Increasing awareness on household rainwater tanks as supplementary water supply for island municipality in the Philippines

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Abstract. The Australia-ASEAN Council of the Department of Foreign Affairs and Trade through Swinburne University of Technology implemented the project, “Australian Design Rainwater Tanks for Households and Schools in the Philippines”. The project involved working with relevant local counterparts for proper design, installation and management of rainwater tanks for effective rainwater harvesting from schools and households in Philippines. A Local Government Unit staff and rainwater tank supplier and installer from the Philippines visited Melbourne to learn more about the storm water management projects by Knox City Council, SouthEast Water and the water supply treatment plant operated by Melbourne Water. A rainwater tanks manufacturer in Melbourne was also visited to keep inform of the latest design, proper installation and management of rainwater tanks. The project also involved the installation of rainwater tanks to schools and households in Dimasalang, an island municipality in the Philippines. Data collection on water consumption from rainwater tanks is in progress.

1. Background
Household rainwater tanks is increasingly becoming popular as alternative source of water supply worldwide. Its popularity as an alternative water source has significantly increased in recent years [1]. Fuelled by widespread drought [2], rising water prices [3], government incentives [4] and emerging awareness of environmental concerns [5], adoption of rainwater tanks has spread rapidly to household properties [6].

In Melbourne, Australia, the number of dwellings with rainwater tanks rose by 170% in a six year period [7] and 32% increase in the last three years [8]. This could be attributed to the rebates given by the Victorian Government to households who installed rainwater tanks from 2010 to 2015. In Germany new rainwater tank installations are reported at 100,000 per year [9]. This trend has been seen to lesser extents in many other regions such as China [10], Korea [11] and some states of America [5]. Furthermore, changing climate conditions have caused interest in RWH spread to many areas that have not traditionally valued decentralised water collection [12].

It is worth noting though that while increase in household rainwater tanks are occurring in most countries, there is a slow adaptation of this practice in developing countries especially in tropical regions where there are abundant of rainfall to be harvested during the rainy season and there is a need for additional supply of water during the dry season. This includes countries like the Philippines and Indonesia [13]. One of the barriers in the adaptation of the rainwater tanks can be due to most people in these developing countries believed that rainwater tanks are expensive and unaffordable [14]. With two seasons in a year, many believed that it would be uneconomical to install household rainwater tanks as...
it would be empty during the dry season. It was also reported that in Indonesia rainwater is considered to be of lower quality [15].

This paper presents a partnership project between Australian academic institution and a Local Government Unit in the Philippines to increase awareness on the importance of household rainwater tanks as supplementary supply of water to reduce reliance on deep wells among the residents and at the same time manage stormwater to minimize pollution in the oceans in an island municipality in the Philippines.

2. The Project
The project, “Australian Design Rainwater Tanks for Households and Schools in the Philippines” aims to increase awareness on the importance of rainwater tanks as source of water; to decrease reliance on deep wells, and to minimize ocean pollution through runoff. The project also involves providing improved technology and skills on the design, installation and management of rainwater tanks. A total of 15 rainwater tanks of varying capacities have been installed with 1000L for schools and 430L for households.

The project is funded by the Department of Foreign Affairs and Trade – Australia ASEAN Council in 2017. The Council’s mandate is to cover the ten countries of ASEAN. They seek to:

- Initiate and support influential persons and groups in Australia and South-East Asian countries, with activities that encourage a greater interest in the development of cooperation and collaboration between countries;
- Promote cooperation between individuals and institutions in Australia and South-East Asian countries which enhance learning, teaching and research;
- Broaden awareness and understanding in Australia and South-East Asian countries of each other’s culture, values and traditions;
- Promote the Australia-ASEAN region relationship and foster relations through media and alumni activities; and
- Wherever possible the Council seeks to expand people-to-people and institutional links.

2.1. The Project Area
The project was implemented in one of the municipalities of the island province of Masbate (Figure 1). Although more than 2.1 billion people have gained access to improved drinking water sources since 1990, exceeding the United Nations Millennium Development Goals target (http://www.un.org/millenniumgoals/pdf/Goal_7_fs.pdf), there are still a number of people in developing countries who have limited access to sufficient amount of good quality water.

The Philippines is tropical country with average monthly rainfall of 204.7 mm, ranging from 510.2 mm in August to 18.23 mm during dry months (February). In island municipalities despite of this amount of rainfall during the rainy months, water shortage is experienced during dry season or summer months. Residents in island provinces and municipalities heavily rely on deep wells.

Masbate Province is the 11th largest island in the Philippines but is one of the poorest provinces in the country. In 2015, it had a population of 892,393 (National Statistics Office of the Philippines (web)). It was reported that in 2010, four out of 10 families did not have access to clean water and six out of 10 families have no access to a clean toilet. In 2014, this slightly improved but is still having three out of 10 families with no safe water and five out of 10 have no access to a clean toilet (http://www.gmanetwork.com/news/news/specialreports/526618/biyaheng-totoo-a-barangay-in-masbate-still-cries-for-clean-water-toilet/story/).
2.2. The Project Outcomes

2.2.1. Orientation Session. The project was introduced to the community through an orientation session (Figure 2). In this session, the community was informed of the project funded by the Australian DFAT-ASEAN Council, its objectives, the selection of the recipients and the support expected from the local Government and the recipients.

![Figure 1. Project Area.](image1)

The local counterpart also informed the attendees of the value of the project to the community and encouraged them to participate in the project (Figure 3).

![Figure 2. Project Presentation to the Community in Dimasalang, Masbate, Philippines.](image2)
2.2.2. Selection of the Rainwater Tanks Recipients. The project is limited in funding and only provided 18 rainwater tanks to a number of schools and households. To get the most out of these limited number of rainwater tanks, households and schools recipients were selected based on the number of users within the households or schools.

A Survey Form was distributed to each of the attendees in the Orientation Session. The survey questions focus on the household size, the area of the roof and the condition of the roof and guttering system. The household size is one of the criteria in the selection of household recipients based on the premise that larger household size would mean more users of water and higher potential of water savings. For the schools this is based on the number of students.

The roof area was also considered as this would translate to more rainwater harvested and not having a rainwater tank would mean more rainwater wasted and runoff to the ocean. Houses with large roof areas were given preference.

The remaining criteria used in the selection of recipients is the condition of roof and guttering system. As the project only involved the installation of rainwater tanks houses with good roof and guttering system were preferred as beneficiaries of the project.

Based on these criteria, 15 households and three schools were selected as recipients of the project. The households selected have an average household size of 7, and the total enrolment in the three schools is 3762. These equate to 3885 beneficiaries.

2.2.3. Collaboration with Australian Relevant Organisations. As per project brief, representatives of the Local Government and rainwater tanks supplier visited Melbourne, Australia to understand how stormwater are managed by local councils in Greater Melbourne, by water authorities and how water supply system is managed by Melbourne Water (Figure 4). A visit to a rainwater tank manufacturer was also undertaken to observe the latest technology in rainwater tanks production, increase understanding on rainwater tanks features and installation to efficiently harvest rainwater from roofs (Figure 5).
2.2.4. Installation of rainwater tanks in schools and households. A total of 18 rainwater tanks were installed in Dimasalang, Masbate, Philippines. Local labor resources were utilised in the delivery and installation of rainwater tanks in hard to reach barangay schools and houses. Training were also provided by the rainwater tanks supplier on the proper installation after confirmation and agreement with the recipients on the location of rainwater tanks. As part of the project brief, these rainwater tanks have to have the Australian DFAT ASEAN Council logo (Figure 6).

2.2.5. Collection of water usage data from rainwater tanks to enhance research on the benefits of rainwater tanks. The collection of water usage data is on-going. The information that would be collected is beneficial in determining how rainwater tanks provides alternative supply to these household and schools and add to the currently scarce data on rainwater tanks benefits.

3. Conclusion
The study has provided rainwater tanks to recipients who are among the few needing this alternative water supply system. It also provided additional knowledge and understanding to Philippines counterpart in regard to storm water management in Australia.

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