

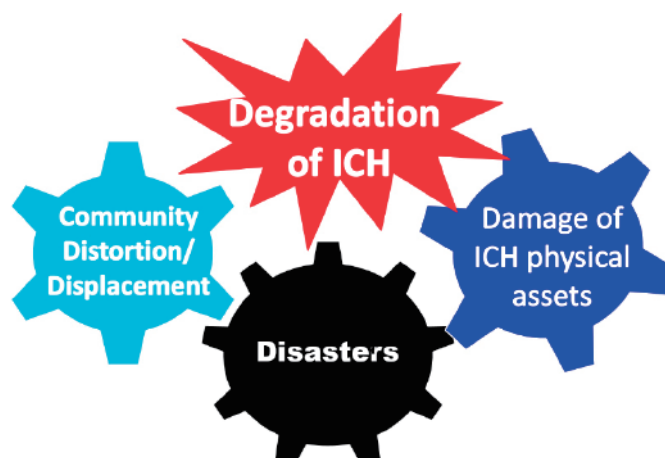
# PARTICIPATORY 3D MAPPING IN BRIDGING THE INTEGRATION OF INDIGENOUS RESILIENCY CULTURE INTO COMMUNITY-LED DISASTER RISK REDUCTION: THE CASE OF TUBLAY, PHILIPPINES

**Abner O. Lawangen**

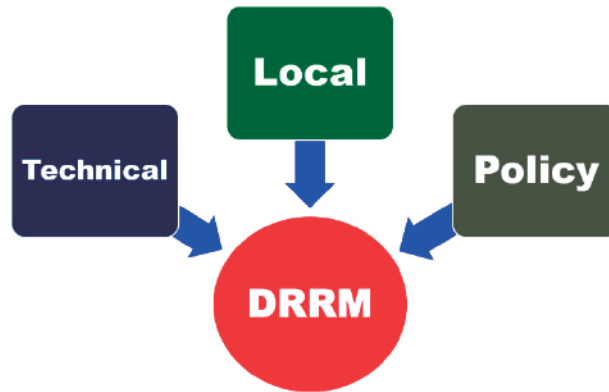
Disaster Risk Reduction and Management Office of Tublay, Philippines

A very good day to everyone! I will be presenting our local project in our municipality on bridging the integration of indigenous resiliency culture into community-led disaster risk reduction through participatory three dimensional (3D) mapping. Tublay is an indigenous town in the province of Benguet in Northern Philippines, with about 18,000 inhabitants belonging to three ethnic tribes. It is the most economically deprived town among the thirteen municipalities of the province, highly depending on agriculture. In our municipality, we believed that disasters caused degradation of intangible cultural heritage (ICH) either by damaging ICH physical assets or by displacing the community, which further lead to degradation as people find themselves in new environment and societies (Figure 1). The new environment is totally different from their way of living, thereby restricting them from practicing their usual day to day activities and leading to the incremental loss of ICH.

This situation is not new to the Philippines. Being a country frequented by different types of disasters, significant efforts have been made to protect the people and the properties. Unfortunately, there is a huge dichotomy of approaches between significant players – local communities, technical and policy sectors (Figure 2). If you zoom in, there are various potentials and opportunities offered by these sectors, yet left unutilized due to fragmentation of programmes. The local communities are repositories of rich indigenous resiliency efforts, tested overtime, flexible, locally appropriate and more importantly connected to the people. These are practical



**Figure 1** ICH-disaster operational framework of the project.



**Figure 2** Local-technical-policy integrated nexus in DRRM of Tublay.

adaptations normally transmitted orally and non-written knowledge. Due to the increasing and intensifying impacts of disasters and climate change, these local adaptations are overwhelmed. These local practices and knowledge are promising approaches in resiliency building but are significantly threatened by disasters. Yet, they are often neglected by disaster risk reduction and management (DRRM) efforts. On the one hand, the technical sector offers promising futuristic state of the art, sophisticated, high technologies generated from researches. Yet, the system of development, transmittal and dissemination often is locally non-friendly. They are academically structured and often engaged few specialists in the development. Most of these technical innovations embed technical data and form that are hard to be interpreted by lay people. Moreover, the local communities are not familiar with the technologies. These instances result to poor support from the locals as they felt alienated and no sense of ownership on the programs. On the contrary, the policies are often copied or based on external contexts, most are top-down in approach, non-flexible and are untested if its relevant to the local communities. Policies are often prepared by technical people and local inputs are rarely considered. These limitations in the current policy development resulted in legislations that are less responsive, less engaging and are less accepted and supported by the public.

It is now one of the objectives of the municipality of Tublay to strengthen local DRRM and promote safeguarding and nurturance of this intangible cultural heritage or local knowledge and practices by integrating them on local programs and policies. Within this framework, the local government initiated a local project in partnership with researchers from the University of Auckland, New Zealand and the University of the Philippines-Diliman.

This project dubbed ‘Participatory 3 Dimensional Mapping (P3DM) in resiliency building’ showcases the integration of local sectors in DRRM programs particularly on hazard and risk assessment, vulnerability and capacity identification and intervention development (Figure 3). It has four components: a) 3D map development; b) participatory hazard and risk assessment; c) local resiliency profiling; and d) integration of indigenous knowledge, system and practices (IKSP) and ICH in DRRM.



**Figure 3** Local stakeholders brainstorming during the P3DM. (Source: Lawangen 2016)



**Figure 4** Children (left) and women (right) participating during the P3DM. (Source: Lawangen 2016)

This tool is very interactive and inclusive and encourages the participation of different sectors including young people, women and other minorities and more importantly, it breaks the dichotomy of technical and local efforts (Figure 4). This P3DM commenced with the development of the 3D scale model of the municipality which was prepared using scaled map prepared by the mapping unit of the municipality and an elevation map from the online digital elevation model (DEM). The 3D map was prepared by the stakeholders using local materials like bamboo sticks, common nails, push pins, yarns, paper and Styrofoam.

The different geophysical features of the municipality were reflected on the 3D map starting from rivers, forests, roads, public spaces and infrastructures, farms, houses, schools and others (Figure 5). Disaster prone areas were also identified by the community based on actual experiences. The places where disasters occurred were plotted and the assets, families and resources affected were identified. Technical



**Figure 5** The 3D scale model of the municipality (left); the legend for the features (center); and the disaster historical profile (right). (Source: Lawangen 2016)

people based on their assessment also indicated risky areas. This now leads to the identification of local hazards, which include typhoons, monsoon rains, drought, earthquakes, infrastructural fires and pest and diseases. These hazards then were ranked according to their significance based on agreed criteria, which are 1) frequency of occurrence and 2) impacts. The risks of the individual hazards were also identified and consolidated making it available for the community and to local government offices. Most serious risks of the different hazards include:

- 1) Damage of crops
- 2) Low production/income and bankruptcy
- 3) Damage of properties and farms/facilities
- 4) Decrease in the local food supply and food shortage (at home)
- 5) Reduce capacity to buy/access sufficient and nutritious foods and malnutrition
- 6) Increase in diseases
- 7) Landslides, loss of vegetation
- 8) Scarcity of water and injuries and deaths
- 9) Socio-cultural disruption

After plotting the different land uses and houses, and the high risk areas, the community started to profile assets and resources at risk. Families on these areas were tagged as priorities. With the 3D map providing a visual reference, it is now easier and convincing for the communities to determine elements at risk. Information and data from this activity were recorded by the participants and copy furnished to the local government for use.

Interestingly, the community were asked on the specific impacts of these disasters to ICH. They mentioned the following observable impacts:

- 1) Accelerated loss of ICH and indigenous practices
- 2) Disconnection of people to the land/space where these ICH and practices are linked (i.e. farms, rivers, forests, etc.)
- 3) Pressure among local people to move to new communities with different culture
- 4) Stoppage of oral transmittal to generations
- 5) Assimilation of the practices and cultural heritage



After risk assessment, the participants were asked how the different land uses and resources stayed intact despite the numerous disasters that occurred in the community. This leads to the identification of local adaptation and resiliency efforts.

The following are some of these ICH identified that are contributory to local resiliency.

1) The '*Ampasit* and the forest'

This is an example of indigenous world view and belief linked on their natural resources. *Ampasit(s)* is/are supernatural being living in the pristine forest. They are the overseer of this natural landscape. They have the power to make someone who harms their home ill. The high respect to these supernatural beings that live in this natural ecosystem and the belief that something bad will happen to anyone who harms these forests contributed to the preservation and protection of these ecological resources. The outcome of this belief contributes to the minimization of landslides and erosions at the same time improve local hydrology and availability of water, which are among the primary risks of disasters identified. Ecologically speaking, the more intact the forest, the more resilient it is (Figure 6).



**Figure 6**  
Protected forest.  
(Source: Feliciano 2017)

2) *Daw-es* and *Am-am*

These are cultural rituals related to disasters. *Daw-es* is a cleansing ritual after calamities or accidents while *Am-am* is generically a thanksgiving and offering ritual for good fortune, good health or a good harvest. These are usually celebrated by the families affected (on their own homes) and in extreme occasions (say after a severe disaster or mass casualty accident) participated by the whole community. Usually, a *Mambunong* (shaman priest) presides these rituals. Animals (usually chicken or pig) are butchered and shared by the people

who attended. These rituals provide avenues for community and family socialization and opportunity for family members and acquaintances to see each other.

3) *Aduyon/alluyon/kamal*

These are innate social practices among indigenous communities. These are voluntary participations of community members in civic activities strongly observed during difficult times like disasters and emergencies and other activities for public welfare such as sourcing and installation of water system and road clearing.

4) *Uma* and *payew* (indigenous upland farm and rice ecosystems)

Indigenous farming system has been scientifically recognized as sustainable and resilient. In Tublay, indigenous rice farming (*payew*) and upland farming (*uma*) still exist. These two farming systems are integrated local technologies carefully designed to optimize biophysical and socioeconomic resources and opportunities of the farm (Figure 7). It showcases sustenance of ecological balance and economic viability of the farm, conservation of agrobiodiversity and continuation of social-cultural farming traditions, which are fundamentals in the sustainability and resiliency of the farm. The sound co-existence of these different farm components creates compensating and supplementing interactions among them to withstand environmental perturbations. This farming system addresses some of the primary issues during disasters including economic loss, food shortage, landslides on farms, soil and fertility loss and other.

5) *Tufing* (indigenous slope protection)

*Tufing* is skilful slope protection and engineering technology of the indigenous people in the Cordillera region in the Philippines including the *ITublays*. It is a preventive and conservation technology adapted in the high elevation and steep upland farms to prevent erosion and landslides at the same time conserve water,



**Figure 7**  
Indigenous vegetable and rice farm in Tublay.  
(Source: Cangsan 2018)



**Figure 8**  
*Tufing* along farm slopes in Benguet.  
 (Source: Benguet Tourism Office 2015)

soil nutrients and soil particles. Indigenous farmers skilfully stacked stones along slopes of terraces creating resilient and picturesque farms (Figure 8).

6) *Kuwelo* (indigenous low cost water impoundment and water conservation)

This is a local water conservation adaptation along high elevation farms where water supply is scarce. This is a very simple strategy where farmers dig earthen impoundment and provide plastic linings on the side to prevent water from seepage. The capacity of the impoundment depends on the availability of space in the farms and the preference of the farmer. Often, these impoundments were prepared before the onset of the rainy season, which coincides with land preparation of most farms. This local innovation addresses the problem of the farmers on water scarcity, especially during drought (Figure 9).



**Figure 9** *Kuwelo* (water impoundment).  
 (Source: Balingan 2018)



## 7) Food preservation

Indigenous communities have rich technologies and practices on food preservation. These technologies and practices enabled them to cope with the worse environmental and climatic conditions. Unfortunately, these practices are deteriorating hastily due to convenience brought by modern technologies. In the locality of Tublay, there are few remaining practices but on the verge of degradation. These include *kini-ing/kinuday* and *bekol/bu'ko* (Figure 10).

The *kinuday/kini-ing* is an ancient way of preserving meat (usually pork, beef or carabeef) by smoking and drying while the *bu'ko* is a local system of preserving sweet potato by sun drying it in chips. These are indigenous ways of food stockpiling. Historically, these were practiced to ensure food availability during the lean season, which usually during extreme hydro meteorological or social conditions. Sweet potatoes cannot be produced throughout the year; hence, drying some of it during abundance is the most adapted way of preserving for the lean period. These local food preservations and stockpiling strategies can address food shortage and inaccessibility to food supplies during disasters, which were identified by the people as among the common concern during disasters.

After understanding the local hazards, risks and the local resiliency efforts, we now have a better understanding of the interconnectivity of these interests. The local government strategized on how to ensure the integration of these local knowledge and ICH to DRRM policies and programs and had come up with four activities. These are through:

- 1) Local ordinances and policies – the output of this activity and related innovations were shared with local legislative bodies for consideration in the development of policies.
- 2) Integrated program (Seal of good barangay governance) – under this program,



**Figure 10** *Kini-ing/kinuday* (indigenous meat preservation) (left); and *bu'ko* (right).  
(Source: Maddela 2010; The Cordillera Connection 2013)



the use of local innovations and knowledge in local development is one of the criteria

- 3) Recognition of best practices on local government – incentives were provided to local barangays with innovative programs showcasing local resiliency
- 4) Community based program (*Brigada sa barangay*) – is a municipal wide program aimed at furthering local knowledge in risk warning and preparedness

Thank you very much.