Ecological wisdom of Hindu-Javanese community settlement in Cetho Hamlet, Lawu Mountains, Central Java, Indonesia

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Abstract. Dwelling culture of Java community has a long history. In Javanese community point of view, Javanese culture is not a homogeneous entity. There is a diversity characteristic of a regional nature of Javanese culture, which is caused by differences in the natural environment on the island of Java. Dwelling Culture settled in the mountains is a variant form of Javanese culture that has its own uniqueness. This study aimed to describe the local values of the rural settlement structure of in Lawu mountains with Hindu-Javanese culture background. This study used a qualitative approach with case study strategy. The locus of research is in the Cetho hamlet on the slopes of Mount Lawu Karanganyar, Central Java. The results showed that local values in the neighborhoods of Cetho hamlet is based on the Memayu Hayuning Bawana philosophy. These concepts are abstracted into various aspects of settlements in Cetho hamlet such as aspects of dwelling house setting, water management, and ritual activities related to environmental management. Memayu Hayuning Bawana philosophy becomes a cultural space coloring the ecological action of the population of Cetho hamlet. The comprehensive motivation of ecological action ultimately leads to one final goal, namely the desire to maintain a harmonic atmosphere with the surroundings.

Keywords: Local wisdom, settlements, Mountains, Hindu-Javanese

1. Introduction

Indonesia is an archipelagic country that has natural landscape and various ethnic groups. Based on the existing records, there are 250 languages and more than 300 tribes scattered throughout Indonesia [7]. The diversity of ethnic backgrounds supported by the diverse landscape of Indonesia, forms the diversity of the traditions of a particular group of people/tribes. Space to live is not an abstract concept of the traditional society. All the space contains the power of life that needs to be managed to maximize luck and avoid evil. For the traditional society, ignoring the power of space life gives bad influence to its inhabitants. The diversity of natural and cultural conditions creates spaces with local meanings. The perspective of each community group in managing space produces local values that distinguish between one place and another. The management of living space for the traditional Indonesian society largely covers the layout aspect, the division of the activity space and the appearance of the building [10].
Javanese tribe is one of the tribes in Indonesia which has a history of culture that is quite old. Javanese cultural region covers Central Java to the eastern part. In the history of its development, there are various differences in attitude and behavior of the Javanese in understanding the culture. This difference is due to differences in geographical conditions and the intensity of interaction with other religious and cultural values. This distinction of understanding leads to various variants of the Javanese cultural domain. According to Koentjaraningrat in Ronald [8] Javanese cultural region is divided into several sub-culture namely Negaraigung (Yogyakarta, Surakarta and surrounding areas, Banyumas, Bagelen), the center of Javanese culture. Pesisir Kilen covers Cirebon to Kudus. Pesisir Wetan include Bojonegoro to Gresik., Mancaenegari cover Madiun until Malang. Tanah Sabrang Wetan covers the eastern parts of Java, Surabaya and Madura. Each sub-cultural region has a distinctive characteristic in implementing Javanese cultural philosophy into everyday life.

Studies of rural settlements in the mountains of Java are still relevant today, as the mountainous areas of Java comprise one-third of the total area of Java [14]. Some researchers have conducted research on rural settlements in the mountains of Java. Rejeki Research [15] took a locus in one villages on the slopes of Mount Sindoro, Wonosobo, Central Java. Rejeki research reveals the values of local wisdom in mountainous settlements on the slopes of Mount Sindoro. The determination of the orientation of the dwelling house facing the north-south, the concept of mancepat on the macro scale and the order of purden became the main findings of Rejeki research. Research on settlement of rural hamlet with Hindu-Javanese cultural background is done by Anngrayani [13] in Jenglong Hamlet located in Kawi Mountains, Malang. Anngrayani research findings indicated that the spatial arrangement of settlements Jenglong Hamlet partly adopted the arrangement concept of the area or environment of Hindu-Bali. The concept of space in Jenglong Hamlet is modified from the Hindu-Bali space concept, which is to adopt the concept of Tri Angga.

Settlement research in Dusun Cetho has the same context with Anngrayani research, that is rural settlement in mountains with Javanese Hindu cultural background, yet different region of culture sub culture. The geographical conditions, technological developments, cultural environment differences may creates differences and adjustments in the application of the settlement arrangement concept. This study aims to locate traditional local knowledge systems and the ways in which they use such knowledge to adapt to their environment.

The term ecology was first introduced by Ernst Haeckel, a veterinarian there in 1869 as the science of interaction between all kinds of living things with their environment. Ecology comes from Greek, oikos (household/residence) and logos (scientific/scientific). So ecology is the science of the home or living place for human being [2]. According to Triyoga [12] Ecological wisdom is a system of beliefs, attitudes, behaviors and actions of local people in making their lives oriented in seeking harmony with the natural environment.

In the Javanese view of life, human life can not be separated from the environment in which he lives. He will always depend on and interact with his environment continuously. Through their experience and observation of the environment, the Javanese built their knowledge on how to live and ethically treat nature, ultimately giving birth to local wisdom values passed down from generation to generation. In regulating human relationships with nature, Javanese recognize the philosophy of Memayu Hayuning Bawana. Memayu comes from the word hayu (beautiful, beautiful or safe) by getting the prefix ma, to be mamayu (beautify, beautify or improve safety). The word Hayuning comes from the word hayu by getting the pronoun of belonging ning (his) which means beautiful, beauty or salvation. Free translation from memayu hayuning: striving for safety, happiness and prosperity. The word Bawana means the world. The world can be interpreted either physically or spiritually. The understanding of Memayu Hayuning Bawono is to strive for the salvation of the world and to keep the world and all its contents in order to remain preserved and harmonic [11]. This study aims to locate traditional local knowledge systems and the ways in which they use that knowledge to adapt to their environment on the settlements of the Hindu Javanese community on the slopes of Mount Lawu.

2.Methods

The research used qualitative approach with case study method. The research area is located in Dusun Cetho, Gumeng Village, Kabupaten Karanganyar, Central Java, Indonesia. The data were collected by observation and interview. The selection of informants was done purposively after the grandtour
observation. Data analysis technique used Spradley model data analysis techniques [9], the first stage is domain analysis to obtain a general overview and comprehensive about the social situation / research object under study. The second stage is a taxonomic and compositional analysis to obtain the domains or categories of the social situation under study. The last stage is the analysis of cultural themes to look for linkages between domains in order to obtain a complete picture of the object of research so that the results can be understood and become the basis for the conclusion.

3. Discussion

3.1. Site and Climate Conditions of Cetho Hamlet

Settlement of the Hindu community in the area of Java Cetho is a hamlet located on the western slopes of Mount Lawu, adjacent to the site Cetho. It is located on an altitude of approximately 1413 m above sea level, at the coordinates 7°35'43" latitude and 111°9'21" longitude. Climatic Character of Cetho hamlet is generally similar to humid tropical climate character of mountainous areas in Indonesia. The air temperature is relatively cool, the average temperature of the night ranges from 24-29ºC and 29-34ºC during the day. The topographic condition of Cetho hamlet located on the slope of Mount Lawu generally has a varied contour, with a land slope of about 10-35 degrees [see figure 2&3]. The soil in this area is relatively fertile, pine and pine trees dominate the vegetation located in the forest area of Mount Lawu, while land around the hamlet is cultivated for horticultural crops such as carrot, cabage, onion, mustard and jar. Cetho Hamlet is administratively located in the administrative area of Gumeng Village, Jenawi District, Karanganyar District, Central Java [see figure 1]. The location is about 35 km from Karangnyar with approximate area about 70Ha. Cetho hamlet is relatively isolated when compared to other hamlets located in Gumeng Village. The area of Cetho Hamlet is adjacent to the Perhutani Forest and the peak of Mount Lawu on the east and north sides and the agricultural fields on the south and west. The composition of the last population in the Cetho hamlet is 304 adherents of Hinduism, 134 Islam and 6 Christians.

Figure 1. Location of Cetho Hamlet at Lawu Mountain, Karanganyar Distric, Central Java, Indonesia
Source: Bappeda Karanganyar (2015)

Cetho Hamlet can not be separated from the presence Cetho temple. Based on the clues point at two places in the Cetho temple complex, Sengkalan Memet sculpture (1451 AD) and Ruwatan building
(1475 AD), indicate that the temple was built on the clear end of the Majapahit kingdom in King Brawijaya V period. Cetho, a Hindu temple built ‘ruwatan’ purpose, attempted to rescue from disaster and the pressures arising from the turmoil at the time. At the time, Majapahit kingdom is undergoing social unrest, political, cultural and even religious practices. Experts suspect this is one of the desolation causes, as well as from the influence of the Islamization of the West [5]. According to Lombard [4], at this time, the power to regulate all Majapahit territory began to weaken. In areas far from power, the ideology of Hinduism and Buddhism began to be abandoned and began streaming a new ritual, which glorifies figures savior. This trend is dominated elements of the original Java.

3.2. Dwelling House Setting in the Cetho Hamlet

The topographic condition of Dusun Cetho which has a fairly steep slope of the land makes the settlement pattern of Dusun Cetho quite unique[see figure 6]. Differences in land altitude among the sites in certain locations are quite extreme, this requires the creativity of site management. The cetho population will level the land before it is constructed in a “batur” manner (cut and fill method).[see figure 5]. There is an unwritten agreement in which the landowners in the above positions are obliged to build a stone talud as a barrier to the land and at the same time resist landslide.

From sample of houses studied, Javanese house in rural settlement have an average two groups of building, griya(building function) wingking with dhapuri(roof shape) limasan sinom and griya gandhok is also with dhapuri limasan or kampung. Griya wingking of the Cetho Hamlet community is better known as ndopo and senthong (left, center, right). While the gandhok was set up as pawon (a kitchen). Support facilities such as stables and bathroom facilities are not seriously equipped. Although located on the wide field, it generally shows two groups of building (griya wingking and griya gandhok (pawon). When referring to the guidelines for Javanese building, Kawruh griya Titika Wisma [6], griya wingking in the hamlet of Cetho have different conditions. Griya wingking description in Kawruh Griya script requires a high degree of privacy, otherwise the condition is different from griya wingking in the hamlet of Cetho. In front of senthong room (Cetho residents often call it Ndopo) the owners used it for various activities such as dining room and a couch to sleep on. This room is a family residence for all activities. It became one of the central features of houses in the Javaneese rural settlement, where a building accommodates various functions/activities.

Javanese houses in Cetho Hamlet mostly face in north and south direction. If forced by access then the house will be faced west, but in some cases the house remains cultivated facing north /south though home access from the west. In Cetho Hamlet there is a trust to avoid facing east, because the house facing the east is believed not to bring happiness and prosperity for its inhabitants.

Roof cover construction has used zinc as a roof covering material. The humid rainy climate conditions of Cetho hamlet cause people use roof covers that are capable to respond the climate change. However, based on the elder story, house roof in the Cetho hamlet used reed materials. When there is a clay roof tile material, residents had switched to tile. The use of tile material does not last
long, given the climatic conditions of the Cetho Hamlet is always wet. It causes the tile wet and also
damage the wood batten roof. Since zinc material is known, the citizens then gradually replace the
roof material to zinc. According to informant story, zinc material more waterproof and able to dispel
rain water especially when there is rain accompanied by strong winds. Zinc material make the house
warmer, and able to drive the cold mountain air.[see figure 4]

The house wall initially uses gedhek (bamboo weaving) and partly uses natural stone
construction. The stone is arranged using limestone adhesive. Stone and sand is obtained not far from
Cetho Hamlet. But nowadays, as the transportation out of the sub-village is easy, new materials such
as brick are already being used by some residents to build houses.

| senthong tengen | senthong tengah | senthong kiwa |
|----------------|----------------|--------------|
| ndopo          |                |              |

Figure 4. Javanese House Room layout at Cetho Hamlet
Source: Field Observation, 2016

Figure 5. Stone embankment between building
Source: Field Observation, 2016

Figure 6. Topography of residential areas on a steep
slope. Source: Field Observation, 2016

3.3. Water Management
The settlements of Cetho Hamlet are located on the western slopes of Lawu mountain, at an altitude
of approximately 1400m above sea level. The soil contains many natural stones and deep ground
water level. Such geomorphological character causes no well as a source of clean water supply. The
Cetho people traditionally rely on mountain water springs that appear in some slopes of Lawu
Mountain. The first source of water used as a source of clean water supply is the source of Sendang
Pundisari water springs. The location of this water spring is right above the highest terrace of Cetho
Temple (east of the temple), like the Hindu temples in other areas. In general, temples are built in
locations that have a good source of water, because water for Hindus is part of the worship ritual.

Based on the stories of the informants, the first generation of people take water from Sendang
Pundisari water springs. From Sendang Pundisari water springs, people used pipes to drain the water
to the distribution tank.. Location of Cetho hamlet which is under the cetho Temple (West cetho
Temple) simplifies the process of distribution of water without the use of pumps (relying on the force
of gravity). From a distribution tank (illustrated in the figure 8), water flowed into houses and several public toilet in the middle of the settlement. Public toilet at Cetho Hamlet commonly called the Kali Baku / Kali Umum. Early generations of residents in Cetho Hamlet do not have bathrooms in their homes. Supplies of water used the resources in the Kali Baku. In certain moments, Kali Baku was used for bathing the baby and bathing the villagers who died. Along with population growth at Cetho hamlet, water supply from the Sendang Pundisari water springs is insufficient to meet the need of clean water of Cetho Hamlet. Finally, the Cetho villager find the greater water springs. The source of water springs is located at Sendang Macan, about one kilometer above Cetho temple. Water from Sendang Macan water springs is distributed to a distribution tank that is not far from the water springs. From a distribution tank, water flowed into houses and several public toilet in the middle of the settlement.

Along with the improvement of living standards and welfare of the population, at this time every house built bathroom each. Residents are able to drain water from the distribution tank directly to their house and respectively. To facilitate supervision, care, and equitable distribution of water, it was agreed that each family can only have one water pipe directly connected to the distribution tank. In addition to being used for daily primary needs such as drinking, bathing and laundry, a source of clean water supply from water springs, used for watering agricultural crops in the moor. Water is needed to improve the productivity of the moor land, given the character of the agricultural system in Dusun Cetho is rain-fed agriculture. Water is flowed from the water spring of Sendang Macan through the pipe to the moor of the population. In the moor, the water pipe is broken apart through the dividing line to fulfil the need of the land area. Usually at the end of the pipe installed a water vane (water diffuser outlet) so the plants watering can be evenly distributed.[Figure 7].

3.4. Ritual activities related to environmental management
3.4.1. Mondosiyo Ritual
The name mondosiyo is taken from one of the names of wuku Mandhasiya in the order of 14 of 30 wuku based on Javanese calendar. The Mondosiyo ritual falls on Tuesdays kliwon wuku mandhasiya. This ritual will be repeated every day, considering that one wuku lasts seven days. The Ritual of Mondosiyo in Cetho hamlet is a tradition of "clean hamlet" conducted by local people.[Figure 9 &10] Mondosiyo Tradition is an activity of the citizens of Cetho hamlet expressing gratitude for the social harmony and nature sustainability that has been given by the omnipotent to all citizens of Cetho Village. According to the beliefs of the villagers of Cetho, respect for nature is an attempt to maintain harmony between macrocosmic natural and microcosmic realm. Clean hamlet ritual is an effort to meruwat (regenerate) the orderliness of the cosmos to create harmony and tranquility of village’s life. This tradition is also at the same time as the tribute of Eyang Krincing Wesi birthday believed to be Dhanyang / embryo of the village that became protector and guard harmony village life order. According to the known Myths story in Dusun Cetho, Eyang Krincing Wesi is the caretaker of Cetho
Temple during the time of King Brawijaya reign (the last King of Majapahit ruling around the 15th century). He always served the needs of the king every time doing activities at Candi Cetho. Eyang Krincing Wesi is believed to have been died and was buried at the Krincing Wesi Punden which is currently in Cetho temple area. The Spirit of Eyang Krincing Wesi is believed to always keep the environment and always be respected by all of Cetho Hamlet citizens.

_Dhanhyang or danyang_ which according to Geertz [3] is considered as the spirit of the deceased historical figures (the founder of the local village, the first person who opened the land). _Danyang_ while still lived as a man came to the village while still a jungle, opened the land and divided the land to his followers, family, friends and he became the first village leader. After his death he was buried near the village and his tomb became _punden_. But in some places punden is not always related to the location of the tomb. _Punden_ is the pioneer / founder of the village who is considered sacred and their spirits are believed to still keep an eye on the village and can provide assistance.

![Mondosiyo ritual](Figure 9. Mondosiyo ritual)  
**Source: Field Observation, 2016**

![Setting of Mondosiyo ritual](Figure 10. Setting of Mondosiyo ritual)  
**Source: Field Observation, 2016**

Mondosiyo ritual is believed to have been conducted from hundreds years ago until now and never broken up. The Mondosiyo ritual begins one day before (Monday-Wage), the residents prepare traditional offerings of special food (_tumpeng panggang_). Then, on a Monday night _tirakatan_ (ceremony) is held in front of the Krincing Wesi Punden. On The Day (Tuesday Kliwon), residents go together to Krincing Wesi Punden around 10:00 am and offerings to carry out a pray together. In the evening, the usually made a Puppet show. The story was selected by the elders. For some residents, the story plays at the time of the leather puppet show is believed to give luck and serenity to the next Mondosiyo celebration.

3.4.2. Dawuhan Ritual

Dawuhan ritual is done every six months on Saturday _kliwon_. Dawuhan Ritual is an expression of gratitude for the citizens of Cetho hamlet on the availability of water and at the same time a form of homage to the water god of the water source in the village of Cetho. Dawuhan ritual series is carried out by water channeling the source center and then ending with a pray at _Sendang Pundisari_. _Sendang Pundisari_ is an ancient water springs located above Candi Cetho. Through the ritual, Cetho villagers want _merawat_ the existing water sources in order to always provide adequate water needs for all citizens. For the residents, the water source is a holy place, because water is used for all the life needs and water serves as a complement of worship rituals. A set of _roasted tumpeng_ (rice, roast
chicken, side dishes, fruit, flowers) was prepared during the Dawuhan ritual. Events usually start around 10:00 and finish at noon. The activity is led by Mangku (the customary stakeholders) in the hamlet area of cetho.

3.5. Ecological Wisdom of Settlement in the Cetho hamlet
The results of observations on the values of ecological wisdom in Settlements in Cetho Hamlet can be grouped into two dimensions [figure 11], the value of space culture and the value of spiritual culture wisdom. Space culture is formed from the relationship among humans as well as that of humans and their environment. Spiritual culture is formed from human relationship with god. The space culture dimension is shaped by the values of local wisdom in Dusun Cetho such as consensus construction of embankment, cut and fill concept, building material selection, determination of building orientation, consensus of water management and agricultural land. Meanwhile, the spiritual culture is formed by rituals and customs that still run in Cetho Hamlet such as Mondosiyo ritual, Dawuhan Ritual and Ritual in Kali Baku. For the people of Cetho Hamlet, the balance between the dimensions of Space culture and the Spiritual Culture Dimension became the basis of the realization of the Memayu Hayuning Bawono philosophy, an ideal condition that is expected by every Javanese people in arranging the environment of his birth and mind to the tranquility of life.

Figure 11. Dimension of Cetho Hamlet Ecological Wisdom

4. Conclusion
The mindset, attitude and actions of managing the environment for the people of Cetho hamlet can not be separated from the knowledge built through the empirical experience inherited from their ancestors. Geographical and climatic conditions with a rural Javanese cultural background have formed a distinctive adaptation pattern for the inhabitants of Cetho. Ecological wisdom that is manifested in the physical / outward and non physical / inner levels shows the characteristics of Kejawen (Javanese beliefs) that still strongly color the life of the people of Cetho hamlet. Memayu Hayuning Bawono philosophy becomes a cultural space coloring the ecological action of the population in Cetho Hamlet. The comprehensice motivation of ecological action ultimately leads to one final goal, the desire to maintain a harmonic atmosphere with the surroundings. The harmony of living with the environment contains two meanings, namely First, the harmonic relationship between humans and the surroundings. Second, the harmonic relationship between humans and God.

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References
[1] Bappeda Karanganyar, 2015, Geografi Kabupaten Karanganyar, Pemerintah Daerah Kab. Karanganyar. http://www.karangangyarkab.go.id/20110119/candi-cetho
[2] Frick, H and Suskiyatno, B. 1998. *Dasar-Dasar Eko Arsitektur*. Yogyakarta: Kanisius. 1
[3] Geertz, Clifford. 2014. *Agama Jawa: Abangan, Sanri, Priyayi dalam Kebudayaan Jawa*, Depok: Komunitas Bambu. 23
[4] Lombard, D., 2000, *Nusa Jawa: Silang Budaya Kajian Sejarah Terpadu; Bagian III: Warisan Kerajaan-Kerajaan Konsentrus*. Jakarta: PT. Gramedia Pustaka. 25
[5] Perpustakaan Nasional Republik Indonesia (Perpusnas). 2014, *Kepustakaan Candi Jawa Tengah- Candi Cetha* http://candi.perpusnas.go.id/temples/deskripsi-jawa_tengah-candi_cetha
[6] Priyotomo, J., 2006, *Rekonstruksi Arsitektur Jawa: Griya Jawa dalam tradisi Tanpa tulisan*. Surabaya: PT. Wastu Lanas Grafika. 173
[7] Rigg, Jonathan, 2002, *Indonesian Heritage: Manusia dan Lingkungan*, Jakarta: Grolier International. 40
[8] Ronald, A., 1990, *Ciri-Ciri Karya Budaya Di Balik Tabir Keagungan Rumah Jawa*, Yogyakarta: Penerbit Atma Jaya University. 183
[9] Sugiyono, 2016, *Metode Penelitian Kuantitatif, Kualitatif dan Kombinasi (Mixed Methods)*, Bandung: CV. Alfabeta. 344
[10] Tjahyono, Gunawan. 2009. *Sejarah Kebudayaan Indonesia*. Jakarta: PT. Rajagrafindo Persada. 29
[11] Endraswara, Suwardi. 2016. *Memayu Hayuning Bawono: Laku Menuju Keselamatan dan Kebahagiaan Hidup Orang Jawa*, Yogyakarta: Narasi. 18
[12] Triyoga, Lucas Sasongko. 2010 *Merapi dan Orang Jawa : Persepsi dan Kepercayaanya*. Jakarta: PT. Gramedia Widiasarana Indonesia. 151
[13] Anggrayani, Irma. 2010. *Tata Ruang Permukiman Komunitas Hindu di Dusun Jenglong Desa Sukadadi, Kecamatan wagir, Kab.Malang*, Tesis .Program PascaSarjana Universitas Gadjah Mada, Yogyakarta
[14] Hefner, Robert W., 1999, *Geger Tengger: Perubahan Sosial dan Perkelahian Politik*, Yogyakarta: Lks Yogyakarta dan The Asia Fondation. 25
[15] Rejeki, VG Sri. 2010, *Nilai Kosmologi Pada Tata Spasial Permukiman Desa Kapencar Lereng Gunung Sindoro Wonosobo*, Forum Teknik Vol 33 No3 September 2010 p.140-148