Results and Discussions

3.1. *Drinking water pattern*

The averages of household's incomes in three different groups ranged between 1.1 – 1.7 Million IDR. Local group has wide ranged in household income as shown on Figure 2. They prefer to rely on bottled water for drinking water compare to other groups. In migrant and SAD group, households have least incomes and they use river and well as their water resources for drinking. The other reason of migrant and SAD group is rely on river and well because of bottled water is hardly to access economically. Most of the migrant and SAD group lives in remote area

and more secluded compare to local group. The out layer of data is due to the high variation of income in every group. As highly of household income is not ensured that household will consume bottled water, most of them are prefer to consume water from well. River was being used if there have a long drought season and their wells are completely dried or shallow, the rivers and the well become low water quality. In the one decade, climate changes act as an indirect aggravating factor for the anthropogenic pressures on the environment (Cromwell et al., 2007; Delpla et al., 2009; Roig et al., 2012), including people in the vicinity of HRF. They are suffering from sufficient fresh water with good quality. Even though they meet the basic need of drinking water however they have threat water insecurity in anytime.

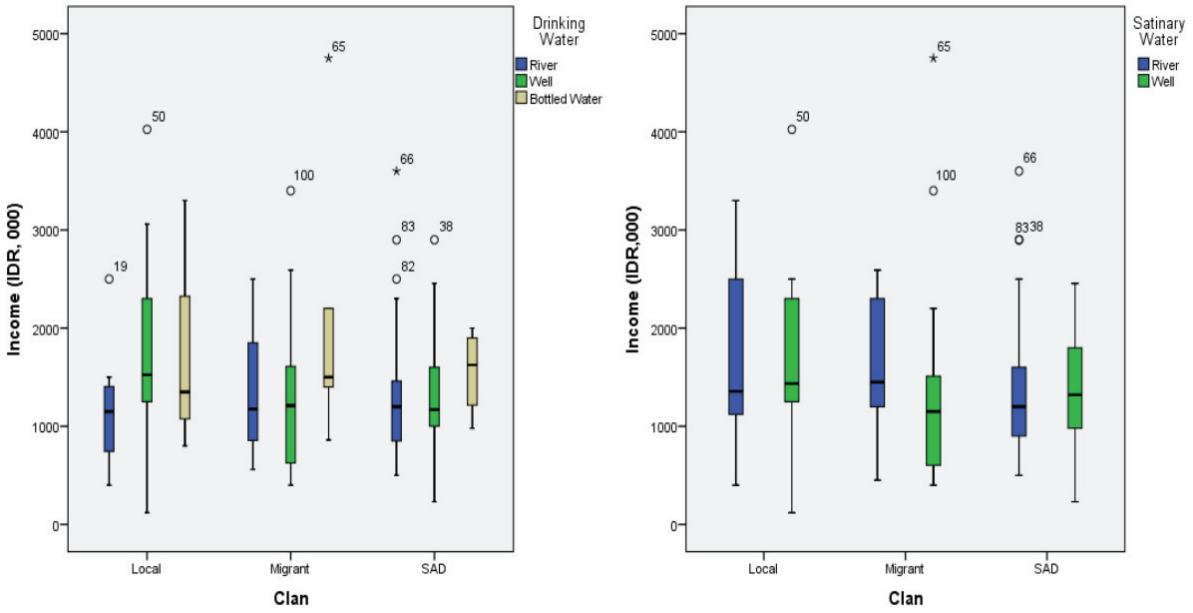

Fig. 2 Drinking water resources (left) and water for sanitary (right) vs. household incomes

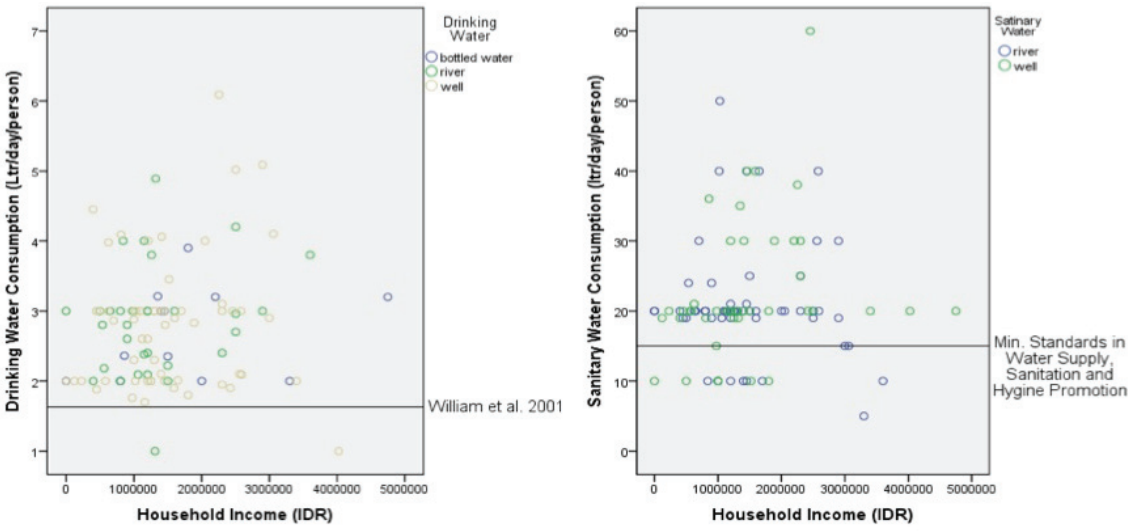

Figure 3. Scatter plot of drinking water consumption (left) and sanitary water consumption (right) vs. households incomes

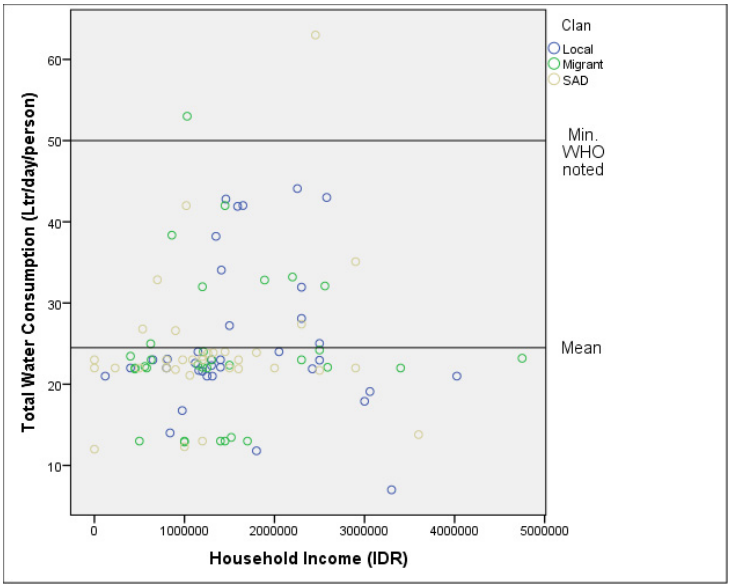

Figure 4. Scatter plot Total Water Consumption (L/d/person) Vs Household Income (IDR)

According to William et al. (2001), one person needs at least 1.6 L/d/person for drinking water to fulfil the basic need of water consumption. Based on Figure 3, only two cases (households) were suffered from water scarcity even though these household economically has purchase ability. After investigation, both of household has difficulties in access of water resources due to long drought season. They have a dried well and far from nearest rivers. Mostly local group and migrant group replace using well water to bottled water because the easy to purchase and high quality however it's depends on the availability in the nearest market. Fixed income of local and migrant group makes them constantly consume bottled water compare to SAD. Over all, resources of drinking water are still dominated by river and well. The solving of drinking water scarcity in short time period, bottled water may reduce the drinking water scarcity however the questions of sustainability will arise. There is an environmental issue about carbon footprint for the transportation of water and new waste for the packaging as well.

3.2. *Sanitary water pattern*

The average of sanitary water consumption in every household is 20 L/d/person. The minimum water usage for sanitation according to minimum standards in water supply, sanitation and hygiene promotion, it needs at least 15 L/d/person to meet the requirement of daily water for sanitation per person. The sanitation water is important as one of the indicator a part of the basic human needs. Water security means not all about drinking water but more such as sanitation and hygiene as well. As all scientist agreed, diarrhoeal diseases are transmitted through human excreta, and it is therefore critically important to have effective barriers in place to prevent this major transmission route. Improved sanitation alone could reduce diarrhoea-related morbidity by more than a third (UNICEF, 2006). The reasons for low prioritization of water and sanitation are many. Sanitation remains a largely taboo subject in most cultures; it is not an attractive subject for media or politicians to promote as a worthy cause; and policymakers are unmotivated or remain ignorant of evidence of the health and economic benefits of sanitation (Hutton et al., 2014). In drought season, all groups are really depending on the river. Most of them sometime have a problem with skin-related diseases however not reported officially. Drought season is a threat for them not only because low level of water availability but also there is no stream come from the forest, the habitat of indigenous fish was also feared. David et al. (2015) reported that most of the SAD is dependent on the river for their protein intake. With fishing normally they will get 1.5 -2 kg fish, it is relative low compare to the previous decade due to the decreasing of water level in the river.

3.3. *Total water consumption*

The quantity of water collected and used by households has an important influence on health; WHO has noted that a person needs between 50 and 100 liters of water per day to meet basic needs (UNCHR et al., 2010). According to the three different groups indicated, most of the households have below minimum standard level of total water consumption based on WHO notes. In average most of them have only 25 L/d/person for the daily water usage. The quantity of water collected and used by households has an important influence on health (drinking and sanitation) (UNCHR et al, 2010). Safe drinking water for human consumption, according to the WHO (2006), should be free from pathogenic bacteria, viruses and parasites, chemical and radiological contamination, and it must also be acceptable in appearance, taste and odour. In all research sites, only well has a better appearance, less odour and taste acceptable. River water normally has the lowest quality of appearance and has abnormal taste.

Conversion from wild forest to oil palm in the vicinity HRF leads to biodiversity loss (Barnes et al., 2014) and water scarcity due to climate change (David et al., 2002; Chapin et al., 2000; Anachchi et al., 2014). Poor sanitation is one of the leading risk factors for child mortality worldwide. Improved sanitation, the practice of appropriate hygiene and use of improved sources of drinking water could prevent 2.4 million deaths (4.2% of all deaths) annually in our world (Bartram & Cairncross,2010), including an estimated 1.2 million children under the age of five who die from diarrhoea (UNICEF, 2012).

In the long term of prediction, they will suffer not only drinking water but water for sanitation as well. In this study the extreme event are not measured. In particular, the main determinants of climate change having a direct or indirect impact on water quality are air temperature and extreme water events (flood, drought) (Van Vliet & Zwolsman, 2008; Brodie & Egodawatta, 2011; Hrdinka et al., 2012). Resource availability in surrounding area of HRF is linked to water availability (Ranjan et al., 2006; García-ruiz et al., 2011; Nan et al., 2011), and it becomes important to consider these extreme events in assessing both evolution of water stress and efficiency of the treatment processes (Wilby et al., 2006; Emelko et al., 2011).

4. Conclusion

The main water resources for drinking water is still dominated by well and river even though local group already adapted to purchased bottled water from elsewhere outside of vicinity rainforest. Local group also often to use river as their sanitary water resources compare to other groups. Fixed income is the most suitable reason for the local group to purchased bottled water. During drought season local groups prefer to use well compare to others. Most of the households prioritized drinking water from the well in the drought season, river were just been used as sanitary purposes. All groups are dependent on river and well as sanitary water resources. The intensity of using river as sanitary water resources was dominant in local group compare to migrant and SAD group. This may be due to SAD has their own well and far from the river. All groups have no different in household income and selecting river or well as sanitary water resources. SAD has consistently using well as their sanitary water resources.

To solving of the water scarcity in the vicinity HRF, beside to manage the water usage, long term planning should be developed in advance. As all scientist agreed that, the indicator of well manage of forest is that it could be reservoir for the surrounding area. The participation of the indigenous people, local people and migrant people in HRF should be empowered to establish mutual understanding for preparing the water security in their area.

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