Local knowledge: Empirical Fact to Develop Community Based Disaster Risk Management Concept for Community Resilience at Mangkang Kulon Village, Semarang City

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Abstract. Local knowledge in disaster management should not be neglected in developing community resilience. The circular relation between humans and their living habitat and community social relation have developed the local knowledge namely specialized knowledge, shared knowledge, and common knowledge. Its correlation with community-based disaster management has become an important discussion specially to answer can local knowledge underlie community-based disaster risk reduction concept development? To answer this question, this research used mix-method. Interview and crosstab method for 73 respondents with 90% trust rate were used to determine the correlation between local knowledge and community characteristics. This research found out that shared knowledge dominated community local knowledge (77%). While common knowledge and specialized knowledge were sequentially 8% and 15%. The high score of shared value (77%) indicated that local knowledge was occurred in household level and not yet indicated in community level. Shared knowledge was found in 3 phases of the resilient community in dealing with disaster, namely mitigation, emergency response, and recovery phase. This research, therefore, has opened a new scientific discussion on the self-help concept in community-help concept in CBDRM concept development in Indonesia.

Keywords: Local Knowledge, CBDRM, Flood, Community Resilience

1. Introduction

The international attention on local knowledge in overcome decreasing disaster risk still increasing [1]. The first principle that have be noticed are community local knowledge always evolving and often known by local ecological knowledge where that can be used to describing relation between knowledge with environment surround it [2]. Then Colfer and Colchester [3] explaining that local knowledge divided into two type which is scientific knowledge and unscientific knowledge. The scientific knowledge is based on everything thing that can be proved by scientific, while the unscientific knowledge based on everything that cannot be proved by scientific. Unscientific knowledge often considered not to important enough for some people, but sometimes unscientific knowledge have a strong power to be hold and to be applicate by community. The community itself developing knowledge that will build guidelines based on past experiences [4]. That been done by earlier generation through "try and error". This is happened by none of modern technology at that time. Every guideline and that knowledge are given by generation through generation [5] and sometimes some knowledge had a religion influence to protect sustainability of knowledge itself.

Therefore, the community are strongly implemented unscientific local knowledge. The knowledge is not necessarily accurate on science but can be created as input for guideline.

The unscientific local knowledge containing a wide number of live guidelines, manners etc [6]. Some of guideline containing disaster management that often happen in the local settlement. Natural disaster that happen in each settlement have a different kind and intensity. The knowledge about disaster management has been considered very important to understand by local community and valued so priceless to share among other community [7,8]. The lesson through experience in overcome disaster can be made as references to other community that facing the same condition. Therefore, they can build a resilience community in encounter local disaster. Local knowledge in general already discussed in the community based disaster risk management guideline since 1996 until 1998 [9]. The term of local knowledge and community based disaster risk management has been developed by international activist. If in Indonesia the terms are known since one of figure in Komunitas Pecinta Alam dan Pemerhati Lingkungan (Kappala) Indonesia which is Dr. Eko Teguh Paripurno also researcher from UPN Veteran Yogyakarta publishing the Participatory Rural Appraisal (PRA) book. Since then arise much of movement that actively have a role in overcome disaster, for example when Nusa Tenggara Timur province in 1998 hit by drought when El-Nino comes. In the beginning, this activity led by Pusat Informasi Rawan Pangan (PIRP) until in the 1999 changing name into Forum Kesiapan dan Penanggulangan Bencana (FKPB) which can do discourse about community based disaster risk management. Since 1998 until 2000 FKPB followed training about community based disaster risk management in Bangkok, Thailand to infiltrate any guide and new knowledge that can be applied in Indonesia. Until 2000 the training is held in Nusa Tenggara Timur by Oxfam GB, since then community based disaster risk management in all around Indonesia are really developed. Then appear regulation about disaster management enforcement within 2007 Indonesian law.

Every disaster management practice based on local knowledge keep on developing and becoming input to construct resilience community [10] in all around Indonesia. One of community location that shown uniqueness in facing flood is Mangkang Kulon Village. Based on previous survey has been found nets that tied on bamboo piece and installed around embankment. This is used for avoiding fishes and shrimps go out from embankment when flood came. Beside every villager also built fence wall and embankment (short stairs from cement) in their yard for preventing floods overflow crashing their house directly that came from river in front their settlement. For overcome disaster villager built barrier (wall in the riverbank) by their own also pile up sand sac for unprotected riverbank. These disaster management practices are a real applied community local knowledge that in enhanced by technology to adapt from flood [11].

The Mangkang Kulon Village is in coastal area of Semarang City and be passed by Plumbon river. The Plumbon river sometimes unable to accommodate overflow from upstream that can cause flood in Mangkang Kulon Village. Highest intensity of rain, wrong river management, also behavior of throw garbage into river became one of reason why flood occur in that area. Mangkang Kulon Village is one of region that have been hit by very bad flood in the Semarang city history [12]. The big flood happened in 2009. After that flood happened again in 2010 and make the wall of the bank in that area broken down. Flood happened again in 2014 and resulting one casualty. Then flood came also in 2015 and drowning the rice field villager about 80 cm high. In the next year in June 2016 flood happened really bad because of the big force that can break down the embankment about 15 meters in length, also repeal the plants along the river. With these events and a lot of loss that have been caused by flood, we need to research the knowledge of Mangkang Kulon villager in facing disaster also disaster management practices starting with mitigation, preparedness, response, until recovering. From every knowledge and practice, we need to know how wide it was being spread in this community for identifying the type of local knowledge. Identifying the type of local knowledge is very important role to know how resilience the community in dealing with flood [4] and how to reduce social vulnerability [13]. If the knowledge and practice in 4 phase of resilience community just been known by small of people in the community means that those people in the community still far from resilience. While the

knowledge or practice in 4 phase of resilience community known by almost event all the people in community then that is mean they can be resilience community. That is explanation that the conclusion of this research is important as input for community or stakeholder for more strongly managing the flood in the future.

2. Research Method

The approach that has been used in this research is mix method because using two analysis which are qualitative and quantitative. Mix method in this research include into sequential mix method with using qualitative interview and then followed with quantitative to make a result [14]. The qualitative method in this research include as narrative qualitative research, which is research strategy that investigating life each respondent and asking someone or group of people to tell their story live, then the researcher can be retelling information in narration form. While quantitative method is included as survey to resuming opinion, manner, or trend quantitatively some population using questionnaire [15].

3. Result and Discussion

3.1. The Relation Between 4 Phase of Resilience Community and Respondent Background

Based on accumulation of answers that has been given by respondents makes researcher want to know relation between respondent answer (25 resilience community variables) and background each respondent (respondent background variables). The respondent background is determined by 6 variables, which are gender, role in community, age, location of stay, length of stay, and last education. To looking for relation between two variable we are using IBM SPSS Statistics application through Crosstabs analysis. In this analysis, we need hypothesis and decision-making base for finding 4 phase of resilience community variable that have relation with respondent background variable. The hypothesis in this research like down below.

H_o : If there is no relation between 4 phase of resilience community variables with 6 respondent background variables

H_i : If there is relation between 4 phase of resilience community variables with 6 respondent background variables

While for decision making we are using probability where can be seen in third output table (Chi-Square test) and Asymp. Sig column which is mean:

If probability > 0,05, then H_o will accepted

If probability < 0,05, then H_i will unaccepted

The score 0,05 as base of decision making in probability obtained from significance level (α) 5% with degree of freedom (Df) 2 and there is Asymp.Sig table that containing result of crosstabs analysis between two variables in down below.

Based on table 1, we can know that yellow column has Asymp. Sig value in the below of lambda value (α) about 0,05. Which H_o is unaccepted that have mean there is a relation between two variables. From the result of analysis there is found 16 variables from 25 overall resilience community variable that have relation with 6 respondent background variables. From 16 variables, there are 11 variable that have relation with role in community variable, which the most dominant relation between these two groups variables and giving mean that role in the community really determine people acknowledge about resilience community to overcome the flood. Followed by 8 resilience community variable which have a relation with length of stay variable, then 5 resilience community variable which have a relation with age variable, then 4 resilience community that have a relation with gender variable, also 2 different resilience community variable that have a relation with location of stay and last education variable in each.

Table 1. Relation of 4 phase of resilience community variables with 6 respondent background variables

Resilience Community Variable	Asymp. Sig Value / Respondent Background Variables					
	Gender	Role in Community	Age	Location of stay	Lenght of stay	Last education
Mitigation Phase						
Flood definition by community	0.022	0.515	0.083	0.249	0.419	0.004
Flood season	0.414	0.204	0.245	0.627	0.022	0.747
Save area	0.026	0.863	0	0.697	0.046	0.648
Flood cause	0.148	0	0.524	0.765	0.315	0.771
Effect of flood	0.63	0.107	0.006	0.271	0.261	0.878
Flood history	0.708	0.001	0.001	0.564	0	0.552
Natural sign before flood came	0.875	0.014	0	0.387	0.752	0.65
Transmission of flood information system	0.006	0	0.217	0	0.74	0.851
Act after knowing flood came	0.703	0	0.511	0.835	0.794	0.403
Element who concern in avoid the flood	0.243	0.007	0.961	0.594	0.714	0.489
Element who responsible in managing river environment	0.606	0	0.235	0.602	0.148	0.69
Element who concern in overcome the flood	0.601	0	0.317	0.336	0.281	0.119
Preparedness Phase						
Preparedness action in facing the flood	0.193	0	0.406	0.507	0.227	0.557
Respond Phase						
Human requirement while flood hit	0.702	0.003	0.084	0.72	0.03	0.92
Recovery Phase						
Recovery	0.024	0	0.462	0.57	0.049	0.707
Rebuild	0.41	0.198	0.021	0.491	0.002	0.27

3.2. The 3 Type of Community Local Knowledge

Based on accumulation answers from respondents from four community association, we found 3 kind of local knowledge that evolve surround community which are common knowledge, shared knowledge and specialized knowledge (see figure 1). The common knowledge collected from 139

respondent answer which have percentage about 8% from all answer. Then shared knowledge built by 1.381 respondent answer and have percentage about 77%. The third is specialized knowledge collected by 264 respondent answer and have percentage about 15%. So shared knowledge become a dominant knowledge that have been spread around Mangkang Kulon community.
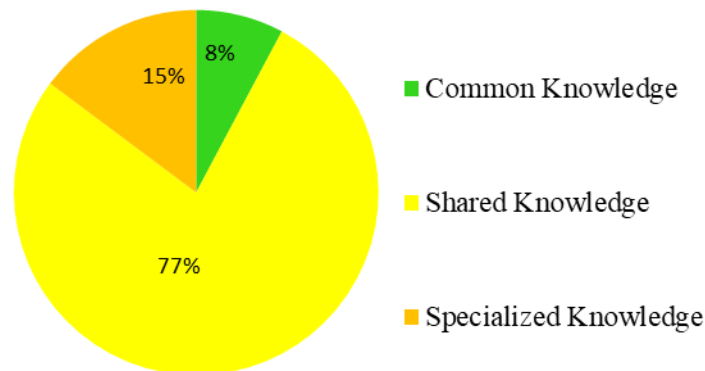

Figure 1. Diagram of Percentage 3 types of community local knowledge

3.3. Common Knowledge

The common knowledge is held by most people in the community [16]. Based from the definition researcher itself divided group of those 3 types of knowledge from accumulation respondent and which indicator that had 66 until 73 respondent answer (91%-100%) makes that variable where the indicator belongs include as common knowledge. Therefore, we found 2 variable that include in the common knowledge which are process when flood comes and element who responsible in monitoring flood when it is comes. Those two variables are included in mitigation phase.

3.4. Shared Knowledge

The shared knowledge is held by many, but not all, community members [16]. Therefore, researcher decided the accumulation of respondents answer in one indicator that have length about 19 until 65 respondents answer (26%-90%) with no other indicator has more than 65 respondents answer in the same variable, makes the variable include as shared knowledge. Then we found 17 variable that include as shared knowledge. Those 17 variables in the 3 from 4 phase of resilience community which is mitigation, respond and recovery. The Shared knowledge become the most dominant and make statement that Mangkang Kulon villager have a middle stage in knowing the disaster management, also make a good step to build community that can be resilience in deal with disaster especially flood.

3.5. Specialized Knowledge

The Specialized knowledge is held by a few people in the community [16]. So, the researcher divided the accumulation of respondents answer in one indicator that have length about 1 until 18 respondents answer (1%-25%) with no other indicator has more than 18 respondents answer in the same variable, makes the variable include as shared knowledge. Therefore, we found 2 variable that include as specialized knowledge which are natural sign before flood came and preparedness in facing the flood. Those variables are included in 2 phase of resilience community that which is mitigation and preparedness phase. After knowing those result data, we made following a vertical bar diagram from the least answer until the lots answer each variable in down below:
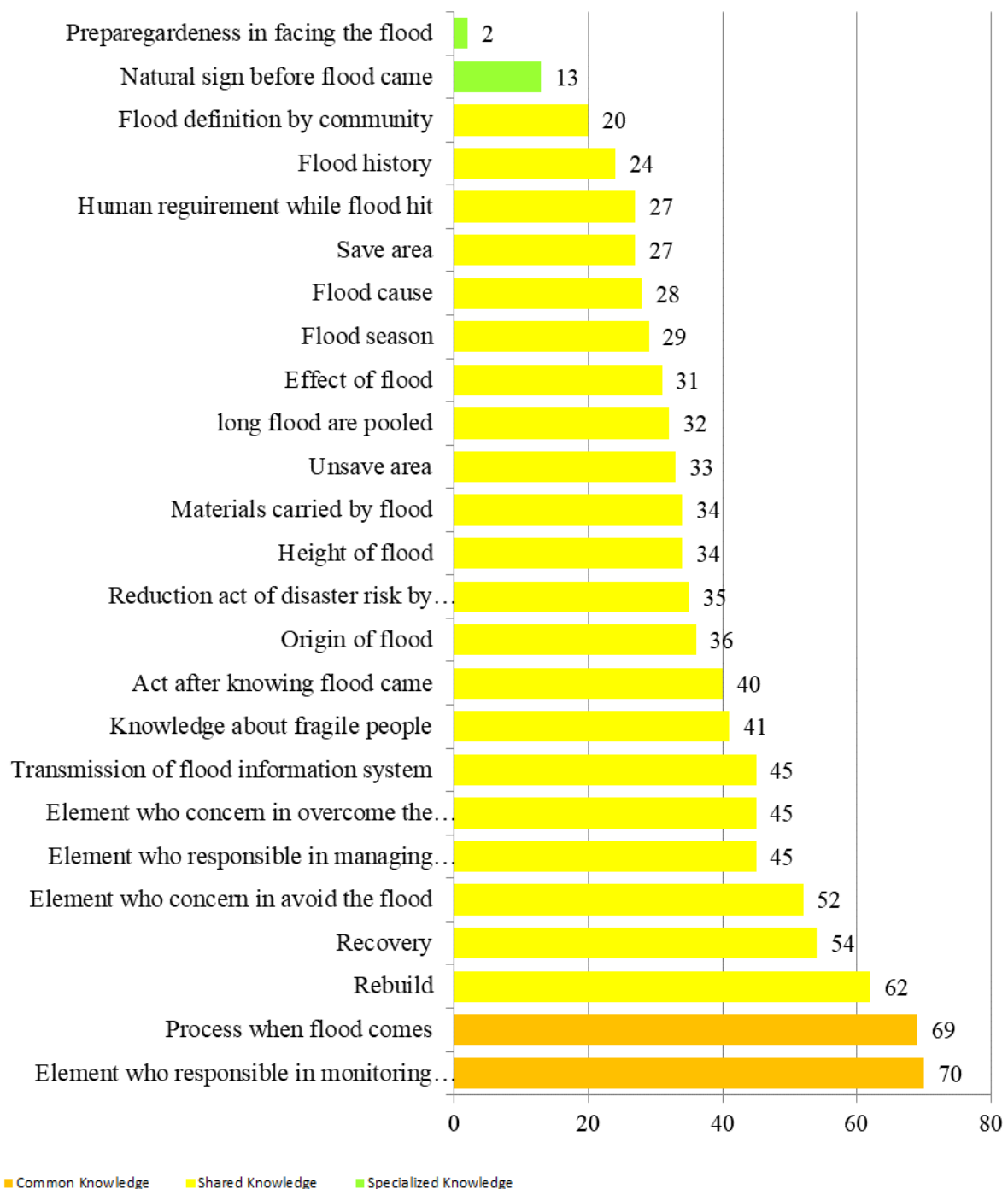
Figure 2. Variables Stage of 4 Resilience Community Phase In 3 Local Knowledge Type of Mangkang Kulon Community Diagram

In the figure 1, the finding was distinguishing the variables into 3 based on 3 types of local knowledge, which the green is specialized knowledge, the yellow is shared knowledge and the orange is common knowledge. From that diagram, we knew that the most dominant local knowledge that had by Mangkang Kulon community is shared knowledge. Followed by common knowledge and specialized knowledge.
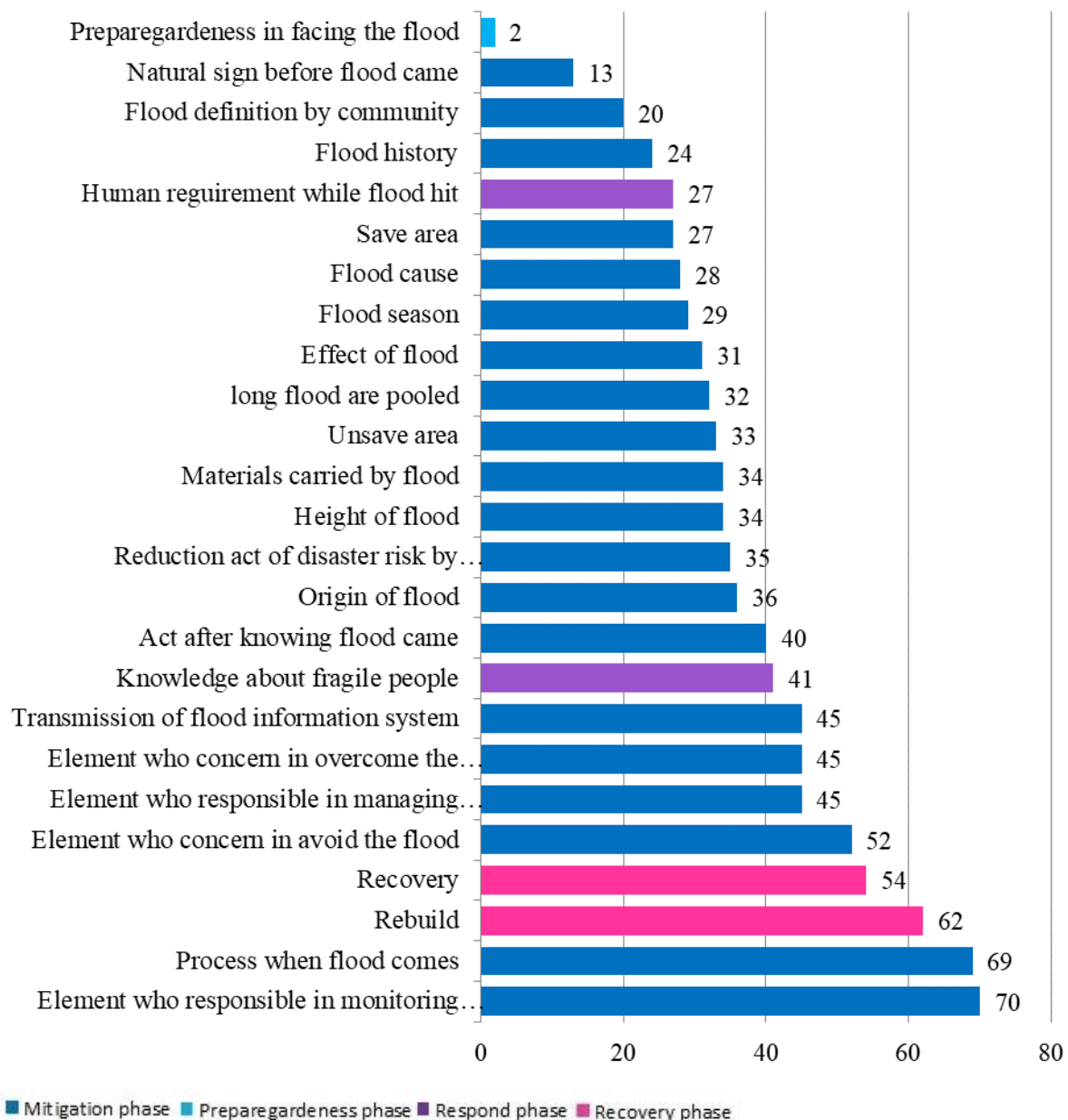
Figure 3. Variables Stage of 4 Resilience Community Phase of Mangkang Kulon Community Diagram

In figure 2, we are distinguishing the variables into 4 phase of resilience community, which the dark blue is mitigation phase, the light blue is preparedness phase, the dark purple is respond phase and the light purple is recovery phase. If we correlate the second diagram with first diagram we know that all of variable that in respond and recovery phase belongs in shared knowledge, also with almost all of mitigation phase variables (see Figure 4). While one and only preparedness phase variable with one mitigation phase variable include as specialized knowledge. Then the last knowledge is common knowledge filled with two mitigation phase variables.

Those diagrams making a half pyramid form if we see them from big picture and that is giving an idea to researcher to make another diagram as conclusion. That diagram having a pyramid form which specialized knowledge in the top of pyramid and giving mean that just a small number of people of community who know certain knowledge. Therefore, specialized knowledge belongs in individual

stage based on 7 stage of resilience community by IFRC [17]. Then followed by shared knowledge in the middle of pyramid which giving meaning that a lot of people in the community knowing certain knowledge, therefore this type of knowledge spread among household and community and clear that this knowledge belongs to household and community stage based on 7 stage of resilience community. The last is common knowledge in the bottom of pyramid which giving meaning that knowledge known by all people in the community. Therefore, this knowledge belongs in the community and local association stage based on 7 stage of resilience community. Then this is the pyramid diagram that shown 3 types of local knowledge and it relation with 7 stage of resilience community in down below.
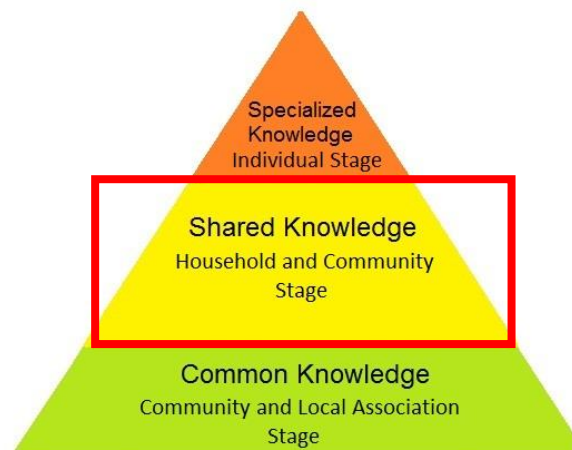

Figure 4. Type of Local Knowledge and the stage of Resilience Community of Mangkang Kulon Community Diagram

4. Conclusion

The dominant local knowledge that had by Mangkang Kulon community belongs to Shared knowledge which in the middle stage. Therefore, Mangkang Kulon community have a good asset to make a forward in build resilience community in overcome disaster, especially in flood. Although Mangkang Kulon community still have a weakness in preparedness phase. The community already have an awareness in overcome the flood, it is shown in the way they try mitigating and responding flood by themselves, although they had limited knowledge. This is one of sign that villager want to resilience but not have a full capability yet. The role in community have a significant power to determine that person is having a high knowledge or not about flood and how to overcome it, especially everything that needs to build a resilience community, beside length of stay and age every person in Mangkang Kulon community. While the least power is gender, location of stay and last education that have been taken by every person, but still have a relation in between.

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