

令和元年6月20日現在

機関番号：24201

研究種目：基盤研究(C) (一般)

研究期間：2015～2018

課題番号：15K06373

研究課題名(和文) Study on the Urban Redevelopment Process in Tacloban City (Philippines)

研究課題名(英文) Study on the Urban Redevelopment Process in Tacloban City (Philippines)

研究代表者

ヒメネス ホアンラモン (Jimenez Verdejo, Juan Ramon)

滋賀県立大学・環境科学部・准教授

研究者番号：10525281

交付決定額(研究期間全体)：(直接経費) 3,800,000円

研究成果の概要(和文)：本研究のケーススタディは、フィリピンの仮設住宅計画に基づいている。特に Tacloban タクロバン市は、2013年11月8日に発生したヨランダ台風により多大な被害をもたらした。市の70%以上が破壊され、4万戸の住宅が半壊し、2万戸の住宅は全壊した。そのため、タクロバン市と国の国土交通省(DPWH)は北部の土地に、仮設住宅と恒久住宅のプロジェクトを台風の後から開始した。本研究は、このタクロバン市の住宅地の現地調査に基づいている。都市と建築デザインの分析、建設プロセスの分析、そして使用と管理の時間経過の変化を明確にしていく。

研究成果の学術的意義や社会的意義

フィリピンにおける住宅不足と未熟な建設技術の問題は、仮設住宅の長期使用の可能性が高くなると思われる。仮設住宅の長期使用における重要なポイントとして、仮設住宅のコミュニティの場所とデザインである。タクロバンの場合、特に重要視されるのは仮設住宅のコミュニティの場所である。タクロバンの災害に対する改修のプロセスの中で、仮設住宅は長期使用をする可能性が高いとされる。そのことを仮定できたなら、今回の改修でタクロバンの街全体のマスタープランを作り、災害後の都市計画のモデルケースとなるチャンスがあったといえる。

研究成果の概要(英文)：Based on the case study of the temporary housing programme in Philippines, this research looks at the long-term outcomes of temporary housing projects in Tacloban, the most affected town by the Typhoon Yolanda in November 8, 2013. More than 70 percent of Tacloban city has been destroyed, including 40,000 homes damaged and over 20,000 completely destroyed. The Tacloban City government and the Department of Public Works and Highways (DPWH) have tagged the un-operational economic zone in the city's northern suburbs to serve as the resettlement area for victims displaced by super typhoon Yolanda. This research based on the field survey of these housing areas, analysis of their urban and architecture design and analysis of their construction process and evolution in time of their uses and management.

研究分野：都市計画・建築計画

キーワード：Urban Redevelopment Tacloban Yolanda Typhoon Temporary housing Philippines

1. Introduction

1.1 Background and objectives of the research

In November 8th 2013, typhoon Yolanda (known as Haiyan outside The Philippines) affected Tacloban city (Figure 1) with winds of about 65-70 m/s¹. According to NSO, NDRRMC and DSWD, 88% of the households and 87% of the population of Tacloban were affected by this disaster². According to fieldwork undertaken by several authors, the most affected structures were those made of rafter and corrugated metal sheets, whereas those made of masonry and reinforced concrete showed less damage³, mainly caused by the inundation from the storm surge, with peaks about 5-6 m according to various assessment between computer simulations and fieldwork^{4 5 6}.

After the disaster, in March 2014, UN Habitat and the municipality of Tacloban tackled a recovery and rehabilitation plan (TRRP) that included massive relocation of residents in the North area⁷; the philosophy of this process relied on fostering the resiliency of the residents, following the principles of Build Back Better (BBB), as defined by the Hyogo Framework of Action (HFA)⁸. This approach has been put into practice in other disasters such as Nepal or Indonesia⁹. Several settlements, both temporary and permanent, formal and informal, were erected in that area from 2014 following the TRRP.

A variety of authors have investigated several aspects of this relocation process. J.M. Ong et al have studied the shortcomings and difficulties of implementing those settlements¹⁰; a field survey carried out by Compton C identified the location of 3 informal temporary settlements in Central Tacloban and 6 in the North area, but did not provide information about the layout, planning or facilities of them¹¹; Dakila K analysed the imposition of “No building zones” in the relocation process, considering them as an excuse to “clean up” the city of informal settlements¹². However, it was found out that no research dealt with the issue of identifying the temporary settlements; not only its location, but also their urban layout and main characteristics.

Talking about the temporary settlements, it is not easy to build a common framework. Despite being temporary, some settlements last for several years¹³ and become permanent. Likewise, they are preferred instead of refugee camps because they allow for freedom of movement and an acceptable degree of dignity¹⁴. Those minimum standards are considered as the basic lifeline that every person should have in order to live with security, hygiene and dignity, according to the United Nations Refugee Agency (UNHCR)¹⁴.

Facing this situation, this research is aimed at identifying the temporary settlements established around Tacloban city after the Haiyan typhoon and surveying its main characteristics in terms of planning, location and facilities to assess whether they comply with minimum standards for a decent living. To effectively comply these objectives, this manuscript is organized into the following sections.

At first the methodology is explained; after that, results from the fieldwork are shown; the minimum standards for temporary settlements according to the UNHCR are analyzed and then assessed against results from fieldwork; At last, the pertinent discussions and conclusions are drawn.

1.2 Research methodology

The research methodology includes three main activities: On-site fieldwork, review of documents from international organizations involved in the management of disaster relief and comparative assessment.

The on-site fieldwork, it was carried out in four different phases. J.R Jimenez Verdejo, J.A. Pulido Arcas and T.D. Elizaga were responsible for the first campaign, conducted from October 31 to November 9, 2014. J.R Jimenez Verdejo, S. Funo, R. Inoue and K. Mabuchi did the second campaign, from

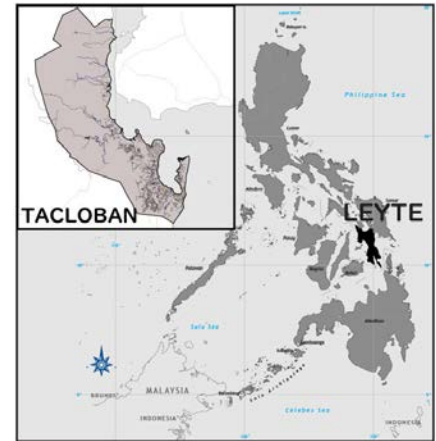


Figure 1. Tacloban and Leyte island

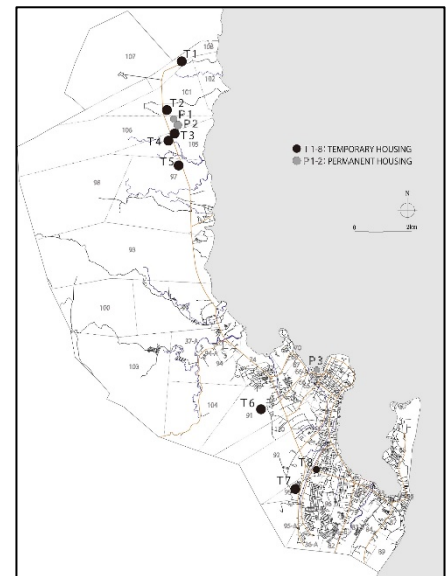


Figure 2. Temporary settlements

December 19 to December 26 of 2014. J.R Jimenez Verdejo did the third one from February 14 to March 1, 2015. Lastly, J.R Jimenez Verdejo, S.Funo, R. Inoue and K. Mabuchi undertook the last one from August 2 to September 4, 2015. The review of documents included, mainly, the UNHCR emergency handbook, which provides the camp planning standards for planned settlements¹⁴

The comparative assessment was done by comparing the standards defined in the UNHCR handbook with those observed during the on-site fieldwork.

2. Results from the fieldwork.

2.1. Temporary settlements

8 temporary settlements were identified during the fieldwork (Figure 2), which were named from T1 to T8. 5 of them were located in the North area of Tacloban, which was, indeed, the intended area for relocation, all of them hanging from Babatngon road, whereas 3 of them were located in the outskirts of Tacloban city. The main characteristics of each one of them are detailed as follows (Figure 3):

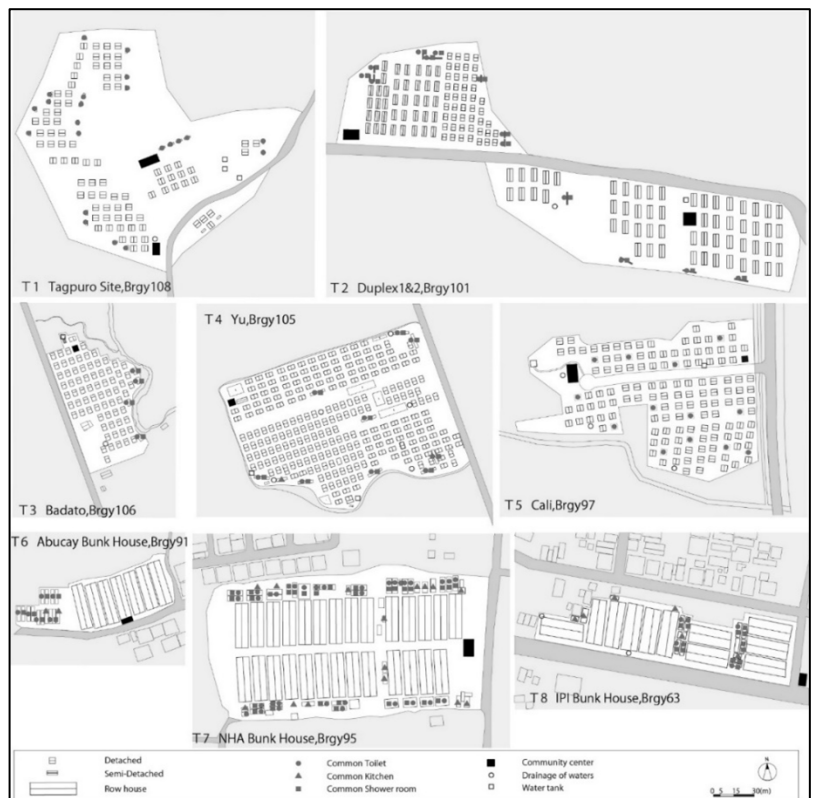


Figure 3. Plan of temporary settlements

- 1) TAGPURO (Figure3-T1): The construction of this community was completed in October 2014 in a plot with 23,327 m² provided by the municipality of Tacloban near the seashore and connected with a secondary road that leads to Babatngon road. This community features detached houses, which are distributed on an irregular basis. Common facilities include a community centre and shared toilets.
- 2) NEW KAWAYAN (Figure 3-T2): This project was scheduled for 2014, but it was completed much earlier. In the same fashion as T1, it has access through a secondary road. The settlement has an open plan design and comprises two types of houses: Single and detached. The project features common toilets and showers, as well as two community centres, but did not provide with common kitchens; for this reason, the residents have started to implement these kitchens into their own dwellings.
- 3) SANTO NIÑO BADATO (Figure 3-T3): Completion date for Santo Niño was scheduled for October 2014. This settlement is located on the side of Babatngon road and has an orthogonal plan with detached houses. Common facilities include one community centre, shared toilets, common showers, one water tank and water drainage. This settlement was made, as far as possible, accessible: Shorter paths for both disabled persons and pregnant women were provided by placing some dwellings near the shared premises. Solar panels provide with basic electric power to some dwellings.
- 4) SAN ISIDRO (Figure 3-T4): This is the biggest project amongst those located in the North area. Construction started relatively soon, in February 2014. It is located along Babatngon road and has an orthogonal plan with detached houses. This project started relatively soon, in February 2014, but the construction is still ongoing, having moved in 69 families, who come from Barangay 37, and from now on there are plans to house more families here, coming from the city centre; however, because of the long distance between city centre and this spot, residents are scarce.
- 5) CALI (Fig.3-T5): The completion date of Cali was scheduled for December 2014, and amongst project for temporary houses, this one was completed the last. Build coverage ratio is the second lowest, 16.3%, and, in the same way as in Tagpuro, residents have started making use of the exterior spaces attached to the kitchens of their dwellings for growing vegetables.
- 6) ABUCAY (Fig.3 T6): This settlement was built in a mountainous area, so available land located in the outskirts represented an issue. The available land for this project is rather small. It features seven bunk houses and has accommodated 121 families thus far.
- 7) CALIBAAN (Fig. 3-T7): The Calibaan project of temporary housing is placed in the areas designated as “No build zones” from the Barangays 31, 35-A, 88 and 89⁷. Common kitchens, shower rooms, and unit baths account for 30 elements, 15 of which are common kitchens.
- 8) SAN JOSE (Fig. 3-T8): With a land area of 7.900 m², 309 families inhabit this settlement distributed in 17 buildings. Before the typhoon, these people would live in the Barangays 37, 60, 62-A and 62-B, which were located near the seashore. Shared toilets and showers room account for 12 units, and shared kitchens for 5 units, distributed in the spaces between dwelling units.

Figure 4 illustrates the different types of houses used in the temporary settlements. There are basically three types: Detached (D), semi-detached (SD) and bunk houses (B). Three subtypes can be found for detached houses (1Ta, 1Tb and 1Tc), accounting for 23.04

m², 15.52 m² and 22.31 m² respectively. Sub-types 1Tb features internal divisions, whereas subtypes 1Ta and 1Tc do not. Semi-detached houses units accounts for 18.06 m² distributed in a single space. A single unit of bunk houses features only 9.10 m² and has no internal divisions.

2.3 Surveyed data

Results from fieldwork is depicted in Table 1. The number of dwellings from each typology was surveyed and, amongst them, those that were effectively occupied were checked. Plans were also drawn for each main type and sub-type (Figure 4), having in this way an estimation of the area of a single unit, as well as the total built area for each settlement. The settlement area was estimated by on-site fieldwork, aided by satellite images. After that, taking into account the unitary surface per dwelling and the total number for each type of dwelling, the total area occupied by dwellings and, consequently, the available camp area (open space) was estimated. The current and total number of potential residents were estimated considering the minimum covered living area per person, according to the UNHCR emergency handbook ¹⁴. Facilities were surveyed, and their total number were registered.

3. Analysis of data and assessment of standards

3.1. UNHCR standards for temporary settlements.

Standards from UNHCR emergency handbook were taken as a reference for calculation. This manual gives orientation about the minimum living conditions that residents of temporary settlements should be provided with to live with security and dignity in a healthy environment; these are called “*Emergency standards*” and are divided into four sections.

- 1.) Minimum standards for planning camps: This standard indicates that at least 3.5 m² per person should be available as a covered area.
- 2.) Average camp area per person (m² per person): This corresponds to the open area per person, excluding private space (roofed space), that should be available to avoid overcrowding. Four ranges are considered: Standard (45 m²), acceptable range (35 m²), unacceptable range (34-30 m²) and critical range (29 m²).
- 3.) Indicative modular planning units: Camps should be organized in modules, starting with the smallest one (Family, 4-6 people) and building up to compose larger modules. Community (CO): 16 families (around 80 people); Block (BL): 16 communities (around 1.250 people); Sector (SC): 4 blocks (around 5.000 people); Settlement (ST): 4 sectors (around 20.000 people).
- 4.) Site planning standards for services and infrastructures: Planning standards are provided with regards to the following facilities: Communal latrines, showers, water supply, rubbish container, refuse pits, health centre, referral hospital school, distribution centre, market place, feeding centre, storage area, lighting, registration area, community centre (administration/office), security post and security fencing.

3.2. Assessment of temporary settlements in Tacloban area

The eight temporary settlements have been assessed against the UNHCR standards which are summed up in section 3.1 (Table 2). With regards to the assessment, the following considerations shall be made.

- 1.) Minimum standards for planning camps: The number of dwellings (built and inhabited) in each settlement, as well as their typology, was surveyed; basic plans and elevations were also drawn (Figure 4). It was extremely difficult to estimate the total number of residents in each settlement, so an estimation had to be done. Assuming that the minimum standards from UNHCR handbook was met, 3.5 m² of covered area per person was

Table 1. Result of fieldwork

Settlement	Area			Dwellings					Residents		Facilities					
	Settlement area (m ²)	Floor/area ratio	Available camp area (m ²)	Detached	Semi-detached	Bunk house	Total	Occupied	Potential (P)	Current (C)	Shared kitchen	Community center	Shared toilet	Water tanks	Common showers	Water drainage
T01	23.327	6.38%	21.839	86	0	0	86	71	499	416	0	2	24	2	0	1
T02	25.148	40.33%	15.006	76	249	0	325	260	1726	1381	1	5	29	4	13	1
T03	4.750	54.55%	2.159	130	0	0	130	108	753	627	5	0	12	4	4	2
T04	17.704	24.04%	13.448	246	0	0	246	69	1553	436	0	3	11	0	9	4
T05	14.483	16.32%	12.120	117	0	0	117	97	739	618	0	2	24	3	0	3
T06	4.288	34.87%	2.793	0	0	168	168	168	437	437	0	1	26	2	6	0
T07	22.409	25.74%	16.641	0	0	648	648	452	1685	1176	15	1	30	0	30	0
T08	7.900	45.97%	4.269	0	0	408	408	309	1061	804	5	0	12	0	9	2

2.) estimated. After that, an estimation of the current number of residents, that is, those ones who inhabit occupied dwellings, and potential number of residents, that is, the estimated number of people that would live in that settlement in the event that all houses were inhabited, was done. This estimation is depicted in Table 1 as potential residents (P) and current residents (C), giving in this way two possible scenarios: The first one showing the current situation of each settlement (scenario C) and the second one, showing an hypothetical situation where all available houses would be inhabited (scenario P).

3.) Average camp area per person: Considering the unitary area of dwellings (Figure 4) and the total number of dwelling for each typology (Table 1) the area occupied by dwellings was calculated; after that, available camp area and floor coverage could be obtained (Table 1). This area was divided into the number of current (C) and potential (P) residents to obtain a figure that could be used as an assessment parameter. **Table 2** shows the disparity of standards between settlements. Only T01 meets the minimum standard of UNHCR both in the current situation and also in the event of a full occupation. The rest of settlements are below the recommended standard: T02, T03, T05, T06, T07 and T08 are within the critical range, always far below 29 m² per person. Only T04 is, at present, in an acceptable condition, but it could fall into a critical condition if all houses were inhabited.

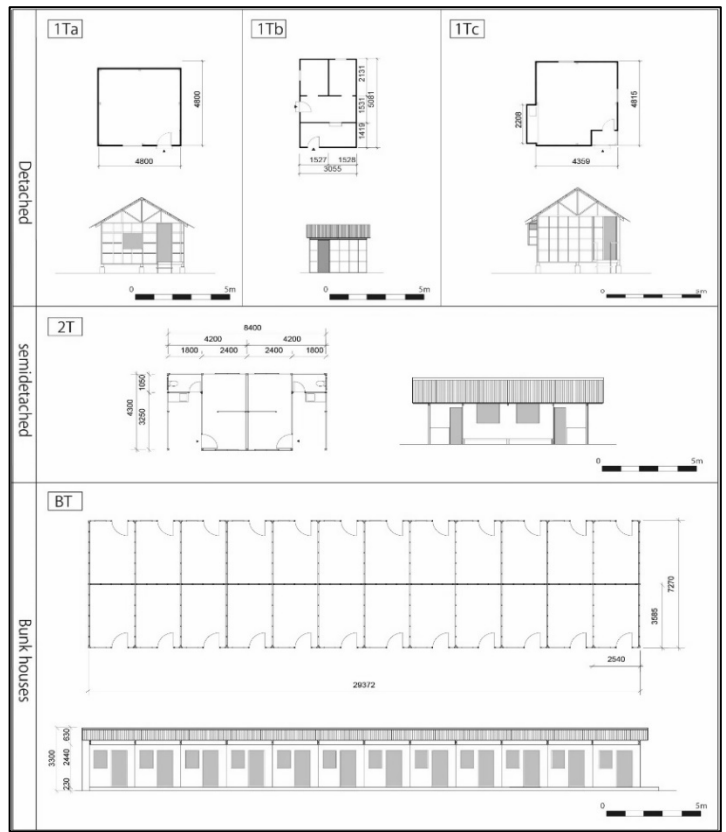


Figure 4. Housing typologies

4.) Indicative modular planning units: According to the number of residents, all settlement range between community and block. Comparing their current state and the potential number of residents, only T04 and T08 could jump from community to block.

5.) Site planning standards for services and infrastructures: The following facilities were not present in any of the settlements: Rubbish container, refuse pits, health centre, referral hospital school, distribution centre, market place, feeding centre, storage area, lighting, registration area, security post and security fencing. This can be explained by two reasons: The first one and most obvious, these facilities were not planned; the second one, some of them need a settlement with a larger scale (at least a sector with 5.000 people) and, being these settlements smaller, it made no sense to plan them. For instance, 1 school is recommended per 5.000 people or 1 sector, and neither of the surveyed settlements can house as much as residents. Assessed services are depicted in Table 2: Common toilets, common kitchens, common shower, community centre, drainage of waters and water tanks (access to drinkable water). Only T01 and T06 settlements comply with the standards regarding common toilets. The number of common kitchens vary greatly between settlements; this can be explained by the fact that some typologies feature private kitchens, so common facilities are not necessary. Provision of shared showers vary greatly between settlements. Some of them (T01 and T05) have none; only T07 comply with UNHCR

6.) Standard at present time but, if all dwelling were inhabited, it would not be possible to meet this standard. The rest of settlements do not meet the minimum standard by far. The UNHCR does not provide guidance for community centres, but it is remarkable that all settlements feature, at least, one of this facility. However, once more, there is disparity between settlements: T01 has 2 centres (one per 208 people) and T07 only one, serving 1176 people. In the same fashion, there is no minimum standard regarding drainage of water, but some settlements do not have this facility (T06 and T07); amongst the ones that have this facility, there is disparity in data. The most evident shortcoming is related to water supply. Despite the minimum standard is 1 tank per 80 people, 3 settlements (T04, T07 and T08) do not have any of it. The ones that feature some sort of water supply are all far beyond the recommended standard.

4. Conclusions

The following conclusions can be drawn from this research.

1.) 8 temporary settlements have been surveyed around Tacloban area, which are distributed around the city centre and the reallocation are in the North fringe of the islands. Their location, extension and planning are very diverse, and no common pattern can be devised for any of them.

Table 2. Compliance with standards from UNHCR emergency handbook

UN Standard (unit)	T01		T02		T03		T04		T05		T06		T07		T08		
	P	C	P	C	P	C	P	C	P	C	P	C	P	C	P	C	
Modular planning unit	CO	CO	BL	BL	CO	CO	BL	CO	CO	CO	CO	CO	CO	BL	BL	BL	CO
Average camp area per person (Sqm)	46.7	56.1	14.6	18.2	6.3	7.6	11.4	40.6	19.6	23.4	9.81	9.8	13.3	19.1	7.4	9.82	
Common toilet. 1 per 20 persons	21	18	60(*)	48(*)	63	53	142	40	30	26	17	17	57	40	89	67	
Common kitchen: No guidance	(*2)	(*2)	0	0	0	0	(*2)	(*2)	(*2)	(*2)	437	437	113	79	177	134	
Common shower: 1 per 50 persons	-	-	133	107	189	157	173	49	-	-	73	73	57	40	118	90	
Community centre: As appropriate	250	208	863	691	753	627	1553	436	370	309	437	437	1685	1176	1061	804	
Drainage of waters	499	416	1726	1381	377	314	389	109	247	206	-	-	-	-	531	402	
Water tank: 1 per 80 people	250	208	432	346	189	157	(*3)	(*3)	247	206	219	219	(*3)	(*3)	(*3)	(*3)	

(*) Semi detached houses feature private toilets

(*2) Private kitchens are available inside houses

(*3) There are no water tanks in T04, T07 and T08.

- 2.) According to the UNHCR standards, all settlements range between block and sector, placing them in the middle range of the classification. There are two of them that are placed between the two categories, depending on the percentage of occupied dwelling and the number of residents. Smaller or bigger settlements are not present.
- 3.) None of the assessed settlements comply with all the criteria, so that they can be categorized as a settlement that provides residents with a dignified living. The most evident shortcoming is the one related to the camp area per person, which prevents overcrowding that, at last, can lead to other
- 4.) conflicts, such as insecurity and rapid spread of diseases. Sanitary facilities are present in all settlements, but do not reach minimum standards per UNHCR.
- 5.) All settlements have facilities that are not regulated by the UNHCR, such as the community centres. This suggests a real concern for building a strong community and provide social interaction between residents. In turn, recovery and resilience of communities reach beyond the provision of basic facilities and has much more to do with protecting and fostering the bond between families and neighbours.

Summing up, this research has clarified the basic planning features of 8 temporary settlements around Tacloban area, assessing them against minimum standards recommended by international authorities. This has to do with common space for settlers. Future research is needed for clarifying the main characteristics of the different typologies of dwellings, assessing in such way the convenience of the private space for displaced residents.

REFERENCES

1. SANADA, Y., TAMURA, Y., NARAFU, T., SHIMIZU, T. & MITA, N. Damage to Building Structures in Philippines Due to Typhoon Haiyan. *J. Wind Eng.* **40**, 30–39 (2015).
2. Mejri, O., Menoni, S., Matias, K. & Aminoltaheri, N. Crisis information to support spatial planning in post disaster recovery. *Int. J. Disaster Risk Reduct.* **22**, 46–61 (2017).
3. MAS, E. *et al.* Field survey and damage inspection after the 2013 Typhoon Haiyan in The Philippines. *J. Japan Soc. Civ. Eng. Ser. B2 (Coastal Eng.* **70**, I_1451-I_1455 (2014).
4. MORI, N. *et al.* Forecast and Hindcast of Storm Surge Modeling by Typhoon Haiyan in 2013. *J. Japan Soc. Civ. Eng. Ser. B2 (Coastal Eng.* **70**, I_246-I_250 (2014).
5. NAKAMURA, R. *et al.* Comparison between simulation of storm surge invoked by typhoon Yolanda and field results. *J. Japan Soc. Civ. Eng. Ser. B2 (Coastal Eng.* **70**, I_236-I_240 (2014).
6. KAWAI, H., SEKI, K. & FUJIKI, T. Storm Surge and Wave Characteristics of Typhoon 1330 in Central Philippines. *J. Japan Soc. Civ. Eng. Ser. B2 (Coastal Eng.* **70**, I_221-I_225 (2014).
7. Tacloban, M. of. *Proposed Tacloban Recovery and Rehabilitation Plan.* (2014).
8. Nations, U. *Hyogo framework for action 2005-2015.* (2015).
9. Landry, M. D. *et al.* The 2015 Nepal Earthquake(s): Lessons Learned From the Disability and Rehabilitation Sector's Preparation for, and Response to, Natural Disasters. *Phys. Ther.* **96**, 1714–1723 (2016).
10. Ong, J. M., Jamero, M. L., Esteban, M., Honda, R. & Onuki, M. Challenges in Build-Back-Better Housing Reconstruction Programs for Coastal Disaster Management: Case of Tacloban City, Philippines. *Coast. Eng. J.* **58**, 1640010-1-1640010–32 (2016).
11. Compton, C. The unheeded present and the impossible future: temporalities of relocation after Typhoon Haiyan. *Crit. Asian Stud.* **50**, 136–154 (2018).
12. Yee, D. K. P. Constructing reconstruction, territorializing risk: imposing “no-build zones” in post-disaster reconstruction in Tacloban City, Philippines. *Crit. Asian Stud.* **50**, 103–121 (2018).
13. Division of program, support and management, shelter and settlement section. *Settlement folio. Planned settlement chapter.* (2016).
14. Agency, T. U. refugee. *UNHCR Emergency handbook.* (2018).