



Integrating Local Knowledge in Disaster Risk Reduction Policies: A Case Study for Indonesia

Tania Ouariachi-Peralta^a and S. H. M. Fakhruddin^b

Regional Integrated Multi-Hazard Early Warning System for Africa and Asia (RIMES), Outreach Building-AIT Campus, 58 Moo 9 Paholyothin Rd., Klong Nueng, Klong Luang, Pathumthani 12120, Thailand.

E-mail: ^atania.ouariachi@gmail.com, ^bfakhruddin@rimes.int

In recent years, we have witnessed an increased interest in integrating the local knowledge and wisdom held by local communities in disaster risk reduction planning and strategies. The Hyogo Framework for Action (HFA) 2005-2015, the international blueprint for disaster risk reduction efforts adopted by United Nations Member' States, acknowledges the important role of local knowledge to reduce impacts of disasters at community level and encourages governments to consider it into policy planning. This paper provides a case study for Indonesia, particularly for the district of Bantul, to evaluate to what extent local knowledge has been reflected in disaster risk reduction policies and for which purpose. This paper also looks at the level of participation of local communities in the policy formulation process. Results reveal that, despite well formulated disaster risk reduction policies that integrate local knowledge, several factors can hamper an effective implementation of the policies. This research recommends increasing budget allocations for disaster risk reduction and financial support towards the Local Agency for Disaster Management (BPBD), making a better use of participatory structures already in place and reinforcing collaboration between local government and NGOs.

Keywords: Disaster risk reduction, HFA, Local knowledge, Participatory policy making, Decentralization, Indonesia.

1. Introduction

Historically, attitudes towards local knowledge in relation to disaster management have shifted from denial, in favor of “advanced geophysical knowledge and technical systems”; to romanticism, through the stereotype of “primitive people in harmony with nature”; and today, acceptance. Since the 1970s, there is a growing recognition that such practices must be acknowledged and form the base for a holistic approach to disaster risk reduction (DRR). The Hyogo Framework for Action (HFA) 2005-2015, the international blueprint for disaster risk reduction efforts adopted by the Member States of the United Nations, clearly shows that there is an internationally recognized importance for integrating appropriate grass

root knowledge as the base for policy formulation: first of all, the HFA guiding principles emphasizes the recognition of local knowledge as “a valuable tool for identifying, assessing and monitoring disaster risks and enhancing early warnings at a local level” (key activity under priority for action 2). Secondly, the framework encourages governments to incorporate “relevant traditional and indigenous knowledge to provide easily understandable information on disaster risks and protection options” (key activity under priority for action 3).

Scholars such as Mercer *et al.* (2010), Pareek and Trivedi (2011) and Khailani and Perera (2013) have highlighted in their studies the potential of local knowledge to improve government policies and to encourage participation of affected communities in policy making³. Participatory policy making (PPM) -which involves not only policy formulation, but also implementation, monitoring and evaluation- has emerged in the last years to foster sustainability, good governance, accountability, and active citizenship⁴. This participatory process facilitate the development of better informed and more equitable policies, and it strengthen ownership and transparency⁵. Good practices and lessons learned from experiences in the Asia-Pacific region have revealed that, in fact, “an incorporation of indigenous knowledge in policies encourages the participation of the affected community and empowers its members to take the leading role in disaster risk reduction activities”⁶. In this context, the process of decentralization can play important roles in broadening participation by locals in decision-making, since more power and resources are placed at a closer, more familiar, more easily influenced level of government.⁷

Even though governments are increasingly aware of the potential of local knowledge for disaster risk reduction, in practice, there is still little documentation on how this interplay is being applied through official channels at the local level.⁷ Bantul, a district in the Special Province of Yogyakarta in Java (Indonesia), can serve as an interesting case study to research this interplay at the local level: prone to earthquakes (Bantul experienced in 2006 a devastating earthquake measuring 6.3 on the Richter scale that destroyed numerous Javanese communities)⁹, availability of local knowledge for disaster risk reduction¹⁰, and existence of a Local Action Plan for DRR, which can be used to identify how local knowledge is being reflected on the policy and the level of participation of communities in the policy formulation. Bantul was the first district in Indonesia adopting the concept of DRR after it was badly affected by the earthquake, establishing its Local Agency for Disaster Management (BPBD) after Indonesia implemented Law No.24 Year 2007 on Disaster Management.¹¹

As we can observe from the arguments above, governments are expected to take a holistic approach to disaster risk reduction, where people’s knowledge, strategies and capacities are taking into consideration and where communities are actively engaging in the process, following international guidelines such as HFA, good practices and lessons learned. Taking Bantul as a case study, this paper aims to answer the following research questions:

- (1) To what extent local knowledge is reflected on the Local Action Plan for DRR 2010-2014 in Bantul?
- (2) What are the local government's main arguments for taking into consideration (or not) local knowledge for DRR?
- (3) To what extent local communities in Bantul participated in the DRR policy formulation process?

Although there have been many studies regarding specific communities' indigenous knowledge in DRR and the role of non-governmental organizations (NGOs) in incorporating this local wisdom in their strategies, there is not enough research answering the questions raised above. This paper contributes to fill this research gap, at the same time that it raises awareness on the value of local knowledge and it provides recommendations to improve DRR policy making at the local level.

In the next chapter, we will introduce concepts and theoretical angles used to guide this research, which will later reflect on the discussions and conclusions. Then, we will present the methodology and the case study with background information on Bantul's physiographic and local knowledge, as well as DRR political and institutional arrangements in Indonesia. Finally, we will present the discussions, answering the research questions, and close up with the conclusions of the research and possible recommendations.

2. Theoretical Framework

The theoretical framework presented here will clarify concepts that have been used in this research, introduce theoretical angles that have guided the discussions and conclusions, and connect this study with the immense knowledge of other researchers. This section links in a logical manner the different elements that compose our research questions: disaster risk reduction, local knowledge, government policies, participation and decentralization.

2.1. Shift of approaches: from disaster response to disaster risk reduction

Currently, a more holistic approach focusing on risk and vulnerability, rather than hazards, has brought about the term of disaster risk reduction¹², defined by the UNISDR as "the concept and practice of reducing disaster risks through systematic efforts to analyze and manage the causal factors of disasters, including through reduced exposure to hazards, lessened vulnerability of people and property, wise management of land and the environment and improved preparedness for adverse events".¹³

There is a general agreement within the scientific community and the humanitarian sector that natural disasters are a major threat to sustainable development and that disaster risk reduction strategies are more effective than response.¹⁴

The reasons for this shift of paradigm are several: moral because DRR can help reducing the extreme amount of casualties during disasters; political, providing security for political institutions and protection of civilians; and economic, reducing the value of damage and loss which could impact the development of many countries.¹⁵ In economic terms, the World Bank estimates that every dollar spent on risk reduction saves seven dollars in relief and repairs.¹⁶

Disaster risk reduction strategies aim to avoid (prevention) or to limit (mitigation and preparedness) adverse impact of hazards, within the broad context of sustainable development. Preparedness strategies, measures taken in advance to ensure effective response to the impact of disasters, are the main focus of this research when looking at local knowledge and practices.¹⁷

2.2. The value of local knowledge for DRR

To summarize relevant literature, local knowledge can be defined as a “body of knowledge existing within a specific culture, acquired by local people over a period of time through accumulation of experiences, society-nature relationships, community practices and institutions, and by passing it down through generations”.¹⁸ We have chosen the term “local knowledge” in order to be consistent with the terms used by Indonesian policies, which exclude the term “indigenous”, probably for political reasons.

Since the 1970s, a counter-culture against top-down approaches and mega-projects as the only way to go forward defended the philosophy that “small is beautiful”, and several international initiatives such as Agenda 21 or Millennium Development Goals emphasized the role of local knowledge in sustainable development.¹⁹ Since then, academicians, governments, policy-makers, international institutions and NGOs have also recognized the importance of incorporating local knowledge and practices into disaster risk reduction. The mainstream literature on natural disasters had minimized before the importance of local knowledge, considered by outsiders as “inferior, belonging to backward and less-educated people”, and it had mainly focused on the expertise approach, which “emphasizes the advanced geophysical knowledge and technical systems as the most effective disaster response”²⁰.

The relationship between local knowledge and DRR has developed mainly for two reasons: first, the change from a focus on natural hazards to vulnerability and resilience; secondly, the multitude of undocumented practices in many indigenous communities in the Asian-Pacific region that have shown a “deep understanding and ability to cope with disasters”²¹.

In order to collect data and analyze relevant local knowledge available in Bantul for disaster preparedness in relation to earthquakes, Dekens’ framework (Table 1) is used for guidance. In the next section (case study), local knowledge in Bantul based on anticipation (forecasting and warning systems; escape routes), adaptation (physical, socio-cultural assets) and communication (beliefs; ceremonies; stories;

Table 1 Framework for local knowledge on disaster preparedness²².

Composed of	Influenced by	In context of	Resulting in	Based on	With effects on
~Knowledge types ~Practices ~Beliefs, values, world views	~Structures ~Processes	~Natural hazards and other shocks ~Global factors and trends	Disaster preparedness at all levels	~Observation Nature and history of natural hazards; evolution of people's social and physical vulnerabilities to natural hazards ~Anticipation Forecasting and warning systems and warning; escape routes; roles, skills and key actors ~Adaptation Human, socio-cultural, financial, natural and physical assets ~Communication Stories, songs, poems; ceremonies; local art; local terminology	~Livelihood, security and Sustainability ~Community resilience building

songs; local terminology; others) will be described. Relevant local knowledge based on observation was not identified in relation to earthquake preparedness.

According to the UNISDR, four main arguments have been made for the value of local knowledge throughout disaster risk reduction literature. First, various local strategies which prove valuable against natural disasters can be transferred to other communities in similar situations. Second, the use of local knowledge can help improving project implementation by providing information on the local context. Third, the “non-formal means” by which local knowledge is transmitted from one generation to another offers a successful model for education on DRR. Finally, “an incorporation of indigenous knowledge in policies encourages the participation of the affected community and empowers its members to take the leading role in all disaster risk reduction activities”²³. Other advantages found in the literature review are cost-effectiveness (using local resources can save costs and decrease dependency on external aid) and improving disaster response (local actors are the first people to respond)²⁴.

It is important to be aware of the fact that not all local beliefs and practices are appropriate or sustainable for disaster risk reduction, since some of them might damage the environment, do not benefit the whole community or create more problems than before. For example, in Bangladesh, the custom of “purdah” can prevent women from accessing vital information about cyclone forecasts, since they are not allowed to visit the market (were radio warnings are heard) or interact with men²⁵. In Indonesia, during the Merapi volcano’s eruption, the Mbah Maridjan o “gate keeper” refused the warning from officials to leave the volcano’s lower slopes and move to a safer place, alleging that he had to pacify the spirits’ brewing anger. When the burning clouds of ash descended, he and many inhabitants who follow Mbah Maridjan were killed²⁶. Therefore, careful analysis

is needed when collecting data on local knowledge for disaster risk reduction purposes.

2.3. *The value of local knowledge for DRR on government policies*

The discussions around local knowledge and practices for DRR highlight its potential to improve government policies. By government policy (or public policy), we mean in this paper the official document that register the course of action designed by governments to achieve particular goals or targets²⁷. Policy cannot be understood in isolation, but it must be examined as part of a process, that means, government policy is formed, adapted and implemented in a “never-ending process”, a cycle where multiple actors are involved to “avoid imposing one solution over others”²⁸. According to Karl, the stages in policy making encompass²⁹:

- (1) Formulation, involving information gathering, analysis and decision-making (this research will focus on the policy formulation stage).
- (2) Implementation, generally involving a set of rules, regulations and institutions to achieve the goals of the policy.
- (3) Monitoring and evaluation of the formulation and implementation of policy.

The same author suggest that there is no specific model of policy making that is “universally valid and applicable”, but that the way policy is made depends on the context³⁰.

According to the HFA, there is an internationally recognized importance for integrating appropriate grass root knowledge and practices as the base for policy formulation; this international blueprint also acknowledges that local knowledge serves as a valuable tool for identifying disaster risks, enhancing early warnings, and strengthening disaster response at the local level³¹.

2.4. *Participatory policy making (PPM)*

As it was mentioned in the introduction, scholars and international organizations have highlighted the potential of local knowledge to improve government policies by encouraging participation of affected communities in policy formulation, which is one of the stages in policy making. This bring us to the concept of participatory policy making (PPM), which emerged in the 1950s and 1960s to foster good governance, accountability, transparency and active citizenship; the process facilitates the inclusion of individuals in the design of policies via consultative or participatory means³². A continuum of participation or “ladder of participation” ranging from minimal to intense participation can be distinguished, according to the typology presented by Bass *et al.*: participants listening only; participants listening and giving information; participants being consulted; participants in analysis and agenda-setting; participants in reaching consensus; and participants involved in decision-making on the policy³³.

The following list, proposed by the Organisation for Economic Cooperation and Development (OECD), describes the most common tools in PPM³⁴:

- (1) Information-sharing tools: draft policy documents can be shared via traditional media such as radio, television and newspapers, electronic media such as websites and emails, and interactive communication information stall in a public space or telephone information line.
- (2) Consultation tools: discussion forums such as round tables, public hearings, town meetings and focus groups; other feedback mechanisms like public opinion polls; and more continuous consultation such as advisory committees of interest group representatives.
- (3) Active participation tools: these tools “help to set the policy agenda, shape the dialogue and propose policy options, although the final decision still rests with the government”. Examples include a small number of stakeholders who are not experts on the policy issue, ones that include expert publics and others that promote broader public engagement. Other tools include campaigns, partnerships and policy research.

The benefits of PPM can be summarized as follows: “better informed policies”, since participation usually brings a wider range of information and ideas to the process; “strengthened ownership” by involving more stakeholder groups in the design of the policy, which in turn will create a more effective implementation; “strengthened transparency and accountability”; and the achievement of “more equitable policies”³⁵.

However, critiques have been raised against the term “participation” because it often refers to information sharing or consultation, without reaching levels of joint decision making and control by stakeholders³⁶. As Innes and Booher maintain, truly participation is not being promoted in practice by many governments because “they are organized around hierarchical-bureaucratic structures and guided by strict mandates and a priori-rules”³⁷.

2.5. Participation and decentralization

Decentralization can offer opportunities for PPM: “it can enhance the opportunities for participation by placing more power and resources at a level of government that is closer to the people and therefore influenced more easily”³⁸. In Indonesia, decentralization became effective on January 2001, after 30 years of President Suharto’s system of centralized and autocratic government³⁹ (more information on the decentralization process in Indonesia will be presented in the case study). The literature distinguishes three major forms of decentralization: decocentration (central government disperses responsibilities for certain services to its regional branch offices without involving any transfer of authority to lower levels of government), delegation (central government transfers responsibility for decision making and administration of public functions to local governments or to semi-autonomous

organizations that are not wholly controlled by the central government but are ultimately accountable to it.), and devolution or democratic decentralization (central government transfers authority for decision making, financial allocations and management to quasi-autonomous units of local government)⁴⁰.

Scholars have asserted that decentralization can play an important role in developing countries in: broadening participation by local residents in political, economic and social activities, as well as decision-making; empowering local communities; and improving policy implementation and delivery of services⁴¹.

3. Methods

To be able to triangulate data and facilitate validation of the results, different qualitative methods have been utilized to collect data:

- (1) Literature review
- (2) Content analysis: method used to analyze the Local Action Plan for Disaster Risk Reduction in Bantul. A content analysis allowed the authors to identify if the term local knowledge is reflected on the policies, in which context and for which purposes.
- (3) Observation: method used during the visits to the villages of Bantul in order to look at the consequences of the earthquake in 2006, have a better understanding of local strategies for preparedness (*gotongroyong* activities, evacuation routes, local warning systems and public gatherings), as well as the levels of participation during meetings between governments and local populations.
- (4) Focus group discussions with university professors, international consultants, members from local DRR Forums, and local communities.
- (5) In-depth semi-structured interviews (15 interviews): key informants include government officials, UNDP staff, academicians, local chiefs in Seloharjo and Wukisari villages, and leaders from NGOs/CBOs^a.

For data analysis, the research follows an interpretative approach to public policy, exploring contrasts between policy meanings and interpretations by policymakers and by other policy relevant groups. The researchers believe that an interpretative philosophy is more suitable since social reality is "socially constructed and the goal is to understand what meanings people give to reality"⁴².

The units of analysis have been people and policies, and the sample size has been influenced by resources such as money and time. This research has used non-probability sampling: snowball (sample built on recommendations from first units

^aNational Disaster Management Agency (BNPB), Indonesian Society for Disaster Response (MBPI), Local Disaster Management Agency (BPBD), Local Development Agency (BAPPEDA), UNDP-Yogyakarta, Universitas Gadjah Mada, local chief leaders in Seloharjo and Wukisari villages, local DRR Forums (PRB Forums), Bantul's Dukuh Association, Youth Movement for Disaster Preparedness, Movement for Jogja Rise, CD Bethesda, Daya Annisa, NGO Lingkar, and Alliance for Jogja Recovery.

until saturation reached) and accidental (all units that the researchers come into contact during the research period. This was the technique was specially used to interview local people from the villages of Seloharjo and Wunosari).

Regarding the scope of this paper, geographically, this research is limited to the district of Bantul, located in the Special Province of Yogyakarta, on the island of Java. The field research has been carried out in the villages of Seloharjo and Wukirsari, two of the most badly hit areas during the earthquake in 2006. In terms of natural hazards, the paper focusses on the earthquake since it is the main hazard in Bantul district.

4. Case Study

4.1. Physiographic

Indonesia is located along the Pacific “Ring of Fire”. Being at the conjunction of the four tectonic plates Eurasia, Pacific, Philippines and Indo-Australia facilitates earthquakes, tsunamis and volcano eruptions among other hazards, making Indonesia the fifth nation most frequently affected by natural disasters in the past 110 years⁴³. Located in such a critical geologic setting, Bantul district is one of the most prone areas to earthquakes in the country, and it is expected to experience another earthquake of higher intensity than in 2006 within the next 50 years⁴⁴.

Bantul district is located in the Special Province of Yogyakarta (island of Java); it consists of 17 sub-districts, 75 villages and 933 sub- villages. Like many regions on the island of Java, it is densely populated with roughly 1,600 people per square kilometer. The district is bordered by the city of Yogyakarta to the north, the districts of Kulon Progo and Sleman to the west, the district of Gunung Kidul to the east and the Indian Ocean to the south⁴⁵.

4.2. Local Knowledge and Practices in Bantul applied to DRR

In order to collect data on local knowledge available in Bantul for disaster preparedness, we made use of Dekens’ framework, described previously in the theoretical framework. In the next section, we will analyze which aspects of Bantul’s local knowledge are being reflected on the Local Action Plan for DRR and for which purpose. Literature review and interviews with key informants were carried out to collect this information.

4.2.1. Anticipation: people’s identification and monitoring of environmental indicators.

Warning systems: the head of Dukuh (chief) Association in Bantul explained in an interview that *kentongan* is the traditional warning systems and it is still used today for warnings of natural hazards, as well as other incidents or situations. To differentiate situations, they use different rhythms and numbers of hits. Every

chief leader and almost every household has one *kentongan*. Early warning is also disseminated through mosque speakers.

Evacuation routes: local people have their own knowledge of the safest and fastest evacuation routes when disaster strikes. During earthquakes they automatically run away from the coastal areas, because of the risk of tsunami in the aftermath of quakes, and they head towards the rice fields and open grounds such as football courts, according to key informants during field interviews. For instance, in *desa* Wukirsari, the evacuation place is located on the ground next to the local government building, which provides first aid in case of emergencies.

4.2.2. Adaptation: people's access to assets

Physical assets: housing is a key physical asset when looking at earthquakes, since earthquake-resistant buildings are able to withstand seismic waves. Regarding housing materials, bamboo and wood are the local materials used traditionally in Bantul for earthquake-resistant buildings. Regarding housing structure, one of the most important characteristics of traditional Javanese wooden houses, especially in the district of Bantul, is the frame or *saka guru*. This consists of four main columns topped with a *brunjung*, a wooden framework in the shape of a reverse pyramid that holds the roof. Joints in *saka guru* are formed using *takik/cantokan* techniques similar to Japanese architecture. Another interesting feature of *saka guru* is that it is usually located in the center of the house, used as a family or guest area, creating a semi-open space. Because of its central location, it functions as a “survival space” in emergency contexts. In addition, wooden structures can absorb seismic energy because of their high deformation capacity situations⁴⁶.

During the earthquake in 2006, the majority of wholly wooden structures suffered minimal harm. According to a study carried out by Ohno and Syamin



Figure 1 *kentongan* from a villager in *desa* (village) Seloharjo.



Figure 2 Bamboo bridge rebuilt using *gotongroyong* in desa Seloharjo.

in the aftermath of Bantul earthquake, “brick houses with and without reinforcement are much more vulnerable than wooden structures to earthquakes of this level”, mainly because of its insufficient quality and amount of material used for reinforcement⁴⁷.

Socio-cultural assets: cooperation between members of a community, which has played a vital role in the rehabilitation process of Bantul, is one of the most precious socio-cultural assets to reduce the risk of natural disasters. This cooperation receives the name of *gotong royong* and it is has been practiced within Javanese communities for centuries. This cooperation “springs from a spontaneous attitude of the participants and from desire to serve the common good”⁴⁸. There are different types of *gotong royong* which are based on different principles. For DRR, we can highlight activities undertaken by the whole village when there is a project that is considered a public necessity (*gugur gunung*). The initiative is always generated at the assembly of villagers and may involve the construction of a dam, the renovation of a mosque, the cleaning of roads and evacuation routes, and the reparation of bamboo bridges⁴⁹.

We can also emphasize those activities which take place when an inhabitant needs help to finalize a work around his house, and that can reduce disaster risks. For instance, a villager may need assistance to reinforce his house before a disaster strikes by repairing the roof, renovating bamboo walls or the construction of the frame (*saka guru*) for a new house.

4.2.3. Communication: people’s ability to transfer knowledge

Oral and written communication: in Bantul, bed time stories, songs or *wayang* (puppet shadow theater) are being used to help young generations to learn about previous hazards, as community leaders explained to us during field interviews. Theater performances are also used to raise awareness. For instance, the local NGO LINGKAR launched the project “Revitalization of Traditional, Cultural Media for Disaster Risk Reduction” in Srihardono village, a popular traditional theatre

performance where local government officials are actors that, indirectly, transmit key messages about DRR, according to the director of this NGO.

Practices and beliefs: Javanese people have built a culture that is complex and spiritually rich. The indigenous Javanese world view and pragmatic philosophy of life is called *kejawen* thinking.^b This thinking is important to take into consideration because it can shape people's understanding, perceptions and responses to natural hazards. One of the core concepts is *pasrah*, which means to "surrender your destiny or fate in the hands of God"⁵⁰. Despite being aware of scientific explanations, many inhabitants in Bantul believe that natural disasters are caused by an omniscient God (*Tuhan*) with an ultimately good intention and they have to accept them as such. This concept should not be understood as the western connotation of fatalism, associated with passivity and resignation, but instead, the acceptance of a disaster is perceived as positive energy, since it eliminates psychological distress⁵¹.

Lastly, it is important to mention the importance of collective ceremonies. In the context of DRR, *slametans* (informal gatherings) are held in order to strengthen people and prepare them psychologically before disasters strike. Civil organizations working in Bantul, like CD Bethesda, facilitate and urge the celebration of these rituals to heal past trauma, increase preparedness of communities, and disseminate knowledge on DRR, as the director of this organization explained to us.

4.3. Political and Institutional Arrangements

Before we go deeper into the development of DRR in Indonesia and Government disaster management policies, it is important to have a background on the political and institutional arrangements. Since President Suharto stepped down in May 1998, after 32 years in power, Indonesia has experienced a push towards democracy. Under the period of democratization called "*reformasi*", the new Government initiates an ambitious decentralization program, devolving central government powers and responsibilities to local governments in all administrative sectors except for security and defense, foreign policy, monetary and fiscal matters, justice, and religious affairs, without conditions and limitations⁵².

The new decentralization laws started in January 2001. The government planned decentralization as "progressing" through four stages: in the first stage (2001), the aim was to ensure the stable delivery of public services; in the second stage (2002–2003), the regional governments that did not implement decentralization laws yet were expected to do it; the third stage (2004–2007), was planned to be a period of "consolidation"; and in the last stage, gaps in concepts and legal frameworks would be resolved⁵³.

^bThe authors Clifford Geertz and Niels Mulder provide a vast literature about the complexity of *kejawen* philosophy and Javanese belief systems. Recommended books are "The Religion of Java" from the anthropologist Geertz or "Mysticism and everyday life in contemporary Java" from Mulder.

One of the most important aspects of the decentralization process in Indonesia, in relation to the topic of this research, is the devolvement of resources and functions to the districts, such as Bantul⁵⁴. By doing this, stronger local participation in government and decision-making was expected. Local communities could now contribute in shaping policies that have a direct impact on them, putting pressure on those leaders to share their power with other actors⁵⁵. In particular, the decentralization of administrative power and stronger community participation have been recognized as key issues to facilitate the integration of local knowledge into disaster risk reduction efforts⁵⁶.

Despite all these benefits, the decentralization process in Indonesia has faced several challenges in practice. The capabilities of local governments to manage new resources and functions are inadequate in many cases, raising concerns whether or not local leaders can channel effectively people's voice and implement their new functions after more than 30 years following orders from the center⁵⁷. Moreover, the lack of transparency and accountability experienced at the local level has brought corruption and formed "little kings" in some regions⁵⁸.

4.4. Development of DRR in Indonesia and Government disaster management policies

The Aceh earthquake and tsunami in 2004 and the Bantul earthquake in 2006 are some of the disasters that have served as "momentum" for pushing a shift of paradigm on disaster mitigation, from emergency to risk management; from charity to rights approach; and from ad hoc work to routine work⁵⁹. The Indonesian Society for Disaster Management (MPBI) started to promote and advocate for an integrated approach on disaster management. Before 2007, there was no law or institution responsible for disaster management. At the national level, Bakornas (National Disaster Management Agency) was only activated when a disaster strikes; at the provincial level, there was a coordination body; and at the city level, an Action Task Force. These units were programmed for the short-term, the budget was also only for emergency without risk analysis and vulnerability mapping and there was not integration with development policy.

The Hyogo Framework for Action has influenced both the design of the Disaster Management (DM) Law and the National Action Plan on Disaster Risk Reduction (NAP-DRR). This 10-year plan adopted by United Nations member's states to make the world safer from natural hazards has been used as a "weapon" for advocacy for DRR by civil organizations in Indonesia, since Indonesian Government was involved in the ratification of HFA.

4.4.1. *Law No. 24, 2007 on Disaster Management*⁶⁰

After years of work, the legal reform of the Disaster Management Law took place, and was ratified and enacted in 2007. Law No. 24 Year 2007 on DM regulates how to respond to a disaster in different phases: pre-disaster, during disaster and post-disaster⁶¹. It also stipulates that the responsible body to conduct disaster management within the government is the National Agency for Disaster Management (BNPB) at the national level, replacing Bakornas; the Provincial Agency for Disaster Management at the provincial level (BPBD); and the Local Agency for Disaster Management (BPBD) at the district/city level, reflecting decentralization in disaster management functions and resources. Interestingly, this law also reflects the importance of conducting disaster management based on participation from communities, which together with national and local governments, are in charge of the monitoring of disaster management activities⁶².

4.4.2. *National Action Plan on Disaster Risk Reduction (NAP-DRR) 2010–2012*

The National Action Plan on DRR 2010–2012 is prepared under the coordination of the National Development Planning Agency (Bappenas) in collaboration with the National Agency for Disaster Management (BNPB). As stated in the policy, the purpose of the NAP-DRR is “to serve as guidelines and reference for all parties involving in the elaboration of the DRR policy at the national level during the determined period of three years, containing the foundation, priorities, action plan, implementation mechanism and institutional framework for the implementation of the action plan”. This document also serves as a guideline for mainstreaming DRR into development planning at all administrative levels.

The NAP-DRR 2010–2012, elaborated through a participatory coordination process according to the document, contains five priorities pointing to an “integrated sustainable disaster risk reduction program” parallel to priorities of the Hyogo Framework for Action 2005–2015.

4.4.3. *Local Action Plan for Disaster Risk Reduction 2010–2014*

Local Action Plans for DRR are expected to be formulated in accordance to National Action Plans for DRR and adjusted to local contexts. These are plans that contain guidelines instead of detailed actions. The detail information and practical implementation are included in *RKT-Rencana Kerja Tahunan* (Annual work planning), and the Community Settlement Plan, adapted to every village. There are several reasons why the Local Action Plan for DRR in Bantul is an interesting case to analyze, according to Professor Dr. Erwan Purwanto from Universitas Gadjah Mada:

- (1) Bantul is the first district adopting the concept of DRR after it was badly affected by the earthquake in 2006.

- (2) Soon after the disaster, the district revised its Mid-Term Development Plan (*Rencana Pembangunan Jangka Menengah Daerah*), with the support of UNDP, to be adjusted with the hazard threats in this district.
- (3) Bantul was the first district in establishing BPBD.

BPBD is the agency responsible of formulating Local Action Plans for DRR. Since BPBD in Bantul started operating in 2010, the Regional Agency for Planning and Development (Bappeda) was the institution in charge for formulating this Local Action Plan for DRR, as BPBD officials confirmed to us during an interview.

5. Discussions

The authors aim in this section to discuss the findings and to connect the results to the theoretical framework and our case study, in order to answer the research questions raised at the beginning of this paper:

5.1. *To what extent local knowledge is reflected on the Local Action Plan for DRR 2010–2014 in Bantul?*

A content analysis has been carried out for the following policies: Hyogo Framework Action Plan for Disaster Risk Reduction 2005-2015, National Action Plan for DRR 2010-2012, and Local Action Plan for DRR 2010-2014 in Bantul. Collected extracts of these policies are exposed to visualize if terms such as “local knowledge”, “indigenous knowledge” or “local wisdom” are reflected and how. In order to answer this question, the HFA is used here as the main instrument to guide the evaluation and the National Action Plan is used to have the national framework in which the Local Action Plan is framed.

5.1.1. *Hyogo Framework Action Plan for Disaster Risk Reduction 2005–2015*

The HFA is an international blueprint for disaster risk reduction efforts adopted by United Nations member’ states, and as such, the Indonesian Government is expected to show its commitment. As the HFA shows, there is an internationally recognized importance for integrating appropriate grass root knowledge and practices as the base for policy formulation. Both of the guidelines advice incorporating local knowledge to make all type of messages related with DRR understandable, from early warning systems to protection from risks.

5.1.2. *National Action Plan for DRR 2010-2012*⁶³

The National Action Plan on DRR 2010-2012 is the policy document prepared under the coordination of the National Development Planning Agency (Bappenas) in collaboration with the National Agency for Disaster Management (BNPB) to

serve as guidelines and reference for all parties involving in the elaboration of the DRR policy at the national level.

In this document, the term “local wisdom” is mentioned explicitly several times. In accordance to the HFA guidelines, the national plan recognizes that “understanding local wisdom in communities” is needed to create a disaster awareness culture (program C.1). This disaster awareness culture is created through the dissemination of understandable information on DRR. In addition, while HFA states that early warning systems must be people centered, the NAP-DRR agree that early warning systems must be “based on community knowledge of relevant hazards and risks” (program F.4) Another explicit mention to local knowledge in the national policy can be found in program F.4, which recognizes the importance of *gotong royong* to strengthen the community’s social resilience. Finally, the national policy also acknowledges the relevance of documentation of local knowledge (programs C.3 and E.4). The Indonesian Government shows commitment to the HFA guidelines regarding the recognition and incorporation of local knowledge for DRR strategies at the policy formulation level.

5.1.3. Local Action Plan for DRR 2010-2014 in Bantul⁶⁴

The Local Action Plan for DRR is a policy document formulated in accordance to National Action Plans for DRR and adjusted to local contexts, which contains strategies for disaster risk reduction at the local level, including an specific action plan, locations and responsible agencies to implement the activities.

The Local Action Plan for DRR, following international and national guidelines, also recognizes the importance of local knowledge for DRR. Specifically and explicitly, policy 3 - program 4 consists of “the inventory and identification of all kinds of local wisdom” and the dissemination of the information collected, which is the same as program E.4 from NAP-DRR about the “documentation of all

Table 2 Extracts from the Hyogo Framework Action Plan for Disaster Risk Reduction 2005–2015.

Priority	Key activities
2: Identify, assess and monitor disaster risks and enhance early warning (pg. 7)	(ii) Early warning (d) Develop early warning systems that are people centered , in particular systems whose warnings are timely and understandable to those at risk(...)
3: Use knowledge, innovation and education to build a culture of safety and resilience at all levels (pg. 9)	(i) Information management and exchange (a) Provide easily understandable information on disaster risks and protection options, especially to citizens in high-risk areas, to encourage people to take action to reduce risks. The information should incorporate relevant traditional and indigenous knowledge and cultural heritage(...)

forms of local wisdom". In the same way, local knowledge is again linked to early warning systems. In the local plan, one of the strategies to improve community preparedness is to develop a system that includes all kinds of "alternatives of early warning system", a system based on "knowledge, science and technologies".

We can say that local knowledge for DRR is reflected in Indonesian Government policy documents. In congruence with HFA and NAP- DRR, the Local Action Plan for DRR in Bantul acknowledges the importance of local wisdom to support disaster mitigation explicitly, and to develop appropriate early warning systems implicitly. In practice, BPBD is working on the establishment of local DRR forums in all villages, including civil society organizations and representing vulnerable groups, to empower and improve people's capacities in disaster mitigation, according to BPBD and Bappeda officials. In the interview, they also mention that through these forums, BPBD is documenting local wisdom and practices that can be of interest for DRR strategies. According to the local progress report on the implementation of the HFA for Bantul district in March 2013, from 75 villages there have been DRR forums in 56 villages. The same report acknowledges that members of these forums have experienced increased knowledge, but that dissemination of such knowledge to other community members is still limited. The knowledge gap between forum members and non-forum members is still very wide⁶⁵.

Other forms of local practices that are being used by BPBD, despite the fact that they are not explicitly mentioned in the policy document, are traditional public gatherings such as *kenduren* in order to disseminate DRR information, and social assets such as *gotong royong* for DRR projects: community work for water management, and garbage management.

The aspects of Bantul's local knowledge, described in the previous section and based on Deken's framework, that are taken into consideration the most by local government are, therefore, related to warning systems and traditional practices such as *gotong royong* and *kenduren*.

5.2. What are the local government's main arguments for taking into consideration (or not) local knowledge for DRR?

After observations during field research and interviews with key government officials, the following arguments for integrating local knowledge in DRR public policies can be concluded:

- (1) To adapt policy formulation to local contexts. Therefore, policies can be accepted by the local people.
- (2) To improve people participation in disaster risk reduction strategies.
- (3) To save costs by making effective use of finances and resources.

If we go back to the theoretical framework of this study, we can find the same arguments on the value of local knowledge for DRR: local knowledge can help improve project implementation by providing information about the local

context; it encourages the participation of the affected community and empowers its members to take the leading role in all disaster risk reduction activities, and it increases cost-effectiveness in the long-term⁶⁶.

Despite the fact that local knowledge is reflected in government policies and actions are happening on the ground, civil society remains skeptical. Members from civil society organizations in Bantul explained to us during field interviews that *gotong royong* is being used to mobilize people to achieve bigger outcomes of projects in exchange of small incentives in order to save costs, and that public gatherings (*kenduren*) are often used by the government for “their own image” and to “impose their own knowledge”. Other local organizations wonder about sustainability: how to identify all kinds of local wisdoms for mitigating disasters if local wisdom is dynamic and changes over time? In their opinion, this program from the Local Action Plan would need to be “systematic and dynamic” to monitor local knowledge, and for that purpose financial resources are needed.

5.3. *To what extent local communities in Bantul participated in the DRR policy formulation process?*

The discussions around local knowledge and practices for DRR highlight its potential to improve government policies, for instance, through encouraging the participation of the affected community in the policy formulation⁶⁷. In this sense, it is important to analyse to what extent communities in Bantul have taken part in the formulation process of the Local Action Plan for DRR in order to create a better informed policy.

As explained in an interview by officials from Bappeda in Bantul, the formulation of the Local Action Plan for DRR involved several government agencies (health, agriculture, forestry, infrastructure, environment’s protection and people’s protection) and community leaders. The inclusion of communities in the formulation process was made possible through disaster mapping and FGD (Focus Group Discussion) at two levels: *desa* (village) and *kabupaten* (district). In FGD at the village level, each participant was given a questionnaire to, later on, discuss different issues together. In FGD at the district level, the data collected from villages was analyzed by government officials and other stakeholders. For this process, Bappeda hired a group of consultants, who designed the questionnaires, facilitated the discussions and “collected the aspirations” to formulate the Local Action Plan for DRR.

Because of the inclusion of participatory techniques, Bappeda has claimed to use participatory policy making. From observations and interviews with key informants from government and civil society, we can affirm that participation has been synonym for “consultation”, looking back at the “ladder of participation” by Bass *et al.* described in the theoretical framework: participants being consulted through working groups held to discuss policy⁶⁸. Looking at the list of PPM tools proposed by the Organisation for Economic Cooperation and Development

(OECD)⁶⁹, we can also say that they are mainly correlated with the “consultation tools”: discussion forums such as round tables, public hearings, town meetings and focus group. As we have observed in the case of the Local Action Plan for DRR in Bantul, participation often refers to information sharing or consultation.

Leaving aside the Local Action Plan for DRR in Bantul, the government has regulations to facilitate people’s participation in policy formulation and more structures have been put in place by the government since the earthquake in 2006, as explained by Bappeda officials and members from the Movement for Jogja Rise during the interviews. These structures are:

- (1) *Pokmas*: community committees existing at the sub-village level in areas prone to natural hazards to discuss issues related to DRR, such as housing reconstruction livelihood security or *gotong royong* activities. These networks, meeting once or twice a month according to the Java calendar, are enacted horizontally and include representatives of each family.
- (2) DRR Forums (Forum PRB- *Forum Pengurangan Resiko Bencana*): while Pokmas is a forum of 100% community members that are beneficiaries of aid, DRR Forums are mainly composed by NGOs. They work closely with its members and government to facilitate various disaster risk reduction activities and initiatives.
- (3) *Musrenbangdes*: This is a government mechanism to filter people aspirations, a participatory approach for development planning. It is a formal structure that takes place once a year, where government and communities discuss and elaborate planning for the next years in relation to development, not only DRR. While Pokmas is characterized by direct participation, participation at *Musrenbangdes* works through representatives.

With these structures, government can practice a deeper bottom-up approach for policy formulation since they already exist and they are community driven. However, despite good intentions from the local government to engage with communities and foster their aspirations and interests, financial issues make the implementation of those demands very difficult, as acknowledged by BPBD officials. The local progress report on the implementation of the HFA for Bantul district launched in March 2013 confirms BPBD’s argument: in terms of financial capacities, the report stresses that their agency counts with limited budget for disaster management, despite the fact that DRR has become the fourth mission in the Middle-term Local Development Plan, and priority issue in local development program⁷⁰.

In relation to the political and institutional arrangements in Indonesia described in the previous section, staff from UNDP-Yogyakarta explained during the interview that barriers in the decentralization process might influence financial capacities: “central government can be reluctant to decentralized budget in order to keep control (. . .) the consequence is that without greater budget allocation, it is

difficult that local government can lead prevention, response and recovery from disasters”.

Another important factor in disaster management is human resources. According to Kusumasari *et al.*, “personnel are insufficient to manage disasters and only a limited number of them had technical knowledge in disaster management; this lack of capabilities of local officials can indirectly have an impact on people’s participation, since their voice might not be channeled effectively”⁷¹. Scholars like Djalante agree that support needs to be extended to enhance the participation of communities and groups at the grassroots level and, in particular, support capacity of local governments⁷².

6. Conclusions

Local communities in Indonesia have dealt with natural hazards for centuries, and therefore, they have a deep understanding and ability to cope with disasters. The interest of documenting local knowledge and practices has increased in the last years, up to the point where the Hyogo Framework of Action for Disaster Risk Reduction 2005-2015, the 10-year plan adopted by UN States Members, encourages countries to incorporate knowledge to make all types of messages related with DRR “easily understandable and people-centered”, making special emphasis for early warning systems. At the national level, the Indonesian Government has shown its commitment to the HFA guidelines at the policy formulation level: one of the activities from the NAP-DRR refers to the documentation (collection of data) and understanding of local wisdom in communities exposed to disaster risks, needed to create a disaster awareness culture. At the local level, the Local Action Plan for DRR in Bantul is also in accordance with HFA and NAP-DRR and it recognizes the importance of local knowledge for DRR. Concretely, one of the activities is also about identifying any local wisdom to mitigate disaster risks, as well as all alternatives of early warning systems.

We can conclude that local knowledge for DRR is reflected in Indonesian Government policies at the national and local level. Their officials acknowledge the importance of local knowledge for DRR and affirm to put it in practice in order to save costs, adapt policy formulation to local contexts and improve people participation in disaster risk reduction strategies. These arguments have been reflected in the theoretical framework of this study.

As our theoretical framework also exposed, the discussions around local knowledge and practices for DRR highlight its potential to improve government policies and encourage the participation of the affected community in the policy formulation⁷³. Our research suggests that, although the Government followed the formal procedures by using participatory approaches, participation refers to information sharing or consultation, in the case of the Local Action Plan for DRR in Bantul. Therefore, we can also conclude that participation of communities in public DRR policy formulation has been limited in this case study. However, there are

regulations and structures already in place that can increase people's participation in policy formulation, for instance *pokmas*: community committees existing at the sub-village level in areas prone to natural hazards to discuss issues related to DRR, such as housing reconstruction livelihood security or *gotong royong* activities, which are enacted horizontally and include representatives of each family.

Finally, this research concludes that despite good intentions from the local government to engage with communities and foster their aspirations and interests, a lack of human and financial resources make the implementation of those demands very difficult, as acknowledged by government officials. As we previously discuss, this lack of resources can be influenced by barriers in the decentralization process in Indonesia, such as reluctance from central government to lose control and lack of transparency and accountability at the local level. All these factors can hamper the practice of participatory approaches and a proper implementation of well formulated policies.

Here are some recommendations derived from this case study:

- (1) Increase budget allocations for disaster risk reduction, as well as financial resources towards the Local Agency for Disaster Management: support needs to be extended to enhance the participation of communities and groups at the grassroots level and, in particular, support capacity of local governments.
- (2) Better use of participatory structures: in accordance with the first recommendation, BPBD and other local agencies in Bantul could make better use of other participatory structures already put in place, such as *Pokmas*, community committees existing at the sub- village level in areas prone to natural hazards to discuss issues related to DRR. Moreover, participation from all community members should be encouraged, despite their educational level or social position, not only community representatives, who in many cases, are elected from above.
- (3) Increase collaboration between local government and NGOs: local government agencies should actively engage with civil organizations and NGOs that have already experience implementing projects that integrate local knowledge in DRR at the community level. NGOs can operate at grassroots level with communities, who are the repositories of traditional knowledge, allowing them to respond better to local people's priorities and building on local capacities. In the case of Bantul, these organizations include, for instance, CD Bethesda, Daya Annisa, or Lingkar.

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