

LESSONS FROM TYPHOON NARI

Storm Resistant Housing Shown To Be Effective

Tran Van Giai Phong, Technical Lead
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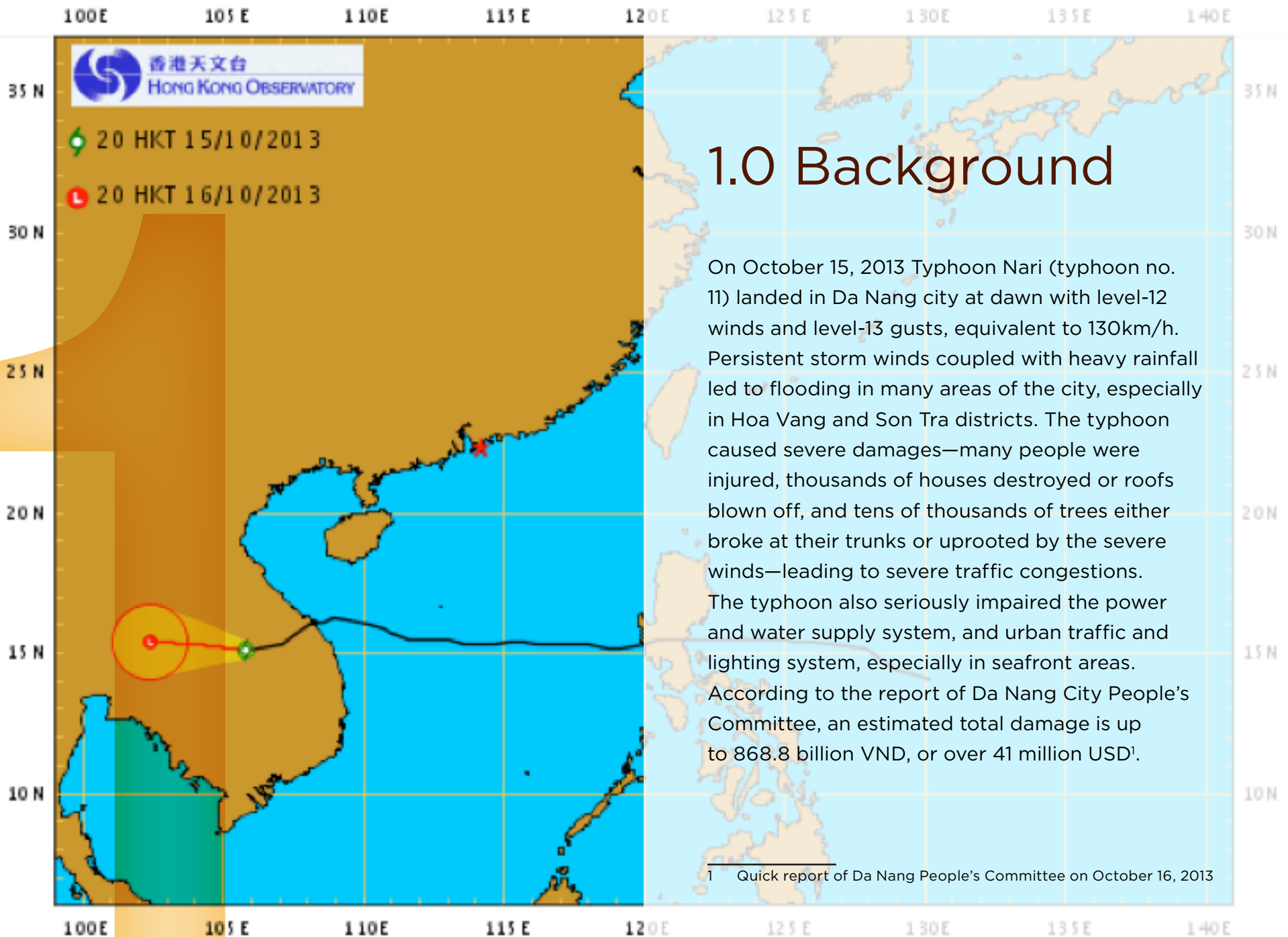
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1.0 Background

On October 15, 2013 Typhoon Nari (typhoon no. 11) landed in Da Nang city at dawn with level-12 winds and level-13 gusts, equivalent to 130km/h. Persistent storm winds coupled with heavy rainfall led to flooding in many areas of the city, especially in Hoa Vang and Son Tra districts. The typhoon caused severe damages—many people were injured, thousands of houses destroyed or roofs blown off, and tens of thousands of trees either broke at their trunks or uprooted by the severe winds—leading to severe traffic congestions. The typhoon also seriously impaired the power and water supply system, and urban traffic and lighting system, especially in seafront areas. According to the report of Da Nang City People's Committee, an estimated total damage is up to 868.8 billion VND, or over 41 million USD¹.

¹ Quick report of Da Nang People's Committee on October 16, 2013

1.1 Damages to Electricity Sector Results in 30 Billion VND in Damages

With impacts of level-12 winds and above-level-12 gusts for over 10 hours, many central provinces encountered power failures that led to widespread blackouts. In Da Nang city, from 13:00 to 22:25 of October 14, Typhoon Nari caused failures to the medium voltage power lines, which led to blackouts in many areas of the city. At 6:15 am of October 15, there was no power in both Da Nang and Quang Nam. At 20:00, the urban power supply of Da Nang was recovered, but it was not until October 20, 2013 when power supply was recovered for the entire city. Moreover, over 1,200 street light posts were broken. Estimated loss of electricity sector was about 30 billion VND (over 1.4 million USD).

1.2 Damages to Domestic Water Supply Affects Access to Drinking Water

From the afternoon of October 14, Da Nang power supply was cut off for safety. The water supply was also cut off the same afternoon. Until October 16, many households had to use candles for lighting. In the afternoon and night of October 14, people had to use stored water, then from October 15 when residents began running out of stored water they had to buy bottled water (at 20,000 VND/bottle). This small amount of water was only enough for



drinking and cooking. The domestic water supply was not recovered until the afternoon of October 15.

1.3 Damages to Transport System Result in 45 Billion VND in Damages

On October 15, the North-South railway section at Lien Chieu district was obstructed by fallen trees. Highway 1A was also blocked, with thousands of cars stuck on the road waiting for the storm to subside to journey on. Roads at seaside areas, such as Hoang Sa and Nguyen Tat Thanh, were seriously damaged. Estimated damage of transport system was about 45 billion VND (over 2.1 million USD).



1.4 Damages to Housing and Education Facilities Result in 141.6 Billion VND in Damages

Although local people and government tried their best to reinforce houses and public structures, total housing and structure damages were still significant. There were 122 houses that collapsed, 1,100 with roof ripped off, and over 4,200 seriously damaged. Estimated damage of housing was about 96.6 billion VND (4.6 million USD). Moreover, there were also 100 classroom roofs torn off, 35 kindergarten and classrooms damaged, 90m of fences broken, an estimated loss of 45 billion VND (over 2.1 million USD).



1.5 Damages to Trees Result in 260 Billion VND in Damages

The ecosystem was the most badly damaged in comparison to previous typhoons. Evidence of this could be seen in the thousands of fallen trees along the city streets. This was trauma had never before been seen, because previous typhoons, like Xangsane 7 years ago, passed much more quickly. Typhoon Nari raged through Da Nang for ~8 hours. This problem was compounded because most of Da Nang's trees were only 10–15 years old, and planted according to the new urban development plan, thus they were easily broken in half or completely uprooted. According to records, over 40 thousand trees in the city were knocked down—a loss of up to 260 billion VND (~12.4 million USD).



2.0 LESSONS FROM TYPHOON NARI

On 16 October 2013, one day after the typhoon ended, ISET-Vietnam and Da Nang Women's Union conducted an assessment of damages and resilience capacity of beneficial wards in the storm resistant housing project. We were pleased to find no damages to any of our 244 beneficiary households.

This project was set out with the goal of building resilience for poor and near-poor households by providing:

1. Credit loans and technical support to households to build storm resistant houses
2. Training and climate change awareness building

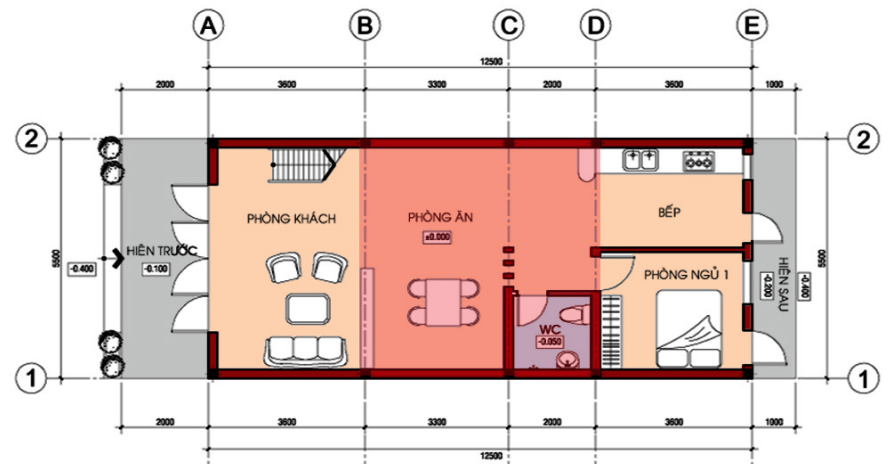
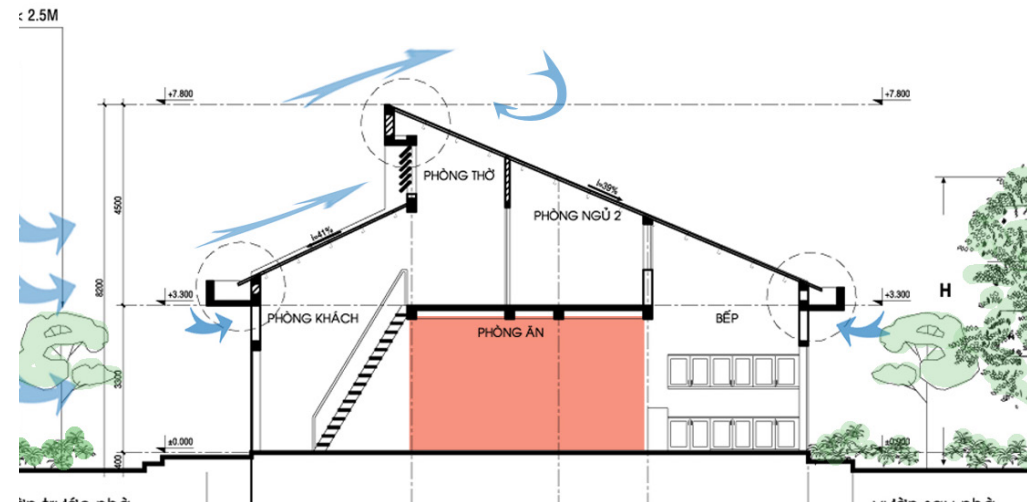
2.1 Five Elements of Storm Resistant Housing

The beneficiary households were each constructed with the following storm resistant elements in mind:

1. Simple building forms
2. Appropriate pitch roofs from 30-45°
3. Stronger housing structure
4. Safe failure by using a solid room in the house
5. Secure connection between roof elements and main structure



The technical drawings shown here were developed by TTArch, the winner of the Resilient Housing Design Competition 2013. This design well reflected the key elements of storm resistant housing, which were shown during a site visit to Da Nang City in May 2013. This competition was funded by CDKN.





2.2 Beneficiary Households Were Safe From Typhoon Nari's Force

Beneficiary households strengthened their houses and prepared carefully to cope with the typhoon, therefore their houses were all safe. Meanwhile, many houses and public structures in their area, even right next to them had their roofs blown away and they suffered heavy damages. People highly appreciate the feeling of safety in their own houses that protect them from the strong storm. After Typhoon Nari, more people are recognizing the value of following storm resistant standards in building their houses. Some households from Man Thai ward actively approached Da Nang Women's Union staff to request support and access to the project loan.



2.3 Replication of Effective Design Elements Are Now Being Considered

At the moment, Da Nang Women's Union is working with Da Nang Climate Change Coordination Office (Da Nang CCCO) and Central Vietnam Architecture Consultancy (CVAC)—the consulting firm providing technical support in storm resistant building techniques—to provide instructions to households for repairing and recovering homes after the typhoon. The Women's Union also proposed to the City People's Committee to develop policies and mechanisms to integrate storm resistant standards into housing development procedures of Da Nang City. For the time being, the focus should be on

communication of storm resistant techniques (such as distributing fliers) to people with collapsed houses or torn off roofs in the typhoon, integrated in Da Nang city's program for Typhoon Nari recovery.

Table 1: Damages to Houses in the 8 Wards Under the ACCCRN Program

Communes/wards	Houses totally collapsed	Houses partly collapsed	Roof totally torn off	Roof partially torn off	Total no. of damaged houses
Hoa Hiep Bac	0	10	23	332	365
Hoa Hiep Nam	6	6	45	204	261
Man Thai	1	2	30	176	209
Tho Quang	18	33	73	423	547
Hoa Nhon	9	0	126	79	214
Hoa Phu	0	0	17	42	59
Hoa Quy	4	4	47	126	181
Hoa Hai	27	66	179	888	1.160
Total	68	88	540	2,270	2,996



Above: Phan Thi Lan —owner of a storm resistant house shares her satisfaction of her house with Tran Van Giai Phong of ISET-Vietnam, Ngo Thi Le Mai, and Do Thi Kim Linh, Head of Da Nang's Women's Union.



Middle: Mr. Tran Van Sanh happy with his storm resistant house



Bottom: The roof of Ms. Nguyen Thi Luong was blown off due to an insecure connection between the roof covers and roof structure.

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3.0 CONCLUSIONS

3.1 Storm Resistant Preparation is More Cost- Effective than Post-Disaster Recovery

Experience from the ACCCRN storm resistant housing credit project demonstrated that investment into preparation is much more effective than spending on post-disaster recovery. In our survey, we found that local people repaired their roofs very quickly after the typhoon for the sake of recovering their living space. However, hardly any storm resistant techniques were employed even though they are quite simple and low-cost. In this way, the city's post-disaster financial support did not help improve resilience, because when the next storm arrives these houses will suffer the same damages again.

Da Nang is a frequent sufferer of tropical storms and typhoons. In 2006, typhoon Xangsane destroyed more than 14 thousand houses, damaged nearly 43 thousand houses, and tore off over 70 thousand roofs. Despite this situation, local investment in prevention is very limited compared to resources spent on responses and recovery. For example, while access to low-interest credits and technical support to strengthen houses were very limited, massive resources were always mobilized by city government for post-disaster recovery. After Typhoon Nari receded, for example, each collapsed house was supported with 10 million VND, and each house with a blown roof received 4 million VND for recovery.

3.2 Informed Planning is Necessary for a Resilient Future

Da Nang is heading towards a green city, but extreme weather and climate was not adequately considered in its urban planning and urban development. For example, while seaside roads and resorts are always very badly damaged by storms, sea reclamation planning and seaside/riverside urban development is still a major development direction of Da Nang city—even in the absence of guidelines or resilient measures. In addition, planting trees that are vulnerable to strong winds, and lack of preparedness before the storm season led to huge

damages. Floods and storms need to be deliberately integrated in urban tree development planning.

Though Da Nang is an area highly prone to floods and storms, the city has not paid proper regard to contingency plans or potential failures caused by these hazards when developing its power and water supply. Specifically during Typhoon Nari, both power and water supply systems were not serviceable for up to three days in a vast area of the city. For this reason, it is critical to integrate resilient measures into development of urban systems, including alternative measures for water supply in periods of power failures, and for power supply when high-voltages lines are damaged.

3.3 Good Emergency Response is Not Enough

Flood and storm response systems and mechanisms in Vietnam are fairly good—the Government responds quickly and flexibly when events arise. In fact, the response to Typhoon Nari was very good. However, for the city to develop sustainably and resiliently to impacts of unpredictable floods and storms, good *emergency response* is not enough. It is essential to *build resilience* for every sector. Experience from the storm resistant housing project is a demonstration of how investments in preparedness and resilience building can be immensely rewarding for the local people, economy, and agencies.



The evidence shared in this report is part of the *Storm Resistant Housing for a Resilient Da Nang City* project funded by the Rockefeller Foundation, in partnership with the Asian Cities Climate Change Resilient Network, and the Climate and Development Knowledge Network. The program was administered by the Institute for Social and Environmental Transition-Vietnam in partnership with the Da Nang Women's Union.

This report shows the immediate success of intervention efforts that were provided to 244 households in Da Nang City with the goal of developing storm resistant shelters. 100% of the houses were proven resilient during Typhoon Nari, which hit Da Nang on October 15, 2013.



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