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Increased Environmental Awareness of Flooding through Public Activation Using Geographic Information System (GIS) and Community Video

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This research was devoted to discover the roles of SIG outputs and community empowerment through community video to increase environmental awareness of disastrous flood. 60 research participants or subjects from 14 to 17 years old were representatives of 10 high schools in Sintang city and resided along Kapuas and Melawi riverbanks. The approach used in this research was action research – a measurement employing environmental awareness scales in two aspects, they were, attitudes and intentions during pre- and post- community video workshops on both control and experiment groups. The t-Test results during pre-test reflected the equivalence between control and experiment groups (attitudes .233 < .05 and intentions .136 < .05,). The Anova results confirmed that intervention was significantly influential towards the increased environmental awareness on experiment group (attitudes *F*=37.543, *R*-square .493 and intentions *F*=31.589, *R*-square .450).

Keywords: environmental awareness, community video, SIG outputs, community empowerment

Penelitian ini bertujuan untuk mengetahui peranan output SIG dan pemberdayaan masyarakat melalui video komunitas dalam peningkatan kesadaran lingkungan terhadap bencana banjir. Partisipan penelitian sebanyak 60 subjek berumur 14-17 tahun merupakan perwakilan siswa dari 10 sekolah menengah atas di kota Sintang dan bertempat tinggal di pinggir sungai Kapuas dan Melawi. Pendekatan penelitian menggunakan pendekatan *action research*, pengukuran menggunakan skala kesadaran lingkungan dengan mengukur dua aspek yakni sikap dan keinginan/niat dan dilakukan sebelum dan sesudah workshop video komunitas pada kelompok kontrol dan kelompok eksperimen. Hasil t-Test saat pretest menunjukkan kesetaraan antara kelompok kontrol dan eksperimen (sikap .233 < .05 dan keinginan .136 < .05,). Hasil Anova menunjukkan intervensi memiliki pengaruh yang signifikan terhadap peningkatan kesadaran lingkungan pada kelompok eksperimen (sikap *F*=37.543, *R*-square .493 dan keinginan *F*=31.589, *R*-square .450).

Kata kunci: kesadaran lingkungan, video komunitas, output SIG, pemberdayaan masyarakat.

Sintang region, based on its history, began with the settlement on the outskirts alongside the river (Fienieg, 2008). As the city is located at the confluence of two prominent rivers, namely, Kapuas and Melawi; and is filled with densely populated settlements located alongside the riverbanks, Sintang has been one of the cities vulnerable to catastrophic flooding (Koestoer et al., 2001; Fienieg, 2008; Jumadi, 2009). Its community has been accustomed to floods and considered it as normal. Therefore, most people call Sintang as high tide city (Fienieg, 2008).

In recent years flood has been unavoidable and the one badly affected is the communities who reside by the riverbanks or beyond rather than those who reside in houseboats. The increasing intensity of floods is caused by the declining ability of the watershed, increasing population on residential riverbanks areas. In addition, the increased number of transferred lands in the upstream catchment area cause soiled areas to decrease and this causes all water to flow to the river and is unable to be absorbed by the soil. Further, siltation in the river due to waste, sand mining of gold also leads to the decreased capacity of the river (Maryono, 2005).

The increased density of settlement on the banks of

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the river gradually leads to a natural river that supposedly have the morphological stability and hydraulic retention components (retention cliffs, basic, and the river channel as well as erosion, sedimentation and flooding) can no longer be minimized or controlled by the river itself (Princess, 2008; Maryono, 2005). Due to the increased frequency of flooding and the difficulty of knowing the times of the tide, flooding becomes a problem for those who live on the edge of the river, especially in the lanting household in withstanding tidal currents and wave when the floods and the health problems increase (diarrhea and vomiting, itching to typhoid).

These conditions do not lead to increased ability of communities to adapt to changes in geographical conditions; it is seen from the increasing number of people who build homes with low and very tight construction on the banks of the river. Lanting houses that are no longer inhabited were left alone until it becomes waste that is ready to float at any time and could hit another home in the event of flooding.

Low awareness of the flood is still visible from the many people who think that flood is not a disaster to be aware of, instead it is a part of their daily lives. Community behaviors are also likely to be seen as uncaring of the environment by making the river as a latrine, drainage for household trash and trading activities of society, and, eventually, sand and gold mining.

Another environmental issue that occurred in Kapuas riverbank communities, Sintang city, is that not all of the communities consist of natives who have settled on the outskirts of the river. In fact, most of them have spent their entire lives on the lanting house (Fienieg, 2008). This leads the processes of adaptation to life on the edge of the river, to merge with the culture and customs.

Based on the issues above, it is then essential to increase awareness of the environment against the floods to those living on the edge of the river, as an effort to improve the quality of life and preservation of rivers and Melawi Kapuas by increasing public knowledge in the geographical conditions of their area in association with flooding and processes involving the communities themselves to explore and transform their knowledge in dealing with flooding in accordance with their own ways that have faded.

Therefore, researchers developed intervention programs to increase environmental awareness of floods on society with the use of output Geographic Information Systems (GIS) and community video approach. In line with the opinion of Mastur (2004) increasing environmental awareness needs to involve cognitive and affective processes. Output GIS plays a role in cognitive factors, namely an increase in knowledge about the flooding which consists of knowledge (knowledge), the impact/ risk and prevention of flood disasters (preparedness) associated with the geographical conditions of the community itself (Mastur, 2004; Jumadi, 2009). One way to increase awareness is to change one's own knowledge about something (Duval & Lalwani, 1999; Silvia & Duval, 2001). Increased knowledge of flood risk can motivate the public in seeking information regarding precautions and minimize the risk of disaster (Griffin et al., 2008).

GIS through community video output as a form of intervention is a tool used to explain to the public about the flood and their geographical conditions. GIS is designed into a visual form that made up the unity of visual and easily understood by the visionaries (Maantay & Ziegler, 2006). GIS output has the advantage to visualize the results of a representative, from the analysis of complex data (Kopinak & Barajas, 2002). Visualization of a region will facilitate in building awareness of changes in environmental conditions that cause potential environmental disaster in the community itself (Kopinak & Barajas, 2002). GIS output function in cognition changes, is in line with the organizing principles of Gestalt theory that visualization can affect perception, especially in terms of proximity, continuity, similarity, closure and symmetry (Atkinson et al., 1996). Change in perception in this regard is in line with the Theory of Reasoned Action (TRA) or reasoned action developed by Fishbein and Ajzen (1980) which states that a person's perception is very instrumental in changing attitudes which refer to behavior change.

Affective process is one factor that must be achieved in order to increase environmental awareness of flooding and this is because, in promoting awareness**,** cognitive factors are not enough unless there are affective changes towards a certain goal (Mastur, 2004; Pond, 2007). Affective element is associated with the emotional feeling towards the impact of environmental degradation (Pond, 2007). Video communities in this study are useful as an approach that can involve emotional elements because this approach involves the community as a whole in every community video-making process (Atmaja, Aziz & Topatimasang, 2007).

Video community production is a participatory approach that focuses on the stages of making the video itself in order to document problems and identify solutions of the problems faced by the community (Gregory & Caldwell, 2005; Atmaja, Aziz & Topatimasang, 2007). These are in line with the opinions of Fazio and Newcomb (Worchel, Cooper & Goethals, 1991) who state that direct experience with attitude object is the most potential state in creating attitude changes.

Consciousness is associated with attention because it serves to identify the objects and events in the environment (Sternberg, 2006). Video can build a community of attention because it has an attraction for the community

and closeness between author, audience and the issues raised into the audio media. In addition to building attention, video community may also involve all elements that exist in the society because of the discussion process that could create opportunities to share across generation (Greogory & Caldwell, 2005). Several studies revealed that low levels of disaster mitigation program's success are due to the fact that community, as a stakeholder**,** participation is still lacking (Directorate of Water & Irrigation, 2009). It does not involve significant elements in society, as chairman of the customs, local religious leaders or people who have a role in the community (Lugo, 2001).

Involve elements of affective and cognitive intervention and community video GIS is expected to increase environmental awareness of flooding on rural communities in Sintang Kapuas River to improve the quality of life and maintain the riverside settlements and Melawi Kapuas as a characteristic of the city. The purpose of this study is to determine the level of Sintang public environmental awareness against floods and the effects of interventions and community video GIS in improving environmental awareness of Kapuas riverside communities in the Sintang district to test the video intervention and the GIS community as a form of mitigation programs in catastrophic flooding.

Environmental Awareness Toward Flood

Environmental awareness is associated with cognitive and affective functions (Mastur, 2004). Pond (2007) stated that individuals who are environmentally conscious people have a desire to know more about environmental issues. Environmental awareness of flood disasters can be started from people's understanding of flooding processes (Griffin et al., 2008). People who never earn the education on flooding will be more prepared to cope and deal with flooding because of the public to get information on the causes, risks and preventive action (Mishra & Suar, 2007).

Cognitive and affective factors are important factors within the process of environmental awareness and can be applied in the form of environmental education (Mastur, 2004; Timpakul, 2005 Pond, 2007). In line with the opinions of Clayton and Myers (2009) who stated that people who respect the environment start from the educational environment involving direct experience in nature since an early start. Environmental awareness of flooding is to be carried out in order to foster sensitivity to environmental issues such as the cause and impacts triggered by the disaster (Bakornas, 2007).

Community Video Function

Community video function is a video that is oriented on the process not the outcome, and it details the process of discussion as the initial information gathering needed in the community video production (Atmaja, Aziz, & Topatimasang, 2007). The approach using video media community is an effort to involve the public as well as to change public perception on self-oriented experience of seeing themselves in their behaviors and their views on the environment. Basic theory of this method is Gestalt psychology who states that humans are part of the environment (Roszak, 1995; Swasson, 1995; Reser, 1995).

Understanding the direct involvement of experienced people while watching the same thing together will change the perceptions and judgments about the environment, culture, disaster and what their involvement is in the process of natural self is. Based on those reasons, it shall expectedly spur the growth of environmental awareness and disaster. This is in line with the opinions of Low (1992), who stated that human engagement with the environment is not only emotionally and cognitively, but also culturally.

GIS Output and Community Empowerment through Community Video as Media Communities to Increase Environmental Awareness Flood

A study on the application of Gestalt principles of visual communication design media (Tanudjaja, 2005), asserted that a person or audience who see a work of visual design was based on psychological choice of stimulus sets they have and is strongly associated with personal relevance. Referring to one subsystem in GIS, GIS outputs are of three kinds, namely: mold in the form of a map or a table or graph paper printed with the media, film, or other media. The output will not be separated from the psychological set of the beholder. Output in the form of maps is the spatial images of the geographical environment, which is designed with the use of colors, and symbols that follow the principles of human psychological set (Maantay & Ziegler, 2006). Besides containing the elements of design, GIS is also equipped with data of tangible figures as geographical and geological data, such as rainfall data, land use and others.

This is in line with research conducted by Kopinak and Barajas (2002) that used GIS to change the policy to build the factory owners industrial waste disposal sites in residential areas. It is proved that the GIS is able to provide new information, and change the initial perception of the distance of a place, through a visual map that comes with supporting information in the form of count data. Based on the GIS in this study video interventions were considered to be a tool to conduct public education on environmental awareness.

Producing a video community, which focused on environmental issues can help the public understand his own environment and environmental problems that exist in the vicinity. In this case the video is used as a means of liaison or communication among citizens about the problems they face (Atmaja, Aziz, & Topatimasang, 2007). There are some important things to note in the video production community, namely 1). Determination of the theme, or story ideas, 2) Video production, 3) Video viewing, and 4), discussion.

All of those four elements were then processed into one integral part and the whole community were involved. In the process, people experience the process of learning which involves himself and his environment. This is in line with the Gestalt theory of learning known as full insight learning (Sobur, 2003). Full insight learning or field theory, are also often identified with the organismic, pattern, holistic, interegation, configuration, and closures (Sobur, 2003). Renewal information also is important in community video production. In line with the opinion of Ajzen and Fishbein (Worchel, Cooper & Goethals, 1991) which stated that an individual is usually quite rational and systematic in using the information provided in the vicinity. The ability of an individual in assessing and adopting information is important, so if the information was minimal and limited alternative choices lead to reduced information (Worchel, Cooper & Goethals, 1991).

The stages in the making of the community video involve individuals (attitude objects) directly and open opportunities for mutual discussion, add, and complete information about their environmental problems (Atmaja, Aziz, & Topatimasang, 2007; Variety, 2007).

Methods

This study uses action research approach (action research) which is a method that allows researchers and participants work together to analyze the social system with a view to change it (Moleong, 2005). This study involves various agencies in their implementation, especially in the implementation of interventions that are packed in the form of community video workshops. It consists of three stages namely: planning, implementation and reflection phase.

Measurement and Research Participants

Moderate intervention measurement method of this study used a nonrandomized method Pretest-Posttest Control Group Design. The study participants (31 people as experimental group and 29 people as control group) were high school students from 10 top levels in Sintang namely; SMAN 1, SMAN 2, SMAN 3, SMA Mujahideen, SMA Muhammadiyah, Panca Setya SMA, SMK Budi Luhur, Immanuel High School and Madrasah Aliyah Sintang Affairs Sintang. The experimental group subjects in each school sent three high school students except SMAN 3 which sent five students and the entire control group was from Panca Setya High School.

Research Procedure

The research steps consisted of planning stage, which reviewed previous studies and built a connection with selected sides within the research, which involved the government institutions, high schools within the Sintang district and local NGOs as partners. Then, problems are formulated and the forms of intervention are determined. Afterwards, the next stage is the stage of implementation, return to the formulation of the problem in the field together with the participants. Interventions were then granted through community video workshops and measurement. The final stage is the stage reflection through playing or showing films that have been made and discussing them.

Measurements were made before (pretest) and after (posttest) community video workshop that is conducted to pretest dated October 26, 2009 in the control group and 27 October 2009 in the experimental group and (posttest) on November 3, 2009 for experimental and control groups. The measurements used environmental awareness scale adapted from Arnhem (1994) by looking at changes in attitude (attitude) and desire (willingness) to engage in efforts to save the environment. Scale adapted to conditions in the field of research. After that the researchers provide intervention and community video GIS packaged in community video workshops held for 9 days (27 October - 3 November 2009) at the Museum Kapuas Kingdom Sintang West Kalimantan**.**

The intervention study consisted of: 1) the initial measurement (pretest), 2) community video workshops, 3) manipulation checks, 4) reflection, and 5) measurement after the workshop (posttest). The experimental group received community video interventions and GIS while the control group did not get treatment. At the workshop, participants were divided into 3 study groups which were then given training to produce a video community on issues from the environment in which they lived. Each group was accompanied by a facilitator and the entire production process was performed by the subject of research, namely the determination of theme, plot preparation, image capture and editing.

Material Stimulus

The provision of interventions used multiple materials to build study participants' awareness of the material disasters and of environmental problems. As for the materials which consist of GIS maps, Sintang rainfall districts, transfer of land and vegetation maps and maps of the district administration. Sintang predicted the destruction of forests by the WWF. Audio-visual material was provided by showing a documentary about the destruction of forests in Kalimantan and its flooded area. In addition, each group got a manual of video-making community (Variety, 2007) and the modules of the city and the Flood Disaster Sintang compiled by the research team.

Results

Research result shows that there was no difference between environmental awareness, both through the attitude aspect on desire/willingness which was significant within the experimental and control groups before the video community workshop that involve SIG output and community education was done (see Table 1).

Thus, the control and experimental groups have equal environmental awareness, or no difference in the time prior to the intervention. Hypothesis testing was done to prove the effect of treatment on the experimental group. Hypothesis testing is done by Analysis of Variance (ANOVA).

Table 2 shows that both the attitude and willingness of both aspects revealed significant differences. Attitude had a value of *F*-count 37.543 with a probability of .000 < .05. *F*-table value at the 5% level with *df*1 = 3 and *df*2 = 116 is 2.683. Ha stated there was a difference between control and experimental groups on the attitude acceptable. Intervention and community video GIS contributed 49.3% effect on attitude change.

Willingness had an *F*-count 31.589 with a probability of .000 < .05. *F*-table value on the 5% level with *df1* = 3 and *df2* = 116 is 2.683. *F*-count value was larger than *F*-table, so Ha stated there was a difference between control and experimental groups' willingness accepted. Influence of a given intervention effect contributes 45.0% of *willingness* to change.

Table 1

Two Different Test Results Average Variable Attitude and Desire/Willingness of the Control Group and Experimental Groups During Pre-Test

Variable	Pre-test Average		*t score*	*p*
	Control	Experiment		
Attitude	69.276	72.677	1.206	.233
Willingness	54.793	59.097	1.511	.136

Table 2

Test Results of ANOVA on Attitude and Desire/ Willingness

Variable	*F-score*	*Probability*	*R-square*
Attitude	37.543	.000	.493
Willingness	31.589	.000	.450

Discussion

The results of the environmental awareness scale on attitude and willingness supported the hypothesis proposed in this research which stated that community video and GIS approach are effective in increasing the environmental awareness of flooding in rural communities and Melawi Kapuas river in Sintang city. The analysis showed a mean difference of significant environmental awareness among the group given in the video intervention and the GIS community with a group that did not get the intervention by taking measurements before and after the intervention. The difference meant that the intervention of community video given to the experimental groups was effective in increasing community awareness of flooding.

Cognitive factors of attitude variables is divided into three aspects namely, the individual opinion of the importance of environmental preservation which is called aspect 1, the ability to recognize environmental problems that occur as the second aspect, and opinions about the importance of finding solutions to environmental problems that occur as aspect 3. From the average of these three aspects the highest change in one aspect which is equal to 9.0 was found before the intervention for 24.52 increased to 33.52 after intervention on a group experiment. The increase of willingness factor refers to the behavioral changes that followed a change in attitude in the experimental group through the desire to behave friendly to the environment as a result of increased environmental awareness of communities to flooding. This was the people's desire to involve them-selves in the efforts to rescue the environment, such as joining environmental organizations and behaving friendly to the environment to minimize environmental problems, including floods and improved quality of life itself for present and future generations .

Other factors (50.7%) caused changes in attitude and 55.0% of other factors influenced the willingness in the

change variables in addition to the intervention of community environmental awareness and receiving community video GIS output. Changes in an individual consciousness of something is a complex and interlinked with both cognitively and affectively (Sternberg, 2006). Attitude changes in a complex situation make a number of attitudes become relevant to the situation. The factors are conditions or situations that need attention in attitude change (Worchel, Cooper & Goethals, 1991). Similarly, willingness in the change which refers to forms of behavior change also through things?? that are complex and interlinked. Factors that influence the environmental awareness are among others, perception, information, attention, level of knowledge, and motivation (Pond, 2007; Mastur, 2004).

Participants also showed that GIS was used to predict the potential disasters in their area including rainfall maps, closures and land vegetation and pre-diction of forest damage from years 1900 - 2010 and it proves to be very effective for building awareness of flood risk.

> "I was terrified (scared) to see the vast damage done to our forests. We used to have lots of forests and the rainfall in West Kalimantan was usually high and still we did not feel scared of flooding. Yet, today, since we live close to the river, an explanation of a GIS map makes me both feel scared and realize that we live close to disaster. "(FN, interview/FGD2; 1 November 2009).

Changes in the attitude of the research participants regarding behaviors that can cause environmental damage (among others throwing trash into the river, silting up the river, damaging the the river sites) could be seen from apathy unto becoming more concerned. These changes are caused by the intervention of the community video package that gives participants the opportunity to conduct research directly by deepening problems in the field in order to create a community video in the form of a documentary film.

> "... When I got off the ground, while recording images of waste trench, I was sad to see it, while taking pictures of community activities in the river, I realized that it turned out that we depend completely on the river, what more when taking pictures of mining, sad to see her first ... at the sight of garbage, trash man I used to be but now it feels unusual, sad to see this environment "(FNG, interview FGD 2: 1 November 2009)

One of the things that can increase awareness is changes in one's attitudes or judgments about something (Sternberg, 2006). This assessment process is closely associated with the perception (Worchel, Cooper & Goethals, 1991). Changes in perception or appraisal are associated with increased knowledge or new information that refers to changes in consciousness. One way of raising awareness is to change one's knowledge about something (Duval & Lawani, 1999; Silvia & Duval, 2001). In the intervention and community video GIS, increased knowledge gained in the first day of the intervention through the material containing the cause of the flooding, the risk and impact on the city Sintang. This material aims to provide information on how close the flood disaster are with the life of the community in the environment. The material also builds awareness of flood risk through the help of visual media in the form of GIS output maps.

Approach to GIS is a tool that is used to describe the subject of geographical research on the relationship with the risk of catastrophic flooding through visual forms that make up a unity of visual and easily understood. Visualization area will facilitate building awareness of changes in environmental conditions that could potentially cause environmental disasters in society (Kopinak & Barajas, 2002). Sternberg (2006) stated that many studies showed most people are less able to recognize the changes that occurred in the environment. This is related to attention or concern, through a visual GIS map display. The subjects were led to build attention in the changes of environmental conditions such as transformation of forest land issues into plantations or settlements and maps Sintang rainfall in the the district which is one of the causes of the disaster the flood.

Through the map, the subject of research built attention toward the environmental changes more easily due to the GIS that has the advantage to visualize the representative results of the complicated data analysis (Kopinak & Barajas, 2002). Visualization in the form of images consisting of color and shape plays important roles important in distinguishing the characteristics of geographic data. This is in line with the principles of Gestalt organization, that is humans have tendencies to organize stimuli into separate groupings based in the proximity (closeness), continuity of similarity (similarity), closure (introversion) and symmetry (asymmetrical) (Atkinson et al., 1996; Jarvis, 2009).

Provision of SIG can build awareness of flood risk. Increased knowledge of flood risk can motivate the public in seeking information regarding precautions and minimize the risk of disaster (Griffin et al, 2008). Changes in willingness aspect refer more to the conation or behavioral consistency of the attitude which has undergone changes. In this respect, one becomes more aware of environmental problems, the importance of environmental preservation and the importance of finding solutions or preventive measures on the issues that cause environmental damage in this disaster the flood.

Changes in behavior are related to the process of community video production itself. Each process in the

community video production involves research subjects directly in the problems that exist in the environment. Changes in behavior is closely associated with the changes in attitude (Fishbein & Ajzen in Aswar, 2003), so the whole set of interventions and community video GIS involves three things namely cognition, affection, and conation. Personal experience and direct involvement with environmental issues occur when making the video, the community is the state of most potential for change in attitudes on environmental issues in the vicinity. This is in line with the theory of Fazio (Worchel, Cooper & Goethals, 1991) which stated that the direct experience of more help guide one's behavior in line with his attitude.

Intervention and community video GIS ouput on the subject tried to give an opportunity to further explore and identify the environmental conditions both in historical, cultural and communal habits through the learning process that involves self, community and environment. This is in line with the opinion of Atmaja, Aziz & Topatimasang (2007) which stated that one of the video functions is as reflective media for the author himself.

Exposure suggests a role in increasing awareness of environmental interventions to flooding because it has been able to increase sensitivity to environmental issues at the riversides of Kapuas and Melawi, and the desire to participate in efforts to save the environment. It can be seen through an average increase of 20.93 after collecting and calculating the willingness of the intervention. This is evident from the decision of all study participants' in the the experimental group who agreed to form an organization named community video Sintang 2009 as a nonprofit organization that focuses on the environmental issues. Also, in FGD, 90% of the subjects stated that saving the environment should start from ourselves.

Pond (2007) stated that individuals who are environmentally conscious have a desire to know more environmental issues and a commitment to save environment for future generations. Besides the reflection stage, showing/ playing the work of participants supported the emergence of motivation to maintain behavior because of the emergence of feeling being appreciated and when they saw traces of the story that was made by themselves, they were experiencing an insight so that changes in attitudes were in line with the internal environmental awareness.

Based on the exposure of the above community video interventions, GIS can be used to mitigate flood in the communities residing on the outskirts of a river or a location prone to flooding, in order to increase environmental awareness, which refers to changes in behavior that is more environmental friendly. This will, thus, minimize the potential occurrence of floods. The involvement of the critical elements in making the community video such as cultural, chairman of the customs, RT or RW and government and society itself can increase the success of mitigation programs.

Conclusion

The results showed that the use of GIS outputs and community empowerment through video community is effective in improving the environmental awareness of flooding by increasing the average changes in attitude and willingness after a given intervention. Community video intervention and the use of GIS outputs involves cognitive, affective and conative factors in raising environmental awareness, changes in perceptions and increased attention in the environmental issues as well as direct experience in environmental issues can increase awareness of disaster risk refers to the preventive measures.

Increased environmental awareness through video community intervention occurs because the stages in the interventions that encourage subjects to focus more on problems and solutions as well as preventive measures through the processes that reflective learning refers to the insight. The higher the level of knowledge about environmental problems, environmental conditions that is a potential for disaster, the higher consciousness of one's environment so that the desire to behave friendly to the environment is also higher. Intervention and video community GIS can be used as a form of flood mitigation in the communities residing in the outskirts of a river or a location prone to flooding.

Recommendation

From the results of research, discussion and conclusions that have been previously described above, the authors propose the following suggestions: (1) SIG Output function not only as spatial information, but also as a tool that can lead to a change in attitude. There should be more research that examines the influence of GIS output to changes in behavior; (2) Video community interventions can also be applied to conservation efforts and cultural nature, because interventions involve the community and the environment as a whole in the video-making process; (3) Products from video communities can be used to further discussions in the community and relevant government, (4) The use of GIS output and empowerment through video community will be very effective in the mitigation process if the GIS output and empowerment are used as environmentally community-based education programs and involve local government and local NGOs. This will form the awareness of flood disasters globally.

References

Arhem, C. (1994). *Environment Awareness Scale*. Retrieved from http//www.sauves-la-terre.org

Azwar, S. (2003). *Sikap manusia: Teori dan pengukurannya*. Yogyakarta: Pustaka Pelajar.

Atkinson, L. R., Atkinson, C. R., & Hilgard, R. (1996). *Pengantar psikologi*. (A. Dharma & M. Adryanto, Trans.) Jakarta: Penerbit Erlangga.

Atmaja, Y., Aziz A., & Topatimasang, R. (2007). *Video komunitas*. Yogyakarta: Insist.

Bakornas. (2007). *Pengenalan karakteristik bencana dan upaya mitigasinya di Indonesia (2nd ed.).* Jakarta: Pelaksana Harian Bakornas PB.

Clayton, S., & Myers, G. (2009). *Conservation psychology: Understanding and promoting human care for natur*e. USA: Wiley-Blackwell.

Direktorat Pengairan & Irigasi. (2009). *Kebijakan penang-gulangan banjir di Indonesia*. Jakarta: Departemen pekerjaan umum direktorat jenderal pengairan.

Duval, S. T., & Lalwani, N. (1999). Objective self-awareness and causal attribution for self-standard discrepancies: Changing self or changing standards of correctness. *Personality and Social Psychology Bulletin, 25*(10), 1220-1229.

Fienieg, A. (2008). *Sejarah Sintang - The history of Sintang*. (N. Sagita,Trans.) Amsterdam: Tropenmuseum.

Fishbein, M., & Ajzen, I. (1980). *Understanding attitudes and predicting social behavior*. Englewood Cliffs, NJ: Prentice-Hall.

Gregory, S., & Caldwell, G. (2005). *Video for change*. London: Pluto Press.

Grffin, R. J., Yang, Z, Huurne, T. E., Boerner, F., Ortiz, S., & Donwoody, S. (2008). After flood: Anger, attribution, and the seeking of information. *Science Communication, 29*(3), 285-315.

Jarvis, M. (2009). *Teori-teori psikologi, pendekatan modern untuk memahami perilaku, perasaan & pikiran manusia* (3rd ed.). Bandung: Nusa Media.

Jumadi, A. (2009). *Waspada, empat krisis jangka panjang mengancam*. Retrieved from http://www. borneotribune. com.

Koestoer, H, R., Tambunan, P, R., Budianto, T, H., & Sobirin. (2001). *Dimensi keruangan kota: Teori dan kasus*. Jakarta: UI-Press.

Kopinak, K., & Barajas, D. R. (2002). Too close to comfort? The proximity of industrial hazardous wastes to local population in Tijuana, Baja California. *Journal of Environment & Development, 11*(3), 215-246.

Lugo-Perez, M. (2001). The mass and disaster awareness in Puerto Rico: A case study of the floods in Barrio Tortugo. *Organization & Environment, 14* (01), 55-73.

Low, S.M. (1992). Symbolic ties that bind: place attachment in the plaza. *Human Behavior and Environment Advances in Theory and Research, 12*, 165-185.

Maantay, J., & Ziegler, J. (2006). *GIS for The Urban Environment*. California: Esri Pers.

Mastur, Z. (2004). *Model pembelajaran lingkungan*. Retrieved from http://www.suara merdeka.com

Maryono, A. (2005). *Menangani banjir, kekeringan, dan lingkungan*. Yogyakarta: Gadjah Mada University Press.

Moleong, J. L. (2005). *Metodologi penelitian kualitatif*. Bandung: Remaja Rosdakarya.

Mishra, S., & Suar, D. (2007). Do people learn from disaster cognition and preparedness?. *Psychology & Developing societies, 19* (2), 143-159.

Putri, D. I. (2008). *Menata Infrastruktur Pemukiman Bantaran*. Retrieved from http://groups.com/group/ /message/35445.

Pond, J. J. (2007). *The Concept of Environmental Awareness*. Retrieved from http://www.hike-2000.com/p2.htm .

Ragam. (2007). *Membuat Video Kampung*. Jakarta: Ragam Media Network.

Reser, J.F. (1995). Whither environmental psychology? The transpersonal ecopsychology crossroads. *Journal of Environmental Psychology, 15* (3), 235-257.

Roszak, T. (1995). The greening of psychology: Exploring the echological unconscious. *Gestalt Journal, 18*(1), 9-46.

Silvia J.T., & Duval T, S. (2001). Objective self-awareness theory: Recent progress and enduring problems. *Personality and Social Psychology Review, 5*(3), 230-241.

Sternberg, J. R. (2006). *Cognitive psychology* (4th ed.). USA: Thomson Wadsworth.

Sobur, A. (2003). *Psikologi umum*. Bandung: Pustaka Setia.

Swasson, J.L. (1995). The call for Gestalt's contribution to ecopsychology: Figuring in the environmental field. *Gestalt Journal, 18* (1) 47-85.

Tanudjaja, B. B. (2005). Aplikasi prinsip Gestalt pada media desain komunikasi visual. *Nirwana, 7* (1), 56-66.

Timpakul. (2005). *Pendidikan lingkungan hidup: Bukan untuk pembebanan bagi siswa*. Retrieved from http://timpakul.hijaubiru.org/plh-4html

Worchel, S., Cooper, J., & Goethals, R. G. (1991). *Understanding social psychology*. USA: Brooks/ Cole Publishing Company.