HOW WAS IT MADE?

CUBA

HURRICANE SANDY DAMAGE RECOVERY IN THE EASTERN REGION

SYSTEMATIZATION EXPERIENCES

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EXPERIENCE SHEETS ON POST HURRICANE SANDY HOUSING RECOVERY PROCESS ON A LOCAL SCALE IN MUNICIPALITIES OF THE PROVINCES OF SANTIAGO DE CUBA AND HOLGUÍN

Índice

Prologue

The Hurricane Sandy struck the eastern region of Cuba in late 2012, causing losses estimated at 7 billion dollars. The main damages- in coincidence with the trend of the last decades- were seen in the housing fund. 262,773 houses were affected, mainly by the loss of roofing. The impact on the social and agri-food infrastructure were also important.

Immediately, United Nations formulated the Action Plan, articulating the contribution of the different agencies. Furthermore, international cooperation quickly joined the efforts of the country for the recovery. The European Commission through the Humanitarian Aid and Civil Protection department (ECHO) was among those who supported Cuba. This contribution was materialized by means of recovery projects for the affected areas of Santiago de Cuba and Holguin, implemented by GVC, CARE, Red Cross, OIKOS, German Agro Action, UNICEF, UN-Habitat and UNDP.

Given the large losses and the need to support the restoration of the habitability to the affected houses, the projects were primarily aimed at recovering roofing. The prevailing option was roofing with light tiles and metal beams, a process that was accompanied by the distribution of toolkits for roofing, as well as kitchen sets, tanks for storing drinking water, water purification tablets and other humanitarian supplies which contributed as a whole to improve the living conditions of families.

The population joined recovery actions. They received technical consultancy, and together with 400 technicians, specialists, volunteer monitors, and local decision makers were trained in roofing placement. People´s participation in the recovery, and the various techniques used for the rapid placement of roofing, sustainably, have generated many learned lessons. These lessons deserve to be documented and shared with other Cuban provinces and other countries in the region, exposed to similar situations.

That is why, the publication we now put in your hands, with the aim of showing the "how it was done", summarizes the experiences of cooperation during the immediate response to the damages caused by Hurricane Sandy, specifically to the housing fund in the provinces of Santiago de Cuba and Holguin. NGOs, Red Cross, the UN agencies above-referred, and OXFAM -coordinated by UNDP- took part in the documentation of all the experiences.

The process of capitalization of experiences on the field was led by the construction faculties of the universities of Santiago de Cuba and Holguin, with the support of the Center for Research and Development of Structures and Materials (CIDEM) of the Central University of Las Villas, with the decisive contribution of the Provincial and Municipal Investment Directorate of Housing in Santiago de Cuba, and the delegation of the National Union of Architects and Construction Engineers of Cuba (UNAICC) in Holguín.

Furthermore, this process had the advice of the National Institute of Housing (INV) and the facilitation of the Ministry of Foreign Investment and Economic Collaboration (MINCEX). UNDP and UN-Habitat facilitated and advised the spaces for reflection and systematization.

It is in the interest of the authors that the results presented in the datasheets of each experience can be taken into account by the institutions and local stakeholders facing similar challenges, in order to achieve effective results in the recovery process.

The focus of this systematization is aimed at showing the interventions in housing recovery with a process approach, as it is shown by the datasheets of the experiences. This includes the damage assessment, mechanisms of distribution of goods, technical solutions for housing recovery, technical assistance, participation processes, the execution organization, among others.

From the diversity of the experiences, valuable lessons and contributions, complementary to each other and adaptable to different contexts, can be observed, showing that the effectiveness of cooperation is much greater when articulated among themselves and with the efforts of local authorities. In this regard, it has been very important to have the methodological and policy accompaniment of national institutions such as the National Institute of Housing.

Finally, we would like to thank the commitment shown by local stakeholders, in particular provincial and municipal governments of Santiago de Cuba and Holguin, the technical and academic institutions, and more particularly the population itself, which in addition to facilitate this work, actively involved in the preparation of this material.

Claudio Tomasi

Resident Representative a.i.

UNDP-Cuba

Prologue

Hurricane Sandy struck the housing fund in the eastern provinces, damaging 262 703 houses, of which 22 396 were totally destroyed. From the rest, 33 055 partially collapsed; 63 190 lost its roofing, and 135 031 roofing were partially destroyed.

From the first moment, the Cuban government, despite the magnitude of the disaster, encouraged to work for the recovery, and it was put into effect the decision of the Revolutionary Government of granting allowances by the State Budget; current prices of building materials were reduced 50% to be acquired by the affected families. They could also apply for bank loans, which were granted with lower interest rates and longer payment periods. In cases of total collapses of houses and roofing, the State budget assumed the payment of bank interest to reduce family spending.

Likewise, to families who needed, and under approval of the local government, allowances to up 99% of the building material costs were granted, as well as subsidies to households with lower incomes were provided.

The Cuban housing policy is led by the National Institute of Housing which develops strategies, plans and actions to improve and increase the housing fund, optimizing material and financial resources for this purpose. A priority in Disaster Risk Reduction is to take care the habitable fund affected by extreme meteorological events as was the case of Hurricane Sandy, on October 25 th, 2012. The affected areas were supported with a roofing placement program, the building of public housing with sustainable technologies and rigid cores (housing cell with heavy and semi-heavy roofing), among other variants that ensure the sustainability of the solutions, in addition, training capacity to strengthen technical assistance to the affected people and to stakeholders including families were developed.

In this regard, international cooperation has played a significant support for the rehabilitation of affected houses. After the disaster, donations from various governments, coordinated action among agencies: UNDP; UN- HABITAT; UNICEF; OXFAM; CARE; among other and national institutions, allowed to operate in the territory to mitigate the damage.

Different experiences by various stakeholders for roofing, with technical solutions from their own expertise were developed to guarantee safe placement within the emergency.

The National Institute of Housing has accompanied the implementation of the project and has witnessed the actions of local governments with the support of agencies that have determined the success of the housing recovery process, as it were: the effective identification of cases to be benefited and its classification, the distribution of building materials, the technical-constructive guidance for ensuring roofing, the activities implemented to ensure safe water and sanitation, the involvement of community and specialized construction brigades in roofing placement, the creation of monitoring brigades, the training to decision makers, technicians and families, as well as other activities and actions to meet the project in time.

Cuba makes great efforts to solve one of the fundamental problems, the solution to the housing deficit, which has been embodied in the Guidelines of the Economic and Social Policy of the Party and the Revolution, approved in 2011.

Any contribution or action that may minimize the housing deficit is welcomed by our local governments and the population; for which stakeholders involved in these issues are activated, taking into account the maxim of accomplishing the task with optimization and clarity in the process. In this regard, Civil Defense System plays an important role.

We hope this publication serves to advance in the knowledge of housing recovery, as an exposition of Good Practices and to systematize the experiences to local and regional level, taking up the challenge to continue increasing sustainable solutions in the housing sector.

Oris Silvia Fernández Hernández

President of the National Institute of Housing

Introduction

On 25 October 2012, Hurricane Sandy went through eastern Cuba, causing serious material damage and economic losses in the provinces of Santiago de Cuba and Holguín, especially on the housing stock, as it impacted the second most densely populated and important city in the country and left serious social consequences in most municipalities of these areas.

Right after the hurricane, the mechanisms of the Cuban Civil Defence System as well as local-government and emergency-management structures for natural disasters and other exceptional contingencies were activated.

A flow of material resources and assistance (human and organizational resources) reached the affected provinces, especially from the central State level and the activation of its emergency reserves. This was complemented by foreign humanitarian aid, which also made a substantial contribution to immediate rehabilitation and further recovery.

Cooperation played a key role in mitigating the effects of the hurricane, strengthening the resilience capacity of local actors and national and territorial agencies for the rehabilitation and reconstruction of damaged houses.

The funds from the European Commission, together with those from various foreign cooperation agencies and programmes underway in the country, made it possible to implement actions in coordination with the national institutions involved in housing recovery in Santiago de Cuba and Holguín.

This assistance provided for valuable local experiences, community initiatives and various actions since the post-disaster emergency phase, which is a valuable collection of good practices, whose systematization and capitalization will give cooperation organizations, institutions and agencies useful, clear information for future action in humanitarian emergency situations.

LOCAL EXPERIENCES

Local experiences in the post-hurricane recovery process were gained in various stages. First, in the emergency phase, actions were implemented to conduct an assessment and diagnosis of, and proceed to the distribution of resources to the affected population. The challenges of such actions involved implementation in the shortest period of time, under exceptional circumstances, and with a degree of effectiveness that makes it possible to accurately identify the situation of the population and to supply the materials needed for rehabilitation or reconstruction of damaged or destroyed houses.

In this primary phase, technical solutions for housing recovery were devised, especially for the installation of roofing elements, the structural reinforcement of houses, and the restoration of liveability to deal with the consequences of the disaster in the short term.

In a second priority phase, awareness-raising and education actions were carried out so that affected communities could participate in recovery works and reduce the social impact of the hurricane. The practical experience gained in technical advisory services is being used to ensure resilient recovery and implement solutions under participatory processes (Figure 1).

TECHNICAL SHEETS

This publication summarizes the best lessons learned from housing recovery after Hurricane Sandy hit Santiago de Cuba and Holguín. These technical sheets aim to systematize essential information on each practice executed and capitalize on such knowledge for potential adaptation and replication by international cooperation and national and local actors towards resilient recovery of the affected housing stock.

Each sheet contains information on the following aspects:

- Identification of the experience
- Description of the problem
- Implementation of solutions
- Material needs
- Costs
- Lead time

Depending on the phase where the experiences are implemented, the document includes the following technical sheets:

I. Assessment and diagnosis of victims

- Methodology used to collect information on damage to housing stock

II. Distribution of material resources

- Recovery of houses affected by weather events

III. Technical solutions for recovery

- Emergency solutions for the installation of metal roofing elements on houses without upper enclosure

- Strapping for the safe installation of roofing elements on hurricane-stricken houses with wood structures

- Metal roofing elements with zinc sheets for gable roofs on houses with wood structures and walls

- Rehabilitation of roofs on houses with wood and brick structures

- Wood structures for roof rehabilitation on rural houses in the agricultural and forestry sector

• Dry bathroom

• Water filter

• Emergency solutions for hurricane victims whose houses totally collapsed

• Mobile sawmills for post-hurricane in situ wood processing for house rehabilitation

IV. Awareness-raising and education

• Children interaction dynamics

V. Technical advisory services for resilient recovery

• Local technical advising and training on roofing element installation

VI. Implementation of solutions

• Community brigades for the installation of roofing elements on houses affected by Hurricane Sandy in the municipality of Palma Soriano

• Recovery brigades for the installation of roofing elements on houses and rehabilitation of agricultural production in rural areas.

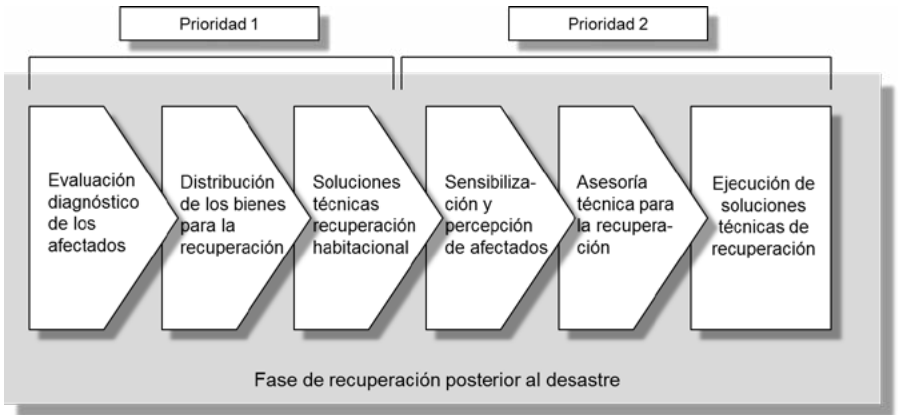


Figure 1. Stages and priorities of the experiences gained in the post-Hurricane-Sandy housing stock recovery phase

Prioridad 1: Priority 1

Prioridad 2: Priority 2

Evaluación y diagnóstico de los afectados: Victim assessment and diagnosis

Distribución de los bienes para la recuperación: Distribution of resources for recovery

Soluciones técnicas recuperación habitacional: Technical solutions for housing recovery

Sensibilización y percepción de afectados: Awareness-raising and education for victims

Asesoría técnica para la recuperación: Technical advising for recovery

Ejecución de soluciones técnicas de recuperación: Implementation of technical solutions for recovery

Fase de recuperación posterior al desastre: Disaster recovery phase

1.

METHODOLOGY USED TO COLLECT DATA ON DAMAGE TO HOUSING STOCK

UNIÓN EUROPEA

NATIONAL IMPLEMENTER: NATIONAL HOUSING INSTITUTE

LOCATION: SANTIAGO DE CUBA

CONTACTS: PROVINCIAL HOUSING INVESTMENT UNIT (UPIV) IN SANTIAGO DE CUBA AND NATIONAL HOUSING INSTITUTE (INV). **E-MAILS:** upiv@upiv.scu.inv.cu; presidencia@inv.cu.

SITUATION

Unlike other tropical cyclones that have affected the country in the past twenty years, Hurricane Sandy hit a large population settlement, in this case, the city of Santiago de Cuba, the country's second largest urban centre in the country, with 450,000 inhabitants and a population density of over 430 inhabitants per square kilometre, mostly with old, vulnerable buildings.

This weather event destroyed or severely damaged 179,314 houses, that is, 54.3% of the total (15,889 completely collapsed; 22,177 were partially destroyed; and 50,585 had total roof loss and 82,729 partial roof collapse). This posed an unprecedented challenge due to the need to assess the damage to a large number of affected houses in a short period of time. The idea was also to identify material needs in order to channel aid for the rehabilitation of the houses that could be repaired, thus helping affected families (Photos 1 and 2).

On this occasion, it was decided that the damage assessment should include houses built following long-lasting construction typologies (classified as type I by INV), which sustained minor damage that, nonetheless, reduced liveability and safety of dwellers (damage to woodwork and technical installations).

The challenge was to develop the tools required for the technical assessment of the housing stock affected and implement an effective methodology for this process in the shortest period of time.

IMPLEMENTATION OF SOLUTIONS

SAll the houses affected by the hurricane in each People's Council at the neighbourhood level were visited in the presence of dwellers to assess the damage caused. The work scheme covers the post-disaster emergency stage, which is led by the local bodies of Civil Defence (DC) with the participation of a number of institutional actors

Fotos 1 y 2. Viviendas afectadas en el Consejo Popular de "El Caney", Santiago de Cuba

to complete the data collection process in a short period of time (Figure 1).

The damage was assessed applying the INV methodology based on the use of technical sheets that were to be completed in situ (see Annex 1). Women played a leading role in this process, accounting for 80% of all participants (Photos 3 and 4).

The whole process is organized and structured by the Command Posts that are activated at each People's Council (CP), which are initially entrusted with the task of:

- Sending assessors to visit each house affected, including technicians and professionals from UPIV, the Municipal Housing Investment Unit (UMIV), the Office of the Historian of the City (OCC), and the Community Architect Programme (PAC).

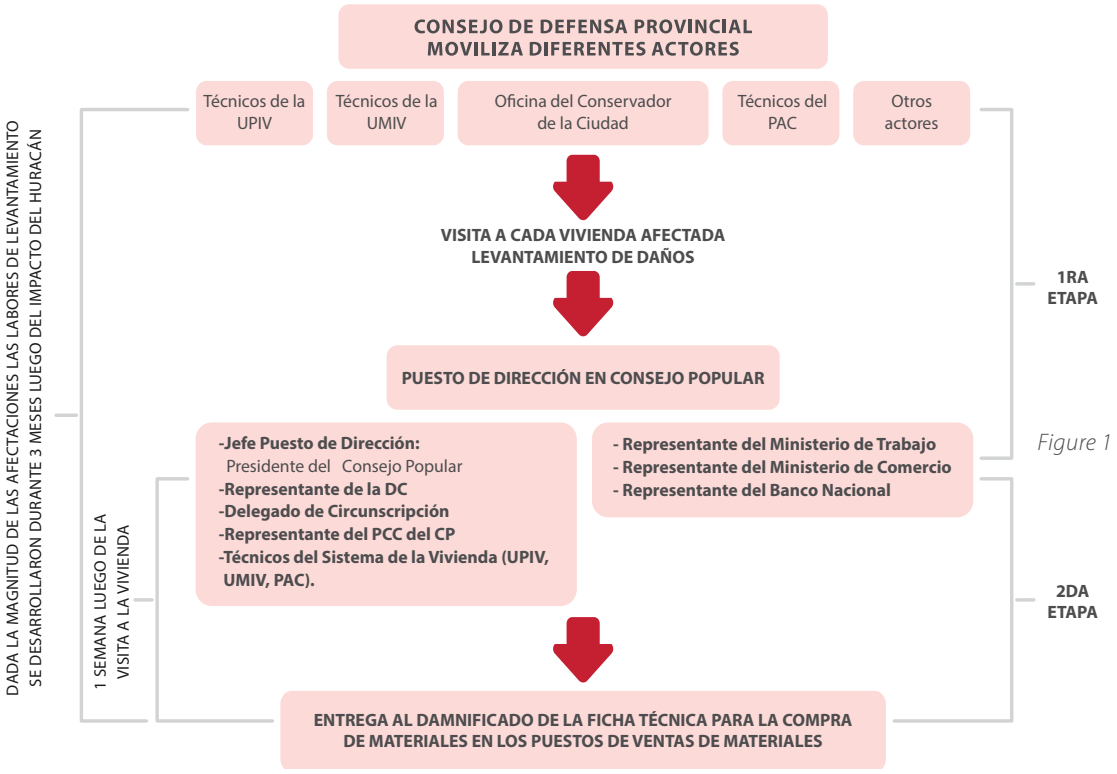


Figure 1

- Collecting the sheets completed.
- Quantifying the materials required for damage repair at affected houses (see Annexes 2 and 3).
- Giving each hurricane victim a voucher for the procurement of building materials at the outlets designated for this purpose.

Foto 3. Evaluadores en el proceso de levantamiento técnico de viviendas dañadas.

In a second stage, the Command Posts at each People's Council were joined by representatives of the Ministry of Labour, the Ministry of Trade and the National Bank of Cuba, with the mission of identifying and implementing the forms of payment to be used: discounts, subsidies, credits or cash. This increased access to building materials by all households, including those that are socially vulnerable (older people living alone, disabled individuals, single mothers, etc.) and require special benefits, such as tax reductions and subsidies.

The distribution and control mechanisms stipulated the presentation of three (3) copies of the technical sheets: one for the victim, one for the Command Post at the People's Council, and one for the building materials outlet. Adulterations and other forms of frauds were thus avoided during the allocation and supply of materials under the relevant form of payment.

The technical sheets made it possible to carry out an inventory that provided reference to organize the entire recovery process, with special

emphasis on the demand and supply of building materials, according to the following classification: total house collapse (over 50% of the house structure damaged), partial house collapse (less than 50% of the house structure damaged), total roof damage (over 50% of the roof), and partial roof damage (less than 50%).

MATERIAL NEEDS

Module for the assessor:

- Sheets of paper

- Writing board

- Set of ballpoint pen and refill

- Calculator

- Measuring tape (10 m, minimum)

COSTS

Each assessor is expected to complete 20 houses and fill in the same number of forms a day. According to the number of houses to be assessed and the number of assessors to be mobilized, either volunteers or institutional representatives, there is a need to supply at least 50 sheets of paper per assessor per day and pay for form printing costs.

Other resources to be procured include writing boards, calculators and measuring tapes, which are assigned to each assessor only once. The idea should be to procure additional units to cover losses and breakage, as well as sets of ballpoint pens and refills. Estimates show that each assessor needs a set per week.

Indirect costs involve transportation of assessors, meals during working hours and, eventually, clothing and footwear. They will depend on the specific solution adopted. Similarly, the use of institutional staff as assessors makes it possible to operate without a recruitment fund. If necessary, volunteers should get involved, mainly university and polytechnic students in construction-related specialties).

LEAD TIME

The lead time depended on the number of houses assessed. In this case, it was 20 houses (technical sheets) per day. This helped to save time and render the process all the more effective. A total of 179,314 houses were visited in 90 days. The time required to train assessors and develop and print forms was not accounted for because it varies in accordance with the solutions adopted for specific situations.

2.

DISTRIBUTION OF MATERIAL RESOURCES FOR THE REHABILITATION OF HOUSES AFFECTED BY WEATHER EVENTS

UNIÓN EUROPEA

NATIONAL IMPLEMENTER: CUBAN NATIONAL HOUSING INSTITUTE

LOCATION: SANTIAGO DE CUBA

CONTACTS: PROVINCIAL HOUSING INVESTMENT UNIT (UPIV) IN SANTIAGO DE CUBA AND NATIONAL HOUSING INSTITUTE (INV). **E-MAILS:** upiv@upiv.scu.inv.cu; presidencia@inv.cu

SITUATION

The impact of Hurricane Sandy on the country´s second major city in terms of population, size and political importance led to a difficult situation for thousands of victims whose houses were either completely destroyed or seriously damaged: 54.3% of the housing stock (over 330,000 units).

The challenge was to organize, during the post-disaster emergency phase, the appropriate logistics for material and financial assistance—both from the central level of the Cuban State and international cooperation agencies and organizations—to victims in a fair, speedy and equitable manner, especially those who had endured the greatest damage and loss.

There was a need to implement an effective, efficient distribution system for the material resources required for the recovery of houses in the short period of time and with the necessary organization and transparency, so that the objectives outlined during the emergency response and early rehabilitation stage could be met.

IMPLEMENTATION OF SOLUTIONS

The effective distribution of resources was guaranteed with the establishment of Command Posts at the level of each People's Council.

Under the system and structure of the Government of the Republic of Cuba, the People´s Council is the acting body of the People´s Power in a given area, which covers the so-called constituencies or cells where the representatives of the most basic government structure fulfil their mandates. These People´s Councils are empowered to exercise coordination functions between state institutions in their areas, oversee their performance, and find solutions to the problems of local citizens. Under special or emergency situations, these bodies play a key role.

In keeping with these realities, the Command Posts are established at the People's Council level. Their function is to use the information obtained from the collection of technical data on the houses affected and complement it with the victims social and economic soundness study for the purpose of implementing the alternatives adopted by the Central State: granting low-interest bank loans and/or approving non-reimbursable subsidies and discounts on prices for building materials (reducing them by half as compared to regular market prices).

In order to perform these functions, the Command Posts are made up of representatives of various agencies and entities involved in selecting beneficiaries or recipients, granting financing (credits and/or subsidies), and conducting discount sale of building materials to the population affected.

The Housing System, in this case represented by the Housing Investment Units (UMIVs), developed and processed the technical sheets for calculating and/or estimating the material resources required by the houses affected, based on rules and specifications as well as on the results of the in situ data collection process.

The local representation office of the Ministry of Domestic Trade monitored discount prices and the sale of building materials to the population in need.

The Ministry of Labour and Social Security was also represented on the Command Post, with social workers helping to determine the socio-economic profile of the residents in the houses destroyed or affected by the hurricane. This made it possible to identify potential beneficiaries of credits, subsidies and discounts for the procure-

ment of materials. The representatives of the Central Bank of Cuba were also involved in supplying funds, in keeping with the classification of the population affected (Figure 1).

The other part of this process involved channelling resources to end users. In order to expand the range of action and benefit all victims, mechanisms were established at the People's Council level to increase efficiency in and speed up

Figure 1

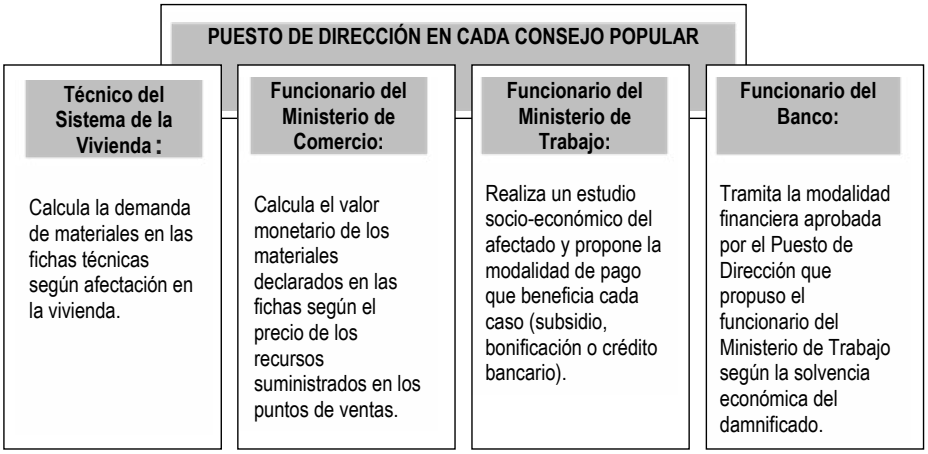


Figure 2

the relevant administrative procedures. This was supplemented with communication and information dissemination actions (Figure 2).

The technical sheets used to determine the amounts of materials per item required for the houses affected take into account the damage situation, as described below:

- Total collapse of the house (over 50% of the house structure affected);
- Partial collapse of the house (less than 50% of the house structure affected);
- Total collapse of the roof (over 50% of the roof affected); and

• Partial collapse of the roof (less than 50% of the roof affected).

According to this classification and the overall house area (m2), predetermined indexes were applied under a resolution of the National Housing Institute (INV). These indexes helped to maximize the aid and raise the degree of satisfaction of beneficiaries. The following are two examples of the consumption indexes under the process:

ROOF COLLAPSE			
Type	m^2 of roof	Reinforcement of the structure	Electrical materials
Total	70 m^2 *	Materials for the construction or repair of beams, enclosures, tiling or other structural elements required for roofing.	5 electrical outlets 4 switches 4 lamps or sockets and light bulbs, 50 m of electrical piping 100 m of cable 13 electrical boxes
Partial	35 m^2	50% of the materials allocated for total roof collapse	

HOUSE COLLAPSE			
Type	m^2 of roof	Roof structure and electrical materials	Materials for side closure
Partial **	35 m^2 *	50% of the materials allocated for total roof collapse	50 m^2 of finished wall elements 2 outside doors 4 double windows 35 m^2 of floor
Total	According to standards per location (rural, semi-urban, and heritage areas)		
* Includes bracing, fixing and bridging. ** If the bathroom and kitchen areas are damaged, the affected items will be replaced to ensure liveability conditions.			

Fotos 1 y 2. Trabajo en los Puestos de Dirección de la distribución de recursos a nivel de los Consejos Populares en Santiago de Cuba.

MATERIAL NEEDS

With regards to material needs, no special conditions are required other than those that render the Command Post operational. They will depend on the specific conditions of the post-disaster rehabilitation stage. The Command Post should be equipped with a computer, printer, and relevant inputs.

COSTS

They involved material needs and transportation expenses incurred in the transfer of officials from other provinces (accommodation, transportation and per diem).

Foto 3. Puntos de ventas de materiales y recursos en los Consejos Populares para la recuperación de viviendas.

LEAD TIME

The lead time for the distribution of material resources to victims could not be determined. However, the time for procedures can be determined. On this occasion, over 120 cases were analyzed every day.

3.

EMERGENCY SOLUTIONS FOR THE INSTALLATION OF METAL ROOFING ON HOUSES WITH NO UPPER ENCLOSURES

UNIÓN EUROPEA

PNUD Al servicio de las personas y las naciones

UN-HABITAT POR UN MEJOR FUTURO URBANO

OXFAM

unicef

NATIONAL IMPLEMENTER: NATIONAL HOUSING INSTITUTE

LOCATION: SANTIAGO DE CUBA

CONTACTS: PROVINCIAL HOUSING INVESTMENT UNIT (UPIV) IN SANTIAGO DE CUBA, MUNICIPAL HOUSING INVESTMENT UNIT IN PALMA SORIANO (UMIV), AND NATIONAL HOUSING INSTITUTE. **E-MAILS:** upiv@upiv.scu.inv.cu, presidencia@inv.cu. **PHONE (UMIV - PALMA SORIANO): +5322501108**

SITUATION

The municipality of Palma Soriano in the province of Santiago de Cuba was particularly affected by Hurricane Sandy, which caused extensive destruction and damage to the housing stock and generated social difficulties due to the number of victims and their economic and social vulnerability.

A total of 806 houses experienced total collapse and 2,215, partial collapse. In addition, 6,434 houses had the roofs removed and 15,155 had total or partial roof collapse, thereby forcing residents to leave their homes.

As part of the multilateral aid channelled to the municipality of Palma Soriano, along with the resources supplied by the central agencies of the Cuban State and provincial funds, various organizations and institutions provided humanitarian cooperation. The United Nations Development Programme (UNDP) and OXFAM-Canada donated roofing modules for the houses affected. Through UNDP, a total of 1,700 families received 35-m2 modules during an initial stage. The so-called progressive construction criteria were applied to benefit as many affected families as possible. In a second stage, 141 extended families received 70-m2 modules, hopefully to use them as shelters in the future. Through OXFAM, 250 families received 70-m2 modules.

However, among the houses whose roofs had been completely or partially destroyed, there were units, which due to their rudimentary construction or the damage sustained, lacked upper enclosures that are required for the conventional installation of metal roofs.

This problem was locally solved by technicians at the Municipal Housing Investment Unit (UMIV) in the municipality of Santiago de Cuba, with the help of Community Brigades. The selection of beneficiaries was carried out at the People's Councils; most of the houses did not have the structural conditions necessary for metal roofs (Figure 1)

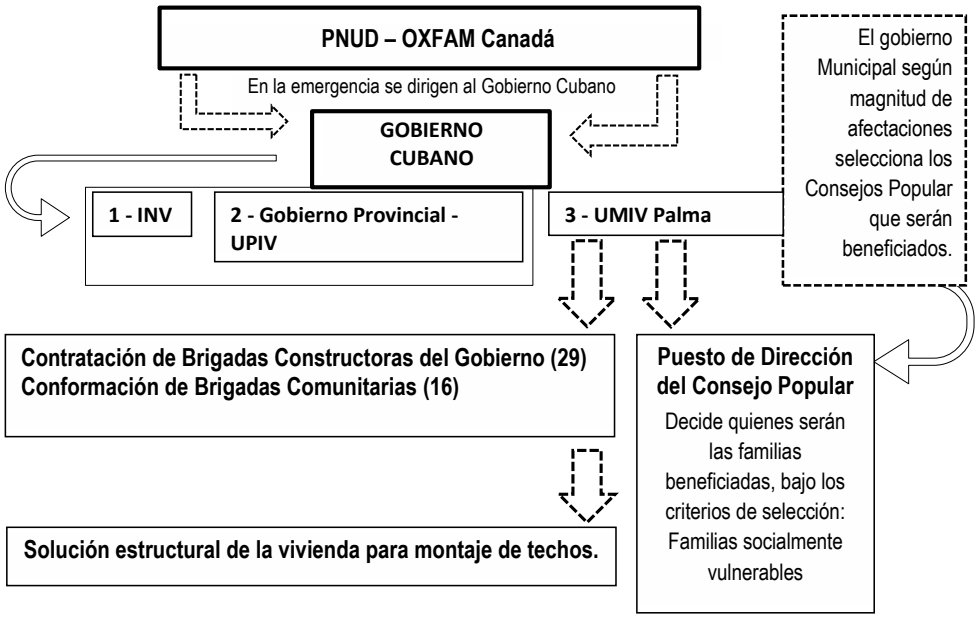


Figura 1. Mecanismos de selección de beneficiarios para el montaje de techos en experiencia de Palma Soriano.

IMPLEMENTATION OF SOLUTIONS

LThe installation of the roof module requires upper enclosure. According to this criterion, the number of eligible houses was restricted and a large percentage of socially vulnerable families were left out. UMIV technicians and specialists devised immediate technical solutions to anchor the metal beams that would support the roof (purlins) on the walls. These solutions were adopted under an emergency situation, with roofs available, but a short period of time to have them

installed. Such solutions were vitally important because most houses lacked the technical conditions required for this purpose. Homeless families were living at relatives', state-owned facilities or places with minimal liveability conditions (Photos 1, 2 and 3).

Purlin-Wall Connection

• A steel, L-shaped structure (ø ½) is inserted into the wall (Figure 2A).

• The minimum depth is at least half the thickness of the wall.

• The steel structure should go through the wall and get fixed at the other end.

• The steel structure is welded to the purlin, at a minimum distance equal to the web height.

• If there is any roof parapet, the purlin is introduced directly into the wall (Figure 2B).

• If there is any enclosure beam with no steel inserts, it is necessary to keep removing until one of the longitudinal steel structures appears. A brace is welded to the purlin (Figure 3).

It should be noted that that the first two examples involved solutions under emergency situations, where risks and benefits were weighed. It is appropriate to use tie and load-bearing beams around the walls and spans of the structure. All walls must be tied together at the top through a

Fotos 1, 2 y 3

crown plate of at least the same thickness as the wall and a minimum height of 15 cm in order to withstand wind and earthquake loads.

Purlin-Purlin Connection

• The length of the purlin is not always enough to cover the spans. Two purlins should be put together for this purpose. This connection should not be made in the middle, but at approximately 1/3 of the span.

• The connections can be either bolted or welded:

1. Cut the wings of the purlin and overlap the web and the other purlin (Figures 4 and 5).

2. Put them together by means of a scrap plate (Figure 6).

In both cases, at least 4 6.3 x 25 mm self-drilling screws will be used and placed in zigzag. The minimum distance between them will be twice the diameter, and the maximum distance will be 8 times the diameter, which also applies to the edges of the platen (Photo 4).

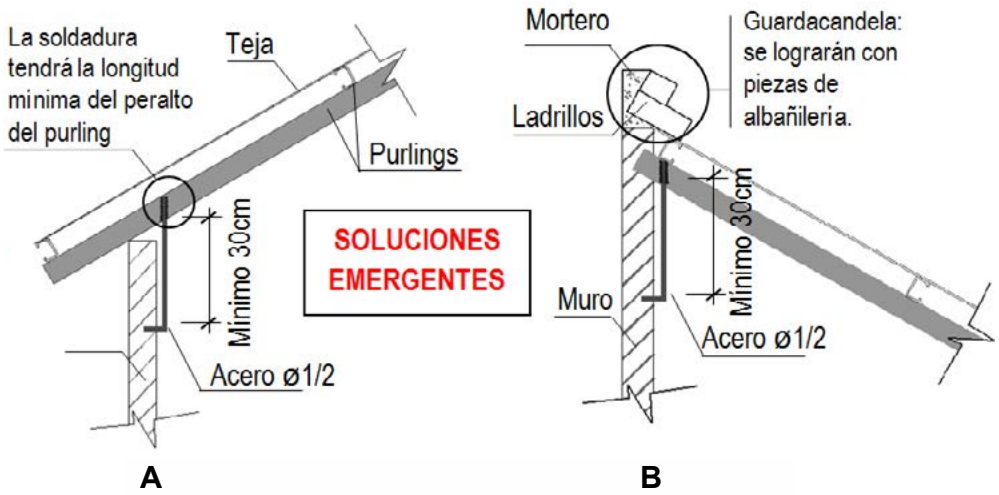


Figura 2. Soluciones emergentes de anclaje: A) Anclaje del purling al muro – B) Anclaje del purling con inserción en el muro

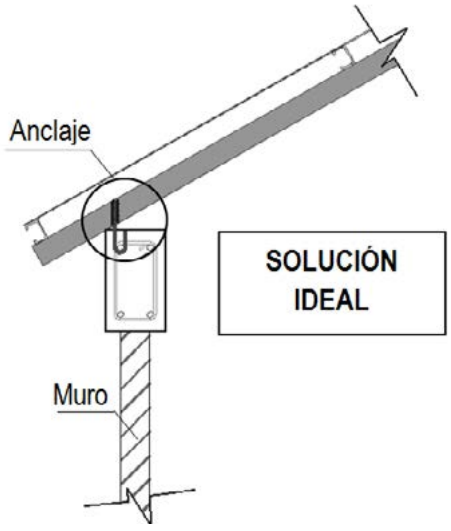


Figura 3. Anclaje de purling a viga de cerramiento.

Finishing

In order to finish and render the roof waterproofed, tiling and guards are installed (Figures 5, 6 and 7).

The finishing materials (tiling and guards) can be purchased by the owner at the relevant outlets upon submission of a hurricane victim voucher.

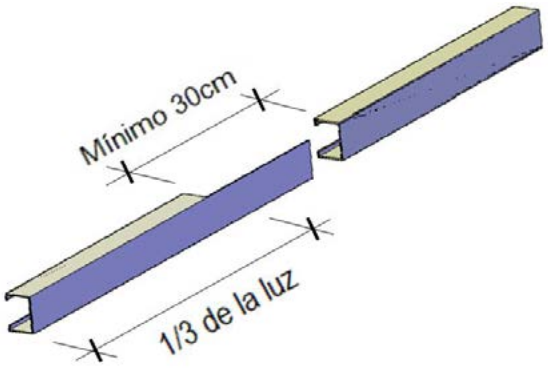


Figura 4. Corte de las alas del purling

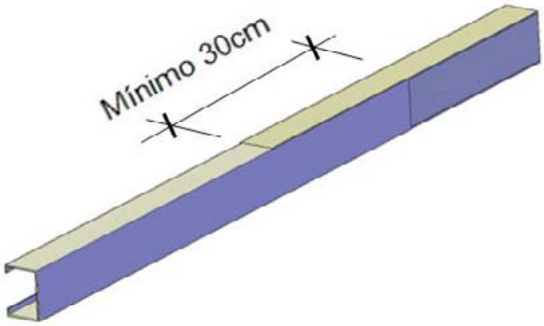


Figura 5. Solape de los purlings

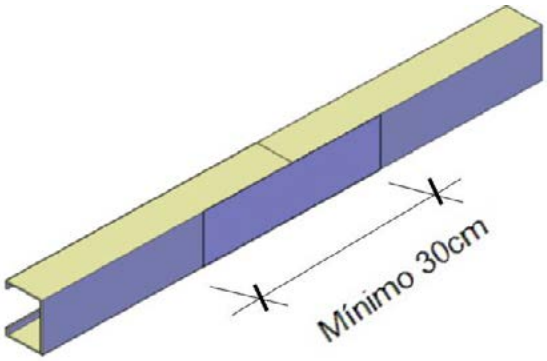


Figura 6. Unión de 2 purlings con una platina

MATERIAL NEEDS

The quantity of safety gear, equipment and tools to be used by each brigade is as follows:

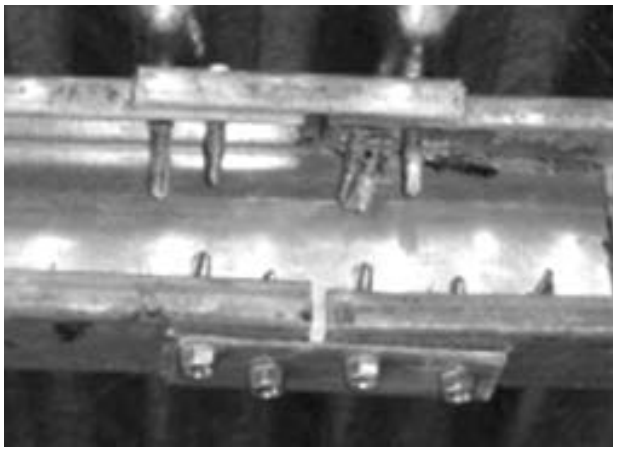


Foto 4. Detalle de unión entre purlings.

Fotos 5. Vista de los guardacandelas en una cubierta.

Fotos 6. Vista lateral

Foto 7. Detalles de guardacandelas.

Safety gear	**Unit**	**Quantity**
Industrial leather gloves	Pair	10
Goggles	U	10
Safety helmets	U	10
Implements and tools		
Multipurpose pliers	U	5
Scaffolding (2 sections with 2 platforms)	U	1
Electric screwdriver with pta	U	2
Chisel for concrete	U	10
10 m measuring tape	U	10
8 l. masonry bucket	U	2
8” trowel	U	4
Electrician blade	U	2
Aluminium ladder	U	1
24” angle bracket	U	5
30 m extension cable	U	2
Rubber float trowel	U	2
12 x 19 wood float trowel	U	2
6-piece tungsten drill set	U	8
6-piece screwdriver kit	(kit)	8
Electrician test lamp (neon)	U	1
Electric welding machine	U	1
16 oz claw hammer	U	4
40 cm plastic level	U	10
Construction shovel	U	4
Crowbar	U	1
Digging pick	U	1
No. 8 electrician pliers	U	1
Cast-iron plummet	U	1
6 mm hexagonal tip	U	10
Carpenter’s hand saw	U	5
Circular saw	U	1
1/2" (1,050-watt) hammer drill	U	1
Vinyl Tape	U	10
Construction wagon	U	2
Metal cutting disk	U	1
Metal straight scissors set	U	1
Toolbox	U	1
Metal drill set	U	1
Disk polisher	U	1
Flame cutting equipment	U	1
Electrode	U	1

Use of materials and basic components according to the area of the house:

	Consumption for 70 m^2 module	**Consumption for 35 m^2 module**
Galvanized steel key-pattern zinc sheets	20 u	10 u
Purlin	8 u	6 u
6.3 x 25 mm self- drilling screws	300 u	150 u
4.2 x 16 mm self-threading screws	200 u	100 u
Steel bars	18 m	9 m
Electrodes	25 Kg.	12.5 Kg.
Bricks	3 m^2	1.5 m^2
Thick cladding	10.5 m^2	5 m^2
Fine cladding	10 m^2	5 m^2

COSTS

	Materials donated by UNDP (zinc sheets, purlins, screw works)	Finishing materials supplied by the Cuban government (bricks, cement, steel bars)
70 m^2 roofing	716.25 €	983.63 CUP
35 m^2 roofing	359.00 €	492.00 CUP

LEAD TIME

The lead time for roofing is one to two days per house, according to individual specifications and roof area (35 m2 or 70 m^2).

4.

STRAPPING FOR SAFE INSTALLATION OF ROOFING MATERIALS ON HOUSES WITH WOOD STRUCTURES DAMAGED BY THE HURRICANE

UNIÓN EUROPEA

BENEFICIARIES: 16,700 PEOPLE (6,900 FAMILIES) IN 36 COMMUNITIES (BY DECEMBER 2013)

NATIONAL IMPLEMENTER: CUBAN RED CROSS

LOCATION: SANTIAGO DE CUBA

CONTACTS: PROVINCIAL DEPARTMENT OF THE CUBAN RED CROSS / CARRETERA DEL MORRO NO. 268 ENTRE A Y B, TEL: 622848-623300 / E-MAIL: Croja@medired.scu.sld.cu

PNUD
Al servicio de las personas y las naciones

SITUATION

The great disruption and devastation caused by Hurricane Sandy in the province of Santiago de Cuba, with 54.3% of its housing stock affected (15,889 total collapses, 22,177 partial collapses, 50,585 units with total roof collapse and 82,729 with partial roof collapse) were a source of concern to the International Red Cross Federation and national societies of various countries, which donated a number of roofing materials and tool, kitchen and hygiene kits to the Cuban Red Cross Society.

The entire house selection process was carried out by the Commissions of the People's Councils, which were deeply aware of the living conditions of each family. The selection was conducted in accordance with the criteria of the Red Cross, prioritizing socially vulnerable families.

The number of skilled workers and state labourers in the province proved to be insufficient for installing the roofing materials, given the extent of the emergency and the number of houses affected. In this case, community brigades were established by the People's Councils for the installation of roofing elements, giving priority to the most vulnerable families (Figure 1). These brigades are an example of solidarity among neighbours, since the work was carried out without any type of payment. The brigades were made up of an average of 5 men, including 2 with previous experience as carpenters.

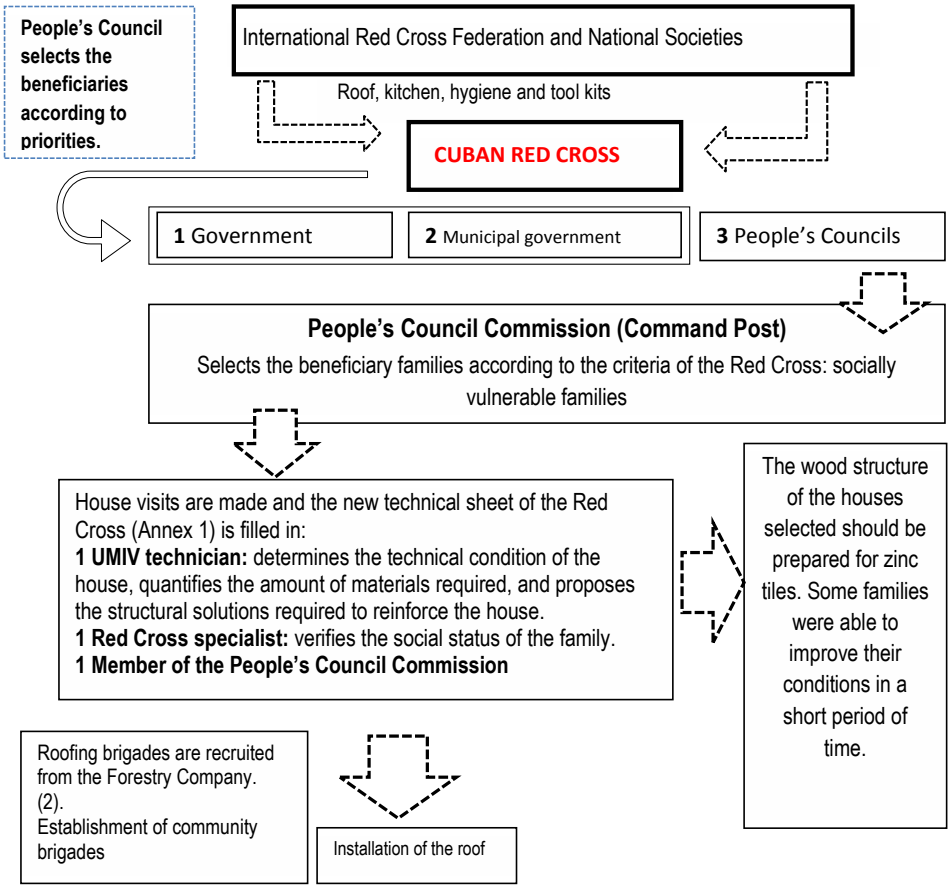


Figura 1. Mecanismo de distribución de la donación de techos a través de la Cruz Roja Cubana.

IMPLEMENTATION OF SOLUTIONS

Once a beneficiary family was selected following a visit, it was given a voucher by the commission to get the materials required.

The roofing kits consisted of zinc tiles (2.44 m x 0.88 m), umbrella head nails, wood nails, washers and strap. The latter was a new element in the local roofing culture.

The nails were made of low carbon steel with hot dip galvanized coating, shaped like a flat rod with diamond point, and the following sizes: length: 2" (not including the head), rod diameter: 4 mm

(gauge 9), head: 7.52 mm, with a tensile strength of 620-827 N/mm2. These nails should be fixed alternately on the surface of the strap (Figure 2).

Two training workshops were held to secure that roofs were properly installed by community brigades: one for technicians at the Housing System and another one for Red Cross instructors. The workshops were replicated at the community and People's Council levels. The idea was to train participants in safe installation of straps and zinc tiles.

Strapping

The straps made of galvanized steel have alternate holes for reinforcing connections in wooden roof structures and performing several functions, such as connecting and reinforcing the connections between roof beams and connecting secondary and primary beams (Figure 3).

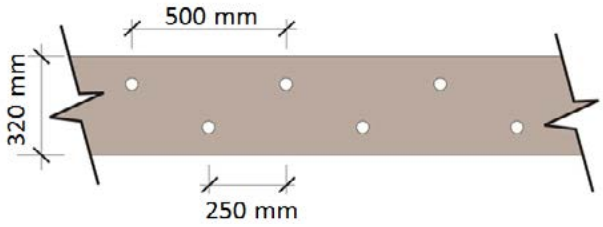


Figure 2. How to fix nails on strapping.

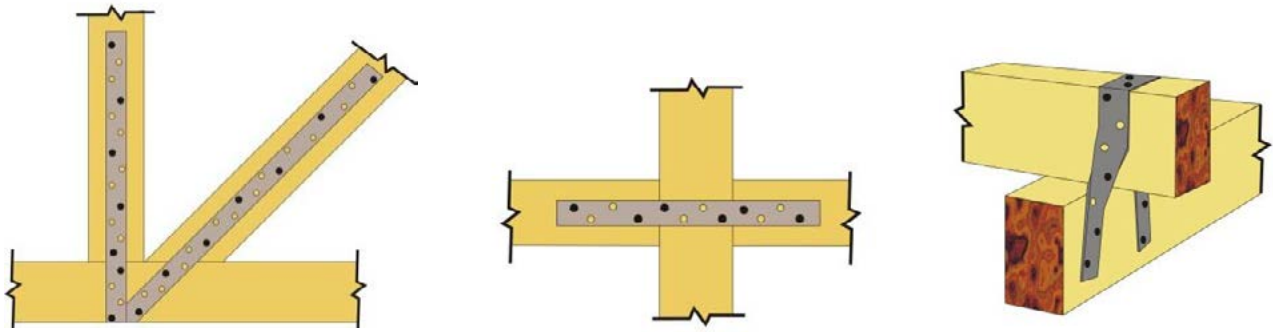


Figure 3. How to fix the strapping to reinforce roofing structure connections.

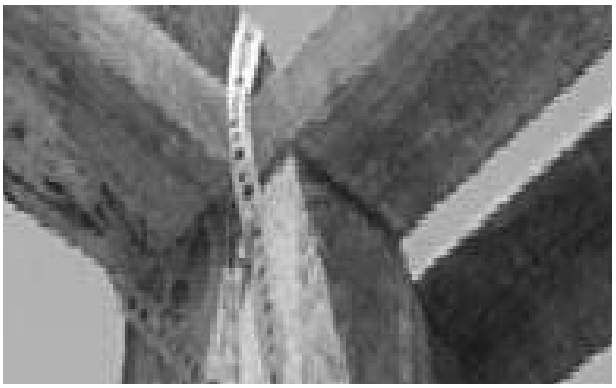
Workshop participants were given practical training as to how to use strapping on different types of connections and structural elements of the roof (Figures 1 to 6). A new element introduced in the training process was the use of models, which provided a three-dimensional visualization of the elements, thus helping participants to understand how it is done (Photos 7 to 10), including diagrams on the most commonly used straps.

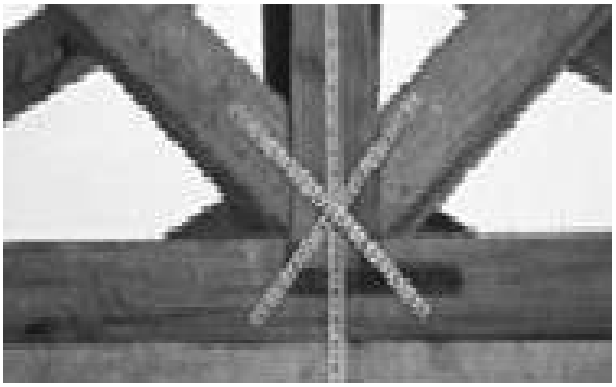
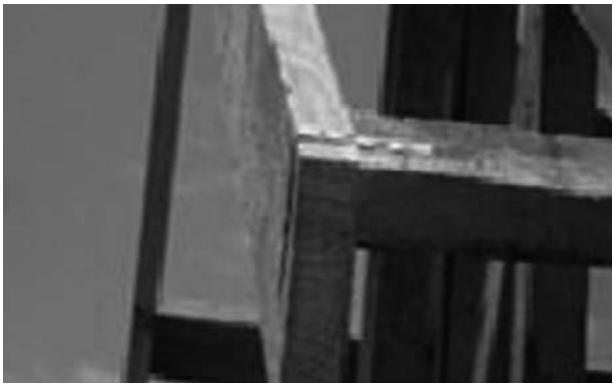
This made it possible for participants to devise appropriate solutions (considering both quality and safety) to a wide range of roof situations (Photos 11 to 16).

Metal sheets for roofing

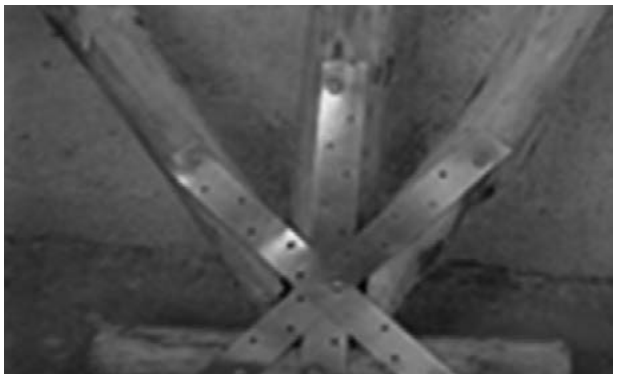
For installing zinc tiles, the general criterion was to secure strap adhesion into the structure using umbrella head nails and neoprene washers (Figures 4 and 5).

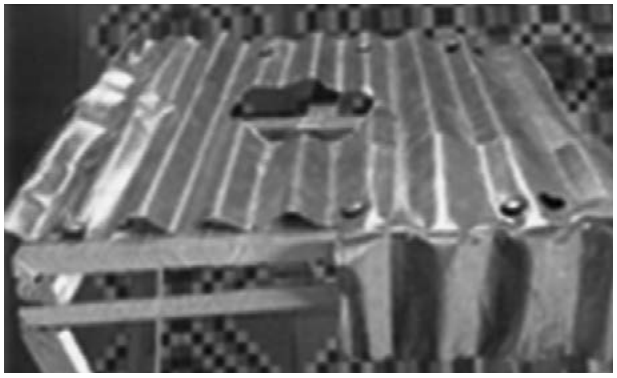
The roofing kits did not include ridges. Under this situation, an emergency solution was applied, which consisted in cutting zinc tiles into three equal parts and later bending sections to form a piece that could be used as such (Photo 17).

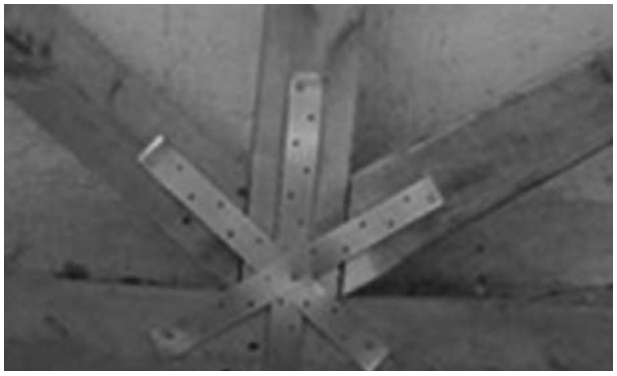


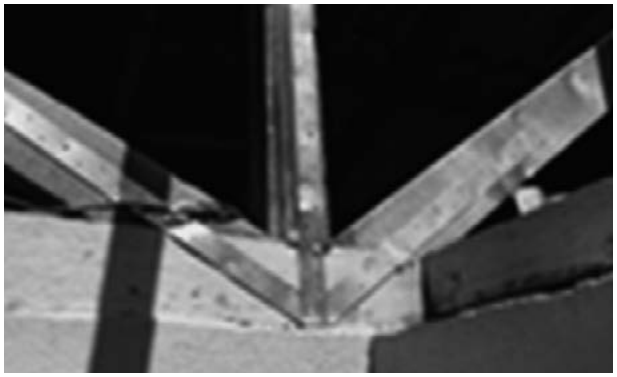
Photos 1 to 6. Different types of roof connections reinforced with strapping



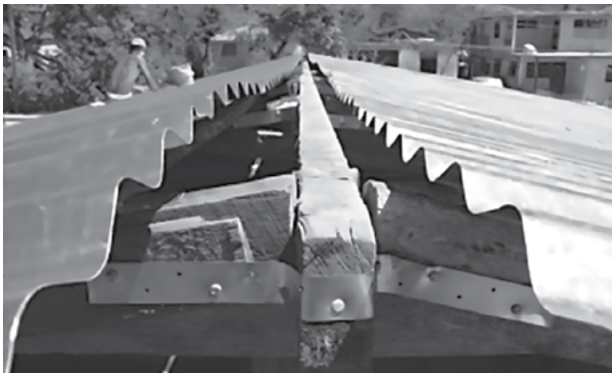




Photos 7 to 10. Structural connection models built for use in training workshops



Photos 11 - 12. Strapping on cross section of structural element: 2 nails minimum. Strapping along the longitudinal section of structural element: 5 nails minimum



Photos 13 to 15. Connection of beams and purlins: 2 nails minimum at each end and on the beam

Photo 16. Strapping loop-type connection: the ends can be crossed and fastened at each end with at least 2 nails

Figure 4. How to interlock tiles (1.5 to 2 curves) and how to fix tiles onto the crest to protect from water.

Figure 5. How to fix nails to binding tiles or corrugated sheets. For tile-tile connection, nails are fixed every 40 cm and for tile-structure connection, every 2 curves. For tiles on both ends of the roof, 2 nails are fixed on the first curves.

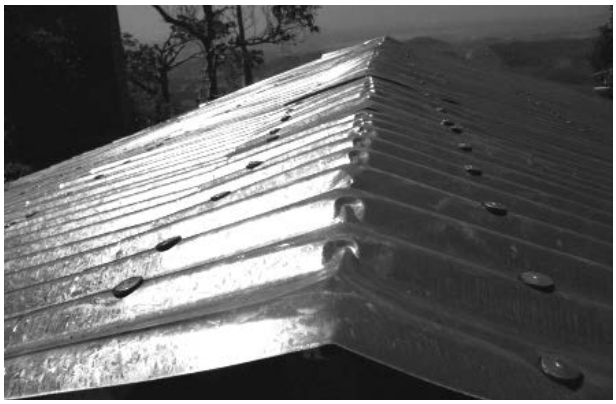


Photo 17. Emergency solution for roof ridge

MATERIAL NEEDS

The amount of materials needed for a house varied according to roof areas, although the criterion followed was to cover the entire roof affected, since the families selected were those with the highest social and economic vulnerability from among all hurricane victims.

Consumption indexes were used to identify material needs, as presented below (bearing in mind zinc tile size: 2.04 m x 0.88 m):

Material	Index
Roofing tiles (LT)	= width x length + % of roof structure (15% for mono-pitched roof and 30% for gabled or cross-gabled roof) / 1.55
Ridge tiles (LC)	= ML / 2.04
Total number of tiles (TL)	= LT +LC
Umbrella head roofing nails (CP)	= Total number of roof tiles x 20
Washers (A)	= Number of CPs
Strap rolls (1 roll = 30 m) (RC)	= 2 every 60 tiles
Strap nails (CC)	= 20 x m of strap

The consumption index made it possible to estimate amounts, as referenced below for an average house of 70 m2 and gabled roof:

Material	Quantity
Roofing tiles (LT)	59 u
Ridge tiles (LC)	5 u
Total number of tiles (TL)	64 u
Umbrella head roofing nails (CP)	1,280 u
Washers (A)	1,280 u
Strap rolls (1 role = 30 m) (RC)	2 u
Strap nails (CC)	1,200 u

It is also estimated that the module or toolkit for a brigade should include:

- Large hoe
- Shovel
- Hammer
- Saw
- Rope
- Diagonal pliers
- ½" nails and wood and umbrella head nails
- Nylon rope
- Wires

COSTS

Implementation costs are divided into two groups:

- The strap roll unit price is U.S. $35.50. There was no cost involved under this heading because the strap rolls were donated by the International Federation of Red Cross and Red Crescent Societies.

- Reinforcement solutions (wood used as beams, joists and others for the rehabilitation of damaged structures).

For an average house of 70 m2 with gabled roof, 2 strap rolls, around 30 zinc tiles and another 5 to 7 tiles for ridges were used.

It is impossible to standardize the cost of the construction solutions due to their specificities. However, the cost of the tool kit is $ 18.50, depending on the number of brigades to be mobilized.

Unit costs

Material	Unit cost (USD)
Strap (roll)	35.50
Zinc tiles (u)	11.00
Nails for strapping (4,500-piece box)	86.57
Umbrella head nails (1,900-piece box)	72.60
Rubber washers (2,150-piece bags)	148.76
Tool kit	18.50

LEAD TIME

The lead time required by a 5-member brigade to complete a house work is 2 days.

5.

METAL STRUCTURES WITH ZINC TILES INSTALLED ON GABLED ROOFS IN HOUSES WITH WOOD WALLS AND STRUCTURES

UNIÓN EUROPEA

care

JAPAN

HOLGUIN

UNAICC Unión Nacional de Arquitectos e Ingenieros de la Construcción de Cuba

NATIONAL IMPLEMENTER: NATIONAL HOUSING INSTITUTE (INV), NATIONAL ASSOCIATION OF ARCHITECTS AND CONSTRUCTION ENGINEERS OF CUBA (UNAICC), LOCAL GOVERNMENTS IN THE MUNICIPALITIES OF BÁGUANOS AND CUETO, AND MUNICIPAL HOUSING INVESTMENT UNITS (UMIVS) IN BÁGUANOS AND CUETO

LOCATION: MUNICIPALITIES OF BÁGUANOS AND CUETO, SANTIAGO DE CUBA

CONTACTS: : UNAICC, HOLGUÍN. ARCHITECT RAÚL FIGUEREDO REYES.
PHONE: +53 24 454830 E-MAIL: Raul@hlg.unaicc.cu

SITUATION

Most houses in the rural municipalities of Báguanos and Cueto (north-eastern province of Holguín) are made of wood and are in fair to poor condition.

Hurricane Sandy winds negatively affected this type of houses, especially their roofs, removing roofs and causing damage to house structures.

During the passage of the hurricane, a significant number of houses had their roofs removed altogether, basically wooden houses whose bearing structures and enclosures had deteriorated while the wooden structures, consisting of rafters and girders, were highly vulnerable. Also at risk were the roofs made basically of clay tiles and zinc and asbestos-cement sheets (Photos 1, 2 and 3).

After the hurricane, material assistance began to flow to the area, including resources for the reconstruction and rehabilitation of damaged houses, especially for rebuilding collapsed or severely affected roofs. The assistance of international cooperation agencies included roof modules consisting of metal structures (beams or purlins) and corrugated zinc sheets. However, their installation on wooden walls was not a traditional, widely used solution. As a result, emergency technical solutions had to be devised to improve living conditions and move toward disaster recovery.

Photos 1 to 3. Construction situation of wood houses in the municipalities of Cueto and Báguanos before Hurricane Sandy hit

IMPLEMENTATION OF SOLUTIONS

The solutions consisted of three types of technical actions:

1. Technical preparation of the houses to be rehabilitated due to the situation created by the damage sustained.

2. Installation of metal roof structures onto existing wood elements.

3. Installation of roofing structures such as metal purlins and joists covered with corrugated zinc sheets.

These solutions were implemented at the community level, on the houses affected by the hurricane in the municipalities of Báguanos and Cueto, thanks to the establishment of roofing brigades

and the training of the victims themselves (Photo 4). This made it possible to rehabilitate houses whose roofs had collapsed or had been severely damaged, using effective solutions devised in a short period of time and under emergency recovery conditions (Photo 5).

Technical actions implemented:

1) Technical preparation of the houses to be rehabilitated

The process begins with an initial visit by UMIV technical staff, along with advisors of the National Association of Architects and Construction Engineers of Cuba (UNAICC), to conduct a technical assessment of the damage to houses and plan the rehabilitation work required.

Preparations also included works on the props or wooden columns supporting ceiling beams in the houses, evaluating their structural condition and/or reinforcing or replacing elements in advanced state of deterioration or structurally damaged.

Photo 4. On-site technical training on the installation of new metal roofing elements on wooden structures in the houses damaged

Photo 5. Wooden houses rehabilitated with new metal roofing in the municipalities of Cueto and Báguanos (Holguín province)

Enclosure elements (wooden walls) were repaired or replaced, and the existing structure, consisting of wooden beams or bolsters and keys were also replaced, aligned or levelled (Photo 6).

2) Installation of metal roof structures

This consisted in the mounting of two metal profile falseworks or frameworks, situated on the front and back lines of the house to be rehabilitated, while intermediate falseworks were built of wood, using recovered pieces from the original roof in such a manner that the spacing between them did not exceed 3.5 m (Photo 7).

These elements determined the slope of the new gabled roof and also served as support for the rest of metal purlins or joists (Photos 8, 9 and 10).

3) Roofing

The slant of gabled roofs created by the arrangement of frameworks and falseworks was 57%, which helps further protect houses from winds and favours good rainwater runoff. Purlins or joists are placed on the frameworks with a spacing of 1.5 m (Figure 1).

The connection of the joists or purlins onto the falseworks was made by means of self-drilling or self-threading screws, with a spacing of 228 mm and 230 mm between them. The corrugated zinc sheets or tiles were fixed to the purlins with

Photo 6. Levelling and preparation of bearing structure on one of the houses to be rehabilitated

screws, in this case, 6.3 x 25 mm screws with sealing washers (Figure 2). The connection between tiles was also carried out according to technical specifications (Figures 3 and 4).

Photo 7. Framework or falsework with profile joists or purlins ready to be mounted on the wooden structure of a house under rehabilitation

An important issue to address over roofing is the connection of the metal falseworks with the wooden structure of the house, which was made through a number of specific solutions, using steel plates, both straight and angled (Photos 11 to 16), through bolts and nuts (Photos 17, 18 and 19), and other specific modalities based on the pressing need to find solutions (Photo 20).

Photos 8 to 10. Detailed assembly and installation of new metal frame and roofing elements on wooden elements of the houses under rehabilitation

These technical and social solutions were locally generated during the emergency phase in the municipalities of Báguanos and Cueto. Wood houses could not support the traditional installation of metal roofs. However, the local technical staff (UMIV and UNAICC), together with the help of the victims themselves, enhanced resilience in the municipalities, which were able to provide a secure, appropriate response while increasing the positive social impact of the donations received.

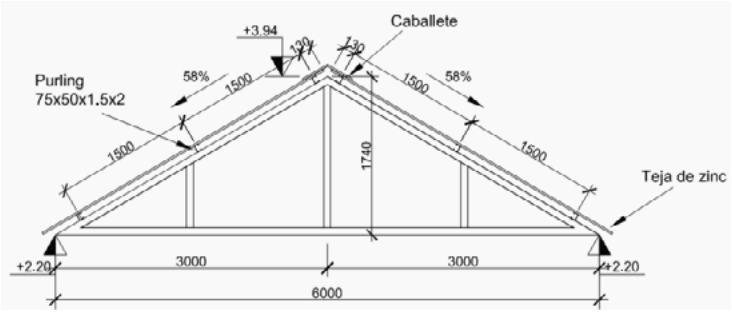


Figura 1. Armadura o cercha de perfiles metálicos empleada en la rehabilitación de los techos.

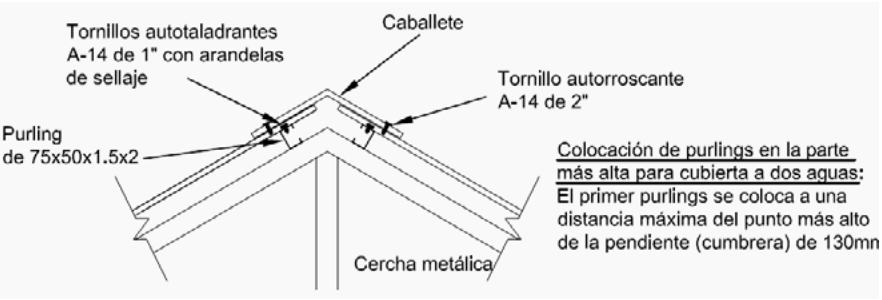


Figura 2. Detalle de la colocación de viguetas o purlings en el caballete de la cubierta.

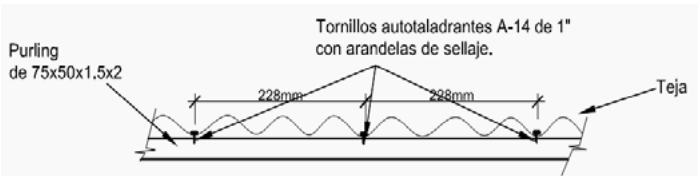


Figura 3. Detalle de la fijación de las tejas o láminas de zinc sobre las viguetas o purlings.

Fijación de tejas:

Las tejas se fijarán a los purlings con tornillos autotaladrantes A-14 de 1" con arandelas de sellaje, espaciados a 228 mm en la parte baja de la onda (se colocarán cada 3 ondas).

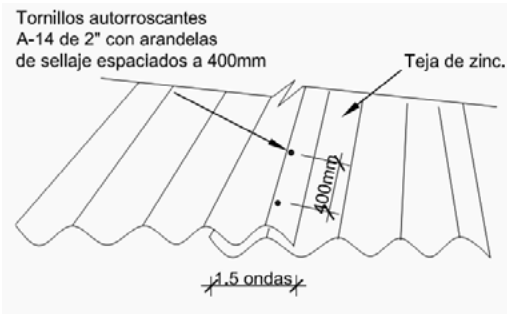
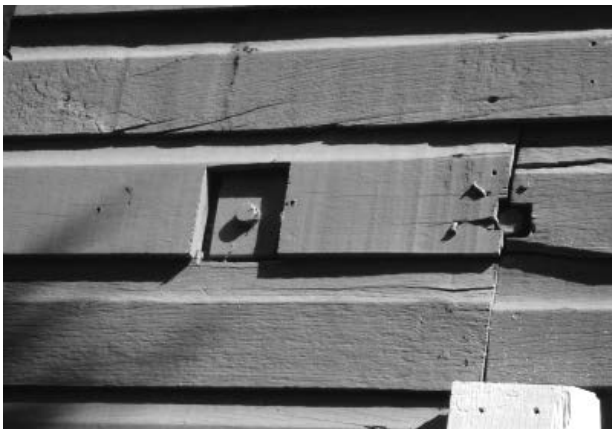


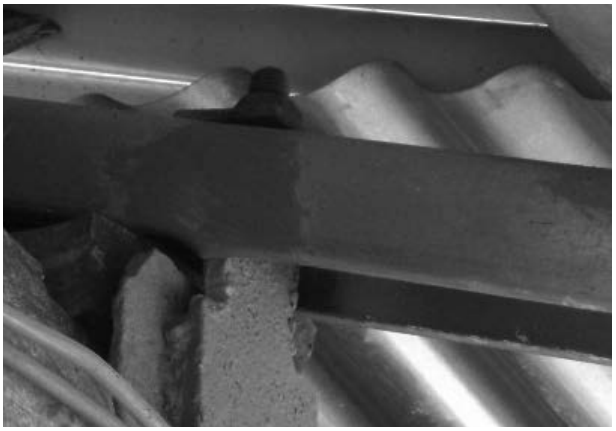
Figura 4. Detalle de la fijación de las tejas o láminas de zinc de la cubierta.

Solape entre tejas:

Las tejas se fijarán a los purlings con tornillos autotaladrantes A-14 de 1" con arandelas de sellaje, espaciados a 228 mm en la parte baja de la onda (se colocarán cada 3 ondas).

Las tejas se solaparán 1.5 ondas. La unión entre las tejas (junta longitudinal) se hará con tornillos autorroscantes A-14 de 2" con arandelas de sellaje espaciados a 400 mm en la parte alta de la onda (cresta superior).


Photos 11 to 16. Detailed connection of metal frameworks or falseworks of the new roof on pre-existing wooden beams, using steel plates and threaded screws

Photos 17 to 19. Connection of metal frameworks or falseworks with wooden beams using screws

Photos 20. Detailed connection of metal structures of the new roofs on pre-existing structures applying various on-site solutions

MATERIAL NEEDS

The demand for material resources was adjusted, depending on specific cases. Nevertheless, the need for five modalities was calculated, according to the roof area affected, ranging from 50 to 90 m2:

In addition to the resources mentioned above, the donation included modules of equipment and tools for roofing brigades, as a result of which these groups were activated, thus ensuring minimum conditions for safety and quality results (Photo 21).

List of tools and supplies for roofing brigades

Drill

Screw nozzle

Extension cord

Portable welding machine and protection gear

Framesaw with metal cutting blade

Construction nylon thread

Hammer

Machete

5.0 m measuring tape

Saw

Level

Resource requirements according to roof area affected	Qty.
For 50 m^2 houses	
3.70 m x 1.04 m zinc tiles	18
7 m purlins	11
1.83 m ridges	5
50 mm (2”) screws	206
25 mm (1”) screws	295
For 60 m^2 houses	
3.70 m x 1.04 m zinc tiles	22
7 m purlins	14
1.83 m ridges	6
50 mm (2”) screws	247
25 mm (1”) screws	354
For 70 m^2 houses	
3.70 m x 1.04 m zinc tiles	26
7 m purlins	16
1.83 m ridges	7
50 mm (2”) screws	289
25 mm (1”) screws	413
For 80 m^2 houses	
3.70 m x 1.04 m zinc tiles	29
7 m purlins	18
1.83 m ridges	8
50 mm (2”) screws	330
25 mm (1”) screws	472

For 90 m^2 houses	
3.70 m x 1.04 m zinc tiles	33
7 m purlins	21
1.83 m ridges	9
50 mm (2”) screws	371
25 mm (1”) screws	531

Photo 21. Members of a roofing brigade using some of the tools and supplies donated

COSTS

The solution for installing metal roof structures on houses with wood walls and structures and roof areas of 50 m2 costs 686.00 EUROS (€) and its adaptation to other (60, 70, 80 and 90 m2) houses costs 130.00 EUROS (€) each. The estimated cost therefore stands at 13.80 EUROS/m2.

LEAD TIME

Based on an 8 -hour work shift, the average lead time for roofing works is 4 days per house.

6.

REHABILITATING ROOFS ON HOUSINGS WITH WOODEN AND MASONRY STRUCTURES

BENEFICIARIES: 600 FAMILIES LIVING IN 11 PEOPLE'S COUNCILS LOCATED IN MUNICIPALITIES AFFECTED BY THE HURRICANE

NATIONAL IMPLEMENTER: NATIONAL HOUSING INSTITUTE (INV), MUNICIPAL GOVERNMENTS, MUNICIPAL HOUSING INVESTMENT UNIT (UMIV) IN MAYARÍ AND RAFAEL FREYRE, AND PROVINCIAL HOUSING INVESTMENT UNIT (UPIV) IN HOLGUÍN

LOCATION: MUNICIPALITIES OF MAYARÍ (PEOPLE´S COUNCILS OF MAYARÍ-CIUDAD, PRIMERO DE ENERO, EL COLORADO, GUATEMALA, CHAVALETA, GUANINA, AND NARANJA) AND RAFAEL FREYRE (PEOPLE´S COUNCILS OF SANTA LUCIA, FRAY BENITO, CARLOS NORIS, AND LA CARIDAD), HOLGUÍN PROVINCE.

DURATION OF THE PROJECT: JANUARY- OCTOBER 2013

CONTACTS: OIKOS: MRS. SANDRA LÓPES AND MRS. RAQUEL CALÁS, PHONE: 8310449, EMAIL: oikoscub@enet.cu; sandra.lopes @ oikos.pt

UNIÓN EUROPEA

oikos
acção humanitária

HOLGUIN

SITUATION

During its passage through the eastern region of Cuba, Hurricane Sandy partially went through the province of Holguín, located north of Santiago de Cuba, causing considerable material damage and loss in both provinces, especially to the housing stock, exceeding 300 million pesos.

One of the most frequently seen consequences was the collapse or partial destruction of roofs, which totalled 1,500 m2 in Holguín province alone. The most seriously affected municipalities were Cueto, Urbano Noris, Báguanos, Banes, Antilla, Mayarí, and Rafael Freyre.

In the municipality of Mayarí, 55.4% of the population had their houses damaged; in Rafael Freyre, 46.8%. In both municipalities, a total of 3,632 houses lost their roofs, while 14,319 had their roofs partially destroyed.

The houses affected were those in vulnerable condition due to the building materials and the construction typology used, poor technical status, and lack of maintenance. The houses damaged were those with wooden structures and walls, masonry (brick and concrete block) structures, and wooden, tile or other material roofs.

The idea was to devise technical solutions that would enable the installation of the roof modules donated by the agencies that had provided assistance following the disaster. These roofs consisted of metal profile frameworks or falseworks, joists or purlins of the same material, and metal sheet tiles. As a result, local implementers in the municipalities of Mayarí and Rafael Freyre, with the participation of UPIV- Holguín, had to solve a number of specific problems to rehabilitate the houses using the new roofs.

IMPLEMENTATION OF SOLUTIONS

The module donated for the reconstruction of collapsed or damaged roofs to rehabilitate the houses affected by Hurricane Sandy consisted of metal profile frameworks or falseworks, canal-shaped or galvanized canal-section joists or purlins, and laminated, inverted-V, folded metal tiles (0.40 mm thick, enamel covered on both sides, and G90 coating).

The solutions implemented were geared at adapting the roof modules onto the bearing structures and other elements of the houses with total or partial loss of the roofs. This included an evaluation and preparation of the existing construction for the new roof elements, the assembly and fastening of the elements on the wooden or masonry structure of the houses and the subsequent installation of the tiles.

This experience began with the selection of the beneficiaries of the 600 modules donated, applying a social and technical approach. The social approach involved the selection of the beneficiary families according to the list of victims and houses registered with UMIV and the local government in each municipality. This action made it possible to identify the most socially vulnerable people to be prioritized under disaster recovery efforts. The technical approach consisted in the identification of the houses with wooden or masonry structures that would meet minimum construction requirements to support the weight of the new roofs.

The first step was to prepare the houses for the new roof installation. In the case of wooden structure and wall houses, the primary objective was to determine the condition of the props or wooden columns supporting ceiling beams, which function as bearing elements for the houses. When necessary, the wooden columns were reinforced or replaced, and their bases were consolidated. The rest of the wooden enclosure elements were also reinforced and repaired, including the alignment and levelling of beams or wooden sleepers.

In case of masonry houses, mostly made of bricks, the general condition of the walls and the rest of the structure were verified. The roofs were made of wood and, although they had been destroyed or severely damaged, the beams or wooden sleepers were evaluated when the enclosure lacked reinforced concrete beams.

With regards to module installation, several alternatives of sloped, gabled or cross-gabled roofs were designed (Figures 1, 2 and 3). A 57% slope was used for the roofs, and connection of the joists or purlins to falseworks was carried out using self-drilling or self-threading screws, with a spacing of 228 to 230 mm from each other. Corrugated zinc sheets were also fixed to the purlins by means of 6.3 x 25 mm screws with sealing washers (Photos 4 and 5).

With regards to houses with wooden walls and structures, remaining wooden elements in good condition were used. In other cases, good pieces of the damaged roof were re-used (Photo 6 and 7).

The roofs installed either on wooden or masonry houses provided a quick and safe solution during the emergency phase itself, with the help of roofing brigades and the population affected by the hurricane. With regards to masonry houses with wooden roofs, original structural elements were re-used (Photos 8, 9 and 10).

It is imperative to highlight the organization of community-based roofing brigades trained by local UMIV technicians from both municipalities at theoretical and practical demonstration workshops held at the People's Council headquarters, with the attendance of the beneficiaries themselves, heads of the People's Power from neighbouring constituencies, and presidents of the People's Councils. This initiative ensured a greater participation and better quality of work, thus meeting the needs of the people affected by the hurricane in a short period of time (Photo 11).

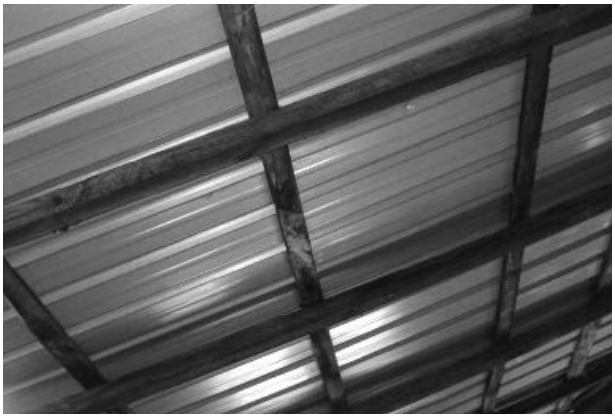
Photos 1, 2 and 3: Possible solutions applied to gabled and cross-gabled roofs on wooden or masonry structures

Photos 4 and 5: View of cross-gabled roofs with fretted metal tiles and supplementary pieces on ridges and junctions of sloping planes

Photos 6 and 7: Re-use of wooden roof elements for the installation of laminated tiles on the roofing modules donated

MATERIAL NEEDS

LThe demand of resources for this type of solutions was adjusted to specific cases; however, the material needs were calculated on the basis of roof area, which ranged from 50 m2 to 80 m2. Only purlins or metal joists were used on masonry houses (with walls made of bricks and concrete blocks).



Photos 8, 9 and 10: Re-use of original structural elements on masonry (brick and block) houses

Photo 10.

Photo 11: House completed with the roof module installed thanks to the Community Brigades and the beneficiaries themselves advised by local technical staff

Materials used according to roof area:

Resource requirements according to roof area	Qty.
For 50 m^2 houses	
3.60 m x 1.04 m zinc tiles	14
1.83 m ridges	9
50 mm (1") screws	280
For 60 m^2 houses	
3.60 m x 1.04 m zinc tiles	17
1.83 m ridges	10
25 mm (1") screws	336
For 70 m^2 houses	
3.60 m x 1.04 m zinc tiles	20
1.83 m ridges	12
25 mm (1") screws	392
For 80 m^2 houses	
3.60 m x 1.04 m zinc tiles	23
1.83 m ridges	14
25 mm (1") screws	448

In addition to the resources mentioned above, the donation included modules of tools and supplies for the roofing brigades, which made it possible to activate these groups and ensure minimum conditions for safe, quality work (Photo 24).

List of tools and supplies for a roofing brigade

- Electric drill / screwdriver
- Extension cord
- Masonry bucket
- Rubber float trowel
- Trowel
- Cleaver
- Nylon thread
- Claw hammer
- Crowbar
- Bricklayer's trowel
- Framesaw / blades
- Drill set and screwdrivers
- Pliers
- Machetes-

Boxes of 2 and 4 inch nails for rustic wooden walls and roofs

- Welding kit (plant, machine and rods)
- Flame cutting equipment
- Levels
- Small hammer drill (double rotation, 110 v)
- 2-6 mm drills (for metal and concrete)
- 5 m metal-made measuring tapes
- Masonry wagons
- Square and round shovels
- Pickaxes, aluminium ladders (two levels)
- Tinman's snips
- 110 v polishers (up to 7 ½")
- Cutting and roughing disks

The toolkit can be used to perform works other than roofing on the house. It will be kept at the UMIV for community use whenever necessary. This is another contribution made by the project.

COSTS

The solution for installing metal roof structures on houses with wood walls and structures and roof areas of 50 m2 cost 296.45 EUROS (€) and its adaptation to other (60, 70, 80 and 90 m2) houses cost 60.00 EUROS (€) each. The estimated cost therefore stands at 6.00 EUROS/m2.

LEAD TIME

Based on an 8-hour work shift, the average lead time for roofing is 4 days per house.

7.

WOODEN STRUCTURES FOR THE REHABILITATION OF ROOFS ON RURAL HOUSES IN THE AGRICULTURAL AND FORESTRY SECTOR AND FOR THE RESTORATION OF PRODUCTION FACILITIES IN THE AGRICULTURAL SECTOR

BENEFICIARIES: 500 FAMILIES, INCLUDING 1,841 WORKERS FROM 29 FACILITIES IN THE AGRICULTURAL AND FORESTRY SECTOR

DONORS: GVC ONLUS

NATIONAL IMPLEMENTER: NATIONAL HOUSING INSTITUTE (INV), CUBAN ASSOCIATION OF AGRICULTURAL AND FORESTRY TECHNICIANS (ACTAF), PROVINCIAL HOUSING INVESTMENT UNIT (UPIV) IN HOLGUÍN.

LOCATION: MUNICIPALITY OF MAYARÍ (20 PEOPLE´S COUNCILS), HOLGUÍN PROVINCE.

CONTACTS: GVC ONLUS, PHONE: +53 7 2027867, EMAIL: gvccuba@enet.cu. ACTAF, PHONE: +53 024 463300.

SITUATION

The consequences of natural disasters, aside from the serious damage caused to houses and urban settlements, include the loss of livelihoods, which aggravates the situation of the victims, and increases the costs of and hinders emergency aid.

Besides its impact on the housing stock in urban and semi-urban settlements, Hurricane Sandy caused extensive damage in rural areas, to isolated houses, hamlets, crops and other agricultural-forestry facilities of economic importance. As a result, the population was doubly affected by the damage to their houses and the negative impact on agriculture and forestry, the two main economic activities in the region.

In the municipality of Mayarí, over 890 production entities (state-owned farms, agricultural plans, forestry companies, cooperative undertakings, and other facilities) sustained significant damage, jeopardizing employment and food security for many people in an eminently rural area. Floods affected 85% of cultivated areas. A total of 880 hectares planted to coffee and 180,000 hectares planted to forestry species were affected by Hurricane Sandy strong winds; 75% of farmers and members of agricultural cooperatives lost their crops and had their houses and production and storage facilities damaged.

As Mayarí is a mountain, difficult-to-accede area, the transportation and distribution of resources are very challenging, hence the importance of local actions for emergency assistance to the population and the rehabilitation of economic facilities affected by the hurricane. The winds turned down many trees that could not be removed during the post-disaster emergency phase. Therefore, one of the most effective local solutions was to process and distribute some of the timber locally to rehabilitate houses and production facilities. This helped reduce the social and economic impact of this weather event and revitalize the municipality.

IMPLEMENTATION OF SOLUTIONS

The donor agency (GVC) focused on the restoration of production facilities in the agricultural sector as a prerequisite for the rehabilitation of houses of rural families and the prompt re-establishment of their livelihoods. In this regard, a comprehensive strategy was adopted, including:

• Support for 29 production units under the umbrella of state-run agricultural and forestry companies in the municipalities of Mayarí and Cueto, including the Urban Agriculture Movement, which enabled to recover the production infrastructure, restore family subsistence crops, and get rural workers back to their jobs.

• Rehabilitation of 500 houses, benefiting workers at state-owned entities and cooperatives, primarily using local resources and some of the wood from trees turned down by the strong winds.

As part of the support provided to production entities, 12 economic facilities were selected in the municipality of Mayarí and 9 in the municipality of Cueto, including state-run vegetable gardens, farms and plantations, organic farming units and crop houses, which were given various resources to resume operations and increase production volumes as soon as possible.

Irrigation systems and electro-pumps, partial-shade cloth for vegetable gardens, plastic laminated raffia for crop houses, and other supplies (wheelbarrows, shovels, hoes, rakes, and knapsack sprayers) were distributed for daily work.

In addition, 430 individual workers of the Urban and Suburban Agriculture Programme were given supplies (wheelbarrows, rabbit cages, meshes, rakes, buckets, shovels) and irrigation systems.

In the forestry sector, 8 entities under the umbrella of the Comprehensive Forestry Company in Mayarí were supported with the installation of coffee pulp-removing machines, dry coffee processing plants, and means to revitalize the timber industry and forestry units.

Support was also provided to recover wood from forest areas affected by the hurricane, providing the Forestry Company with the technical means necessary to deliver both processed and unprocessed wood to families of state workers and cooperative members in this sector.

MATERIAL NEEDS

The experience gained in connection with material needs is very specific as it covers only the agricultural and forestry sector in the municipalities affected by the hurricane. Hundreds of cubic meters of the wood from trees turned down by heavy winds were used to rehabilitate the houses damaged, which became a local post-disaster reconstruction initiative.

The other material resources involved in this experience had to do with equipment, tools and supplies donated for the revitalization of economic activities, including food production, the return of workers to their jobs, and the rehabilitation of houses. The list covers:

- Irrigation systems (sprinkler or microjet) and electro-pumps
- Partial-shade cloth for vegetable gardens
- Plastic laminated raffia for crop houses
- Modules (wheelbarrows, shovels, hoes, rakes, knapsack sprayers)
- Dry coffee processing and pulp-removing equipment
- Industrial wood processing equipment
- Equipment for forestry units

COSTS

The costs are very specific, depending on the equipment and resources required in each case. It is not possible, therefore, to break them down into technical and/or economic indexes.

LEAD OF EXECUTION

January-December 2013.

8

MOBILE SAWMILLS FOR THE *ON-SITE* PROCESSING OF WOOD FELLED BY THE HURRICANE TO ITS EMPLOYMENT IN THE REHABILITATION OF HOUSING

UNIÓN EUROPEA

GVC
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HOLGUIN

BENEFICIARIES: 500 FAMILIES, INCLUDING 1,841 WORKERS FROM 29 FACILITIES IN THE AGRICULTURAL AND FORESTRY SECTOR

DONORS: GVC ONLUS

NATIONAL IMPLEMENTER: CUBAN ASSOCIATION OF AGRICULTURAL AND FORESTRY TECHNICIANS (ACTAF), NATIONAL INSTITUTE OF HOUSING (INV), MUNICIPAL INVESTMENT UNIT OF HOUSING (UMIV) IN MAYARI, PROVINCIAL INVESTMENT UNIT OF HOUSING (UPIV) IN HOLGUIN.

LOCATION: : MAYARI MUNICIPALITY (20 PEOPLE'S COUNCIL), PROVINCE OF HOLGUIN.

CONTACTS: GVC ONLUS, PHONE: +53 7 2027867, EMAIL: gvccuba@enet.cu. ACTAF, PHONE: +53 024 463300.

SITUATION

The wake of hurricane Sandy along the rural areas of Mayarí municipality, rich in forest exploitation of various timber species, caused the fall or affectation of an important volume of trees, with which the amount of wood in the soil was practically impossible to process, carry and saw in post-disaster emergency conditions.

On the other hand, there was an urgent need for the rehabilitation of timber roofs to more than 500 families of the city, given the destruction or structural damages the hurricane caused. All this raised the possibility of working felled wood resulting from the hurricane in areas close to its accumulation, thereby facilitating the recovery.

SOLUTIONS IMPLEMENTED

The project of GVC has developed a specific intervention to support the Integral Forest Enterprise of Mayarí, with the objective of a quickly recovery of the forest management capacity (including reforestation activities) and timber production, exploiting the most remote areas affected by the hurricane. Through increasing the production of timber, a direct benefit for the construction and/or repairing of houses affected by the hurricane was attained, replacing the affected elements in timber structures.

In addition, sets of tools were allocated to the forestry brigades in the recovery and cleanup of coffee plantations (axes, chainsaws, wheelbarrows, shovels, mallet, machetes, limas, pickaxe, hoe and other inputs).

It was decided the use of two mobile sawmills, of small dimensions and possible transportation (Photos 1, 2 and 3), which allow sawing wood in situ (Photos 4 and 5), reaching the most difficult areas and significantly reducing the transportation costs of raw materials.

Fotos 1 y 2

Fotos 3 y 4

MATERIAL NEEDS

The key resource of this experience is the mobile sawmill, with the following specifications:

- Length: 8.00 m
- Width: 2.00 m
- Height: 3.20 m
- Weight: 1769 kg
- Supply: petrol or diesel engine (29 HP or more)
- Maximum diameter of wood pieces: 910 mm x 6.40 m
- Maximum width of wood pieces: 710 mm
- Production capacity: up to 1.3 m3/h

The equipment can saw hard and soft wood, depending on the type of saws fitted; the option of the hydraulic functions to load and manage the wood pieces allows greater production and fewer efforts for workers (Photo 6).

EXECUTION TIME

The machine is capable of cutting wood for up to 6 m in length, with a minimum thickness of ½" and up to 60 cm in diameter. With a steady supply of wood is capable of producing up to 5 m^3 of wood, in an 8-hour workday. The incorporation of a mobile sawmill, has as advantage savings on the order of 50 per cent for transportation and fuel concepts. It can be moved to the place where the wood will be cut, transported in trucks or carts, representing a considerable saving. It should be noted that this technology enables to process the wood at the place where it is located.

A house of 70 m^2 per concept of roofing (including alfardas, rafters, screeds, rails, keys, crossbar, beams, and girders) requires about 1.5 m^3 of processed wood. With this technology can be produced wood for roofing 3 houses per day.

COSTS

Description	**Costs (USD)**
Mobile Sawmill	44000
Automatic grinding machine	7000
Saw blade locking	1500
Minimum Spare parts Kit	1000
Tool kit for the forest management (Chainsaw, axes, shovels, wheelbarrow, rake, mallet, machete, lima, pickaxe, hoe, backpack of fumigation, graft knife, lop pruning scissor)	1500

9.

DRY TOILET

BENEFICIARIES: 21 RESIDENTS IN DOS PALMAS
ADAEL GONZÁLEZ RODRÍGUEZ' FAMILY

DONORS: EUROPEAN UNION, ANTONIO NÚÑEZ JIMÉNEZ FOUNDATION OF NATURE AND MAN (FANJ)

LOCATION: SANTIAGO DE CUBA PROVINCE, PALMA SORIANO MUNICIPALITY, DOS PALMAS PEOPLE'S COUNCIL

DURATION OF THE PROJECT: (START-END) 9/12/2013 - 14/12/2013

CONTACTS: : (INSTITUTION, PERSON, TELEPHONE, EMAIL) FANJ-ROBERTO SÁNCHEZ MEDINA TEL.: 2092952. E-MAIL: roberto.sanchez@fanj.cult.cu

UNIÓN EUROPEA

Fundación Antonio Núñez Jiménez de la Naturaleza y el Hombre

PNUD Al servicio de las personas y las naciones

UN-HABITAT POR UN MEJOR FUTURO URBANO

SITUATION

The sanitation and hygiene situation in Dos Palmas People's Council is a priority issue for the local authorities, since around 90% of families still use the so-called black holes (latrines), which in many cases are also used as showers, without any treatment of wastewater. Furthermore, most houses on the outskirts of the settlement do not have drinking water supply.

The government is interested in finding sustainable, economic solutions to the sanitation situation of these families, who recognize the precariousness of their systems. There is an organizational base, with a number of resources available, at the People's Council due to the ECHO Project, which implements alternative solutions for habitat improvement.

Toilets of beneficiary families

IMPLEMENTATION OF SOLUTIONS

Step 1. Theoretical group work

Step 2. Selection of the site for the toilet, adaptation of the original design, and layout of the work.

Step 3. Erection of the work.

Step 4. Assembly of the toilet bowl with a urine separation system.

Step 5. Accessories and finishing solutions.

Locally produced bricks

Mix preparation

Vent assembly

MATERIAL NEEDS

Materials required for building a typical two-chamber toilet (1.80 x 1.20 m)

Material	Unit	Quantity
P250 cement	Bag	9
White cement	Kg.	2
Bricks	U	700
3/8" bars	m	36
Washed sand	Bag	16
Fine sand	Bag	8
Stone	m^3	0.5
Gravel	m^3	0.5
Wood (1" thick) (2 m)	Board	16
Wood (2 x 2") (2.20 m)	Beam	7
2.00 x 0.80 m door	U	1
4" hinges	U	2
Vinyl paint	gal.	1
Enamel paint	gal.	0.25
Toilet sink with siphon	U	1
Toilet sink faucet	U	1
4" PVC tube (3 m)	U	2
2" PVC tube (3 m)	U	2
2" PVC union elbow	U	4
4" PVC union elbow	U	4
Wire 18	Kg.	2
PVC glue	Can	1
Mosquito mesh	m^2	0.5
1/2" hose	m	5
3" nails	Kg.	2
Roofing sheets	U	2
70 X 70 cm sluice	U	2
20 l. carafe with lid	U	2
60 x 40 x 40 cm plastic boxes	U	3

BASIC TOOLKIT

Tool	Unit	Qty.
Wagon	U	1
Fine-mesh sieve	U	1
Medium sieve	U	1
Masonry trowel	U	1
Flat trowel	U	1
Float trowel	U	1
Plumb line	U	1
Hammer	U	1
Handsaw	U	1
Framesaw and blades	U	1
Measuring tape	U	1
Drill set	U	1
4” paint brush	U	1
2” paint brush	U	1

COSTS

Two-chamber design (1.80 x 1.20 m)

744.00 CUCs (subject to change in design and use of alternative materials)

LEAD TIME

10 to 21 days

10.

SAFE WATER SUPPLY

BENEFICIARIES: 8,340 FAMILIES

DONORS -PARTNER-IMPLEMENTER: NATIONAL: ECHO IS THE DONOR AND IMPLEMENTING PARTNERS ARE THE LOCAL AUTHORITIES OF PALMA SORIANO AND MINSAP. ON THE PART OF UNITED NATIONS, PNUD AND UN HABITAT.

LOCATION: PALMA SORIANO MUNICIPALITY, SANTIAGO DE CUBA PROVINCE

DURATION OF THE PROJECT: 1/1/2013 TO 31/12/2013

CONTACTS: UNICEF CUBA, AIMEE BETANCOURT, abetancourt@unicef.org

UNIÓN EUROPEA

unicef

SITUATION

On October, 2012 eastern Cuba was struck by Hurricane Sandy, crossing the city of Santiago as a Category 2 hurricane in a space of five hours. Of the 340,000 people who were preventively evacuated, 300,000 stayed with family members while the rest were installed in shelters. Despite preparatory measures, around three million people (27% of the country's population) were affected.

The infrastructures of the province and Palma Soriano municipality itself were severely damaged including housing, electricity distribution systems, water supply and communications, as well as schools, hospitals, warehouses, industries and public institutions.

Preliminary reports showed that about 70 percent of the population had limited access to fresh water, and the water reservoirs were unsafe and very muddy. The destruction of basic infrastructure of water supply and sanitation system, as well as floods, poor hygiene and overcrowding of households due to relocated families, led to sharpen waterborne diarrheal diseases and those caused by vectors previously existing but in lesser extent than before the emergency.

APPLIED SOLUTIONS

UNICEF in collaboration with the government of Cuba led the efforts of the UN system in water, sanitation and hygiene. All actions were planned according to the Core Commitments for Children in Humanitarian Action (CCC).

The aim of actions is to reduce mortality and morbidity caused by unsafe water consumption, the poor sanitation, and diarrheal diseases in communities and schools in Santiago de Cuba.

Provincial and local authorities were gradually repairing and improving access to fresh water as the most affected population in Palma Soriano had no reliable means to store, transport or chlorinate water.

That is why a comprehensive strategy with the housing sector was planned to be used in possible similar situations in the future. The municipality of Palma Soriano was chosen and a strong partnership between local authorities and the UN was created to contribute to community sustainability and control. The local authorities decided which families should be benefited based on jointly established criteria. The actions included ceilings for housing and basic means of chlorination, storage, transport, and cooking.

To this end, UNICEF and local authorities improved by purchasing 8.5 mg chlorine tablets, 250 liter water tanks and 10 L flexible container.

This type of chlorine tablets was chosen because it is the proper dosage for water bottles of 1 liter and a half capacity. It was decided to purchase 2,900 tanks of 250 L capacity to be distributed for a single family in both rural and urban areas of the municipality. These PVC covered tanks can be used for many years, being a more permanent solution. For transportation of water, 10 L flexible water containers were purchased which are very light and do not take too much space.

Also, brochures containing awareness messages on basic hygiene aspects like hand-washing and proper food preparation were elaborated. The workshops were supported by the Ministry of Health in order to create a network of local hygiene promoters against waterborne diseases and vectors reduction in the municipality.

The means used and the strategy implemented are integrated response models including sectors such as water, sanitation and hygiene, housing, education, among others.

MATERIALS NEEDED

The following supplies are needed:

- 250 L tanks.
- 8.5 mg purification tablets. These pills are distributed by health authorities to guarantee proper use by the community.
- 10 L containers to transport water.

- Brochures on basic aspects regarding hygiene as hand-washing and food handling.

COSTS:

The unit cost of these supplies is:

UM: USD

8.5 mg Chlorine tablets (box of 10000)	30.53
250 L water tank	33.90
10 L water tank	1.727

TIME OF COMPLETION:

As supplies are imported, the implementation takes between 6-9 months. In the case of water tablets and 10 L containers, processes are simpler as they are standard supplies for emergency response in the field of water and sanitation, purchased through Copenhagen Supply Division.

11.

WATER FILTER

UNIÓN EUROPEA

UN-HABITAT
POR UN MEJOR FUTURO URBANO

unicef

PNUD
Al servicio de las personas y las naciones

BENEFICIARIES: 50 HOUSES

LOCATION: DOS PALMAS PEOPLE´S COUNCIL

CONTACT: PRODUCER – ARTISAN **E-MAIL:** miriya14@yahoo.es

SITUATION

One of the problems generated by Hurricane Sandy in eastern Cuba had to do with the quality of drinking water (water for human consumption thanks to a purification process) due to the technical deterioration of the sewer system or the contamination of other supply sources. This caused outbreaks of diarrheal diseases detected over a survey in the municipality of Palma Soriano.

IMPLEMENTATION OF SOLUTIONS

The water filter, manufactured with ceramic materials that are made rigid by exposure to heat in non-industrial ovens, is part of an ancient tradition followed to preserve the freshness and natural properties of drinking water. With a capacity of 10 litres and an inner (zeolite) filter, the device can store boiled or non-boiled water, after adding sodium hypochlorite to protect human health.

Properties:

- Eliminates the hardness of water
- Maintains the freshness of water

Use:

- For human consumption (natural water, juice, etc.)
- For fruit and vegetable washing
- For food processing

Features:

- Easy to disassemble for cleaning
- The inner filter (separately supplied) should be changed twice a year.

MATERIAL NEEDS

The following materials are used to manufacture a water filter:

- Baked red ceramic material: 0.3 m3
- Zeolite mineral ore: 2 Kg.
- ½" plastic water tap or faucet: 1 u
- ½" plastic knot: 1 u
- White cement: 60 g
- Rubber washer for inner filter seat: 1 u
- Firing wood (marabou)

MEANS AND TOOLS

- Deep pot for preparing and shaping the clay
- Workbench for manual cutting and moulding
- Potter's wheel
- Locally produced spatula
- Ancillary support or shaping base
- Local kiln
- Drill for ½ joint
- Water pumps
- Water hoses

PRODUCTION COST

34.00 CUCs per unit

PRODUCTION PROCESS:

15 to 20 days

12.

EMERGENCY SOLUTIONS TO HURRICANE- AFFECTED PEOPLE BY TOTAL COLLAPSES

BENEFICIARIES: FAMILIES WITH AFFECTED HOUSES: 7.249 FAMILIES WERE BENEFITED

DONOR: UNDP, THE INTERNATIONAL FEDERATION OF RED CROSS AND RED CRESCENT SOCIETIES

NATIONAL IMPLEMENTER: CUBAN RED CROSS IN SANTIAGO DE CUBA, PROVINCIAL INVESTMENT UNIT OF HOUSING IN SANTIAGO DE CUBA, NATIONAL INSTITUTE OF HOUSING

LOCATION: PROVINCE OF SANTIAGO DE CUBA

CONTACTS: - CUBAN RED CROSS IN SANTIAGO DE CUBA. ADDRESS: CARRETERA DEL MORRO NO. 268 BETWEEN A AND B. PHONES: 622848 - 623300, E-MAIL: croja@medired.scu.sld.cu

- PROVINCIAL INVESTMENT UNIT OF HOUSING IN SANTIAGO DE CUBA (UPIV), EMAIL: upiv@upiv.scu.inv.cu

- NATIONAL INSTITUTE OF HOUSING (INV), EMAIL: presidencia@inv.cu

SITUATION

The impact of hurricane Sandy in one of the most populated and dense cities of Cuba and its second-largest urban area in political and social importance, left a large number of homes damaged: 15.889 total collapsed and 22.177 partially collapsed, thus, many families stayed homeless, especially those who could not temporary displace to safer relatives' houses and those of greater economic and social vulnerability.

A part of the disaster-affected people were provisionally evacuated in government institutions, that served as shelters for the emergency; but it was necessary to find some emergency solution for them so that they could return to their residence places and join the reconstruction of houses.

Alternatives for emergency solutions had been searched to temporary, safe and appropriately solve the problem of total collapses and allow affected people remaining in their places to undertake participatory actions and incorporate into reconstruction activities.

SOLUTIONS IMPLEMENTED

Three types of solutions were applied, depending on the donor and the implementer who operated in each case, all of them on the concept of emergency variants for the immediate and temporary location of families in their places of residence and the restitution of their roofs with some effective and safe alternative.

Module 1

It consisted on temporary roof solutions from tiles or elements of easy transporting and placement, in spite of being an alternative for short and medium term due to its durability. These resources were given by subsidy to damaged families and allowed the construction of roofs with fibro-asphalt tiles, solving the supporting structure with locally materials available like recovered or recycled timber elements, and pieces of rustic wood.

These solutions were quickly deployed just after the wake of hurricane and undertaken by the National Institute of Housing (INV) and the Provincial Investment Unit of Housing in Santiago de Cuba (UPIV).

Module 2

It was a solution implemented from the emergency donations by the United Nations Development Program (UNDP), in collaboration with the INV. Corrugated sheeting of zinc or canvas tarpaulins for ceilings were provided by the donor, while the national implementer supported the solution with structure elements, using recycled and rustic timber.

Module 3

This solution was implemented from plastic sheeting donated by the International Federation of Red Cross and Red Crescent societies, and executed in the field by the Cuban Red Cross, and consisted on fixing plastic sheeting ceilings on the residual structures remaining in roofless houses, like a temporary shelter, thus it had a rapid installation and a short term response, especially in neighborhoods and settlements of Santiago de Cuba city and other peripheral locations of social and economic vulnerability conditions.

To these cases within the national programs, construction materials are subsidized to allow affected people building temporarily a minimum space where to dwell in (Module No. 1). UNDP and the Red Cross responded and joined local emergency solutions, providing other humanitarian relief modules (Module No. 2 and No. 3 respectively).

UNDP donated tiles of Zinc and plastic sheeting ceilings, while the Cuban government took care

of supporting and supplementary materials, and in other cases local solutions were found by the own damaged families. In all cases recycling materials got by the hurricane were used.

Technical solutions

In the construction of the emergency solutions, in spite of its transitoriness, stability was ensured to guarantee family's life. In a general sense, the carried out construction sequence summarizes in:

- Preparation of the ground (cleaning of the ground and drainage ditches of water)
- Anchorages of the frame (Driving timber poles at least 60cm into the ground)
- Placement of closing elements (tiles of Zinc and plastic sheeting ceilings)

Special attention was taken to plastic sheeting considered a useful temporary building material for repairs or emergency shelter structures. Its anticipated lifetime is less than 2 years, but a minimum of technical requirements were taken into account to achieve its effectiveness:

1. Fixing plastic sheeting safely to timber structures with nails. Alternatives to be used:

- Standard nails by bending them or nailing them through folded plastic sheet
- U-shaped fencing pins
- Standard nails using washers or bottle caps (sharp side away from plastic) to spread the load.
- Domed head nails
- Using timber battening for spreading the load (figure 1)

2. Fixing plastic sheeting to rope. It could be carried out folding a smooth stone (minimum 3 cm diameter) inside the plastic sheeting and tying a rope or strong cord behind it (Figure 2).

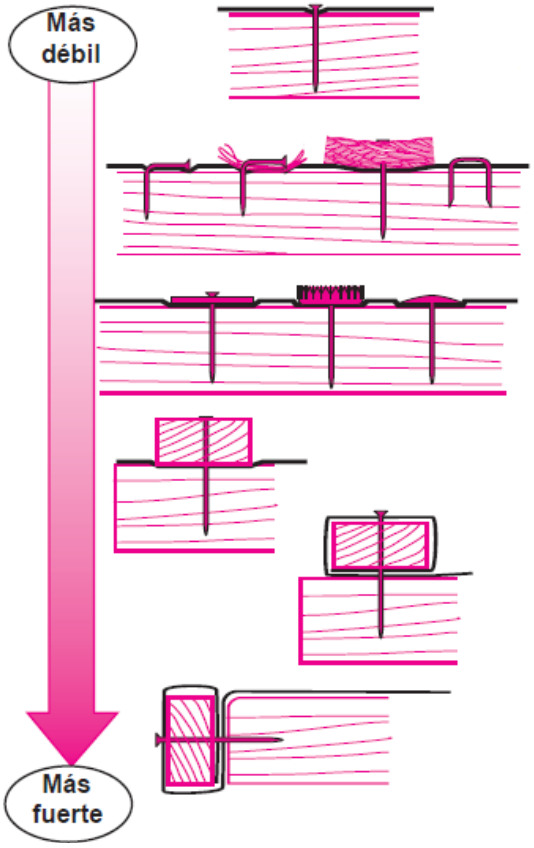


Figura 1. Forma segura de fijar las lonas para techo a estructuras de madera.

- Plastic sheeting either comes with reinforcement bands or with eyelets fitted. The reinforcement bands are usually grey or blue. Sheeting can fixed by cutting a small hole in the reinforcement band and tying thick cord through it. Where eyelets are used, they must be of good quality and well fitted (Figure 3).

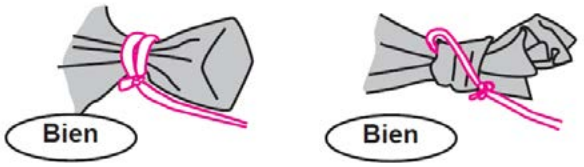


Figura 2. Forma segura de fijar las lonas para techo con una cuerda.

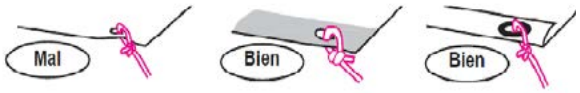


Figura 3. Recomendaciones de fijación o amarre de las carpas o carpulinas de cubierta.

3. To avoid flapping and water puddles forming, it was ensured that plastic roofs were sloped, and

Figura 4. Recomendaciones para el tensado de las carpas o carpulinas en el techo.

fixed taught enough and that there were sufficient well-placed supports (Figure 4).

4. To avoid sharp points: Plastic sheeting is easily punctured by sharp points or worn away by rough surfaces. When building a frame for plastic sheeting it was ensured that edges and rough surfaces in contact with the plastic had been smoothed. External objects such as tree branches can puncture plastic sheeting. In that sense, for a better understanding, the Red Cross distributed booklet guides on the specification and uses of plastic sheeting in (Figure 5).

Figura 5. Contenido del volante de instrucciones a la población y brigadas de techado, distribuido por la Cruz Roja Cubana en Santiago de Cuba.

Social Impact

With these emergency solutions, it was possible to address the immediate needs of 24.572 affected people that instead would have to be evacuated or displaced far from their homes, a less desired alternative, because they are not allowed to be directly involved to recovery actions (Photos 1 to 5).

The social impact of each solution or module was:

- Module 1 (National Institute of Housing): 1.162 families
- Module 2 (UNDP and the INV): 16.161 families.
- Module 3 (International Federation of Red Cross and Red Crescent Societies and Cuban Red Cross in Santiago de Cuba): 7.249 families.

Foto 1 y 2. Soluciones emergentes construidas con los módulos No. 2 (arriba: donante PNUD) y No. 3 (abajo: Federación Internacional de la Cruz Roja y la Media Luna Roja)

Fotos 3 y 4. Refugio temporal de lonas de plástico (carpulinas) en Loma Caballo Blanco, barrio afectado en Santiago de Cuba.

MATERIAL NEEDS

For one average house, depending on the type of solution or module applied, the following material resources were demanded:

Module No. 1	Module No. 2	Module No. 3
• 50 fibro-asphalt tiles • 1.5 Kg. of nails of 2 ½ inches. • 2.0 Kg. of nails of 3 ½ inches. • 10 poles for structure • 1 bag of cement	• 30 tiles of Zinc. • 1.5 Kg. of nails of 2 ½ inches. • 2.0 Kg. of nails of 3 ½ inches. • 10 poles for structure • 1 bag of cement • 2 canvas tarpaulins	• Plastic sheeting

In addition, it should be ensured the availability of the necessary tools for roofing, consisting of:

- Pickaxe
- Shovel
- Hammer
- Handsaw
- Wires and ropes

EXECUTION TIME

In any of the identified variants, the implementation is 1 house daily by brigade.

13.

REDUCING RISK OF DISASTER FROM CHILDREN´S VIEW

UNIÓN EUROPEA

UN HABITAT
POR UN MEJOR FUTURO URBANO

PNUD
Al servicio de las personas y las naciones

BENEFICIARIES: DIRECT: 80 CHILDREN FROM JUAN SIGAS BARÓ SCHOOL. INDIRECT: 1700 FAMILIES INVOLVED IN THE PROJECT

DONOR-PARTNER-IMPLEMENTER: EUROPEAN COMMISSION, PNUD, UNICEF, UN-HABITAT, INV, UMIV, PALMA MUNICIPAL GOVERNMENT

LOCATION: PALMA SORIANO, SANTIAGO DE CUBA PROVINCE

PROCESS DURATION: 5 MONTHS

CONTACTS: ISRAEL LAHERA, **E-MAIL:** cam@enet.cu

SITUATION

• Insufficient children information and awareness concerning community disaster risk reduction.

• Make a preliminary risk perception analysis from children´s perspective.

APPLIED SOLUTIONS

A pilot level work with primary school children was conducted to know their lives, experiences and ideas regarding their community risks, based on what happened with Hurricane Sandy.

After choosing the school and the group of children, the following methodological process was developed which was coordinated with the school and the municipal government leaderships.

Methodology steps for the Community Children's Festival

A Community Children's Festival is a space for socializing and exchanging among children, teachers and the community, where children are main protagonists of activities carried out, being:

- Lectures and practical lessons
- Plays
- Singing.
- Dancing
- Painting
- Discussion groups
- Games
- Contests

First: Explanatory meeting on work purpose with the school leadership.

Second: Selection of children. Process conducted by school leadership, deciding 80 female and male children from 4th, 5th and 6th grades to be involved, and based on children availability and knowledge on the proposed topic.

Third: Community risk analysis by:

• Identification of risks that most affect the community.

• The three priority risks.

• Action plan development for solutions to priority risks.

To achieve this goal 20 children reflected problems and priorities by means of the card technique, and the action plan was developed by brainstorming.

Fourth: Visualize children risk perception through painting.

For this activity, two 30-children groups were organized and given the task of drawing their view of their community risks.

To achieve this objective, they were given some drawing materials and asked to complete the task in an hour. They were assisted by a painter from Granma Province specialized in working with youth.

The best drawings were awarded and exhibited in an area of the school.

Fifth: Launching of contest "I improve my city to face risks", consisting of painting and tales, in which the 80 children participated. 29 works were awarded and exposed in the school and a big canvas was designed to provide visibility in the community. Also the winners were awarded on the occasion of the World Habitat Day on October 8th.

Lessons learnt from working with children.

1. Children are an important means for community and family awareness to risk issues.

2. Children diagnose of risks allowed to know their needs and concerns, which is a key for an action plan development at community level.

3. Designing a basic training program for children will increase their preparation to face risks.

4. As excellent promoters, children should participate in community prevention and recovery works.

COST:

800 CUC, distributed as school material, prizes for children, painting and drawing materials and canvas.

DURATION:

5 months.

14.

ROOFING MONITORS: A TRAINING ACTION EXPERIENCE OF THE RECOVERY PERIOD IN PALMA SORIANO

UNIÓN EUROPEA

Al servicio de las personas y las naciones

UN-HABITAT
POR UN MEJOR FUTURO URBANO

BENEFICIARIES: DIRECTLY: 80 MONITORS
INDIRECTLY: 1,700 FAMILIES INVOLVED IN THE PROJECT

DONOR-PARTNER-IMPLEMENTER: EUROPEAN COMMISSION, UNDP, UNICEF, UN-HABITAT, INV, UMIV, MUNICIPAL GOVERNMENT OF PALMA

LOCATION: PALMA SORIANO, SANTIAGO DE CUBA PROVINCE

PROCESS DURATION: 5 MONTHS

CONTACTS: ISRAEL LAHERA, E-MAIL: cam@enet.cu

SITUATION

• Lack of knowledge and/or information on the part of the population regarding the correct installation of roofing elements

• Need to provide direct support to affected/beneficiary population to ensure the correct installation of roofing elements

IMPLEMENTATION OF SOLUTIONS

It is important to note that the roofing monitor experience is part and parcel of the training process seeking to provide direct technical assistance to families and ensure the safe, resilient installation of roofing elements. Consequently, the following steps were taken:

First: Establishing a group with the task of training the population and identifying roofing solutions on a case by case basis.

Second: Naming the group Roofing Monitors.

Third: Identifying group selection criteria, including specialized personnel from the Municipal Housing Investment Unit (UMIV), construction brigades, People's Power representatives, and community leaders, applying the gender perspective.

The People's Council plays a coordinating role.

Fourth: Providing theoretical–practical training by technical personnel from the National Housing Institute (INV) and UMIV. The training actions were attended by around 150 people each, from whom the monitors were voluntarily selected.

Key contents in the work of the Monitor:

1. Reading and reviewing the manuals and leaflets produced by the project for roofing procedures.

- OXFAM Roofing Manual

- INV Roofing Leaflet

- Thematic Guide for Roofing

2. Providing hurricane-affected families with essential information on the correct installation of roofing elements at meetings convened by the People's Council.

- Visiting houses to check roofing procedures, based on the Thematic Guide, and preparing a process report.

- Visiting houses to check roofing completion and prepare an assessment report.

The monitors, under the slogan "A secure roof guarantees my future," were given T-shirts, caps, backpacks, notepads, and pens.

The so-called Community Bulletins, containing both population and technical experiences, were used as training–promotional tools.

An information dissemination strategy, including the use of tarpaulins and posters with key project messages, was formulated. It also covered messages on local radio and television, as well as the production of five videos about the training process.

LESSONS LEARNED FROM THE WORK OF MONITORS

1. The monitors proved to be very useful in ensuring case by case technical assistance and direct support during the roofing process.

2. It is imperative to provide monitors with good training to do a truly effective work.

3. It is important to combine theory and practice. Pilot roofing experiences showed the types of problems faced by the affected families and other actors. These experiences provide for innovative roofing solutions.

4. The People's Councils play an extremely important role for the monitors' movement.

5. Monitoring and evaluation reports provide a useful tool to identify the specificities of each family and of the roofing process.

6. The monitor uniform contributes to the process visibility and social recognition. The population immediately associated the monitors with immediate technical assistance.

7. It is important to highlight the leading role played by women in technical advising.

COST:

The cost of the training process was 12,000 CUCs.

Breakdown: workshops, information-promotional material, and group identification.

DURATION:

5 months.

15.

URBAN CONSULTATION IN PALMA SORIANO

UNIÓN EUROPEA

UN-HABITAT
POR UN MEJOR FUTURO URBANO

unicef

PNUD
Al servicio de las personas y las naciones

BENEFICIARIES: CITY POPULATION 76 179

DONOR-PARTNER-NATIONAL IMPLEMENTER: UN/HABITAT

LOCATION: PALMA SORIANO, SANTIAGO DE CUBA PROVINCE

PROCESS DURATION: (THREE MONTHS NOVEMBER -DECEMBER 2013)

CONTACTS: MUNICIPAL DEPARTMENT OF PHYSICAL PLANNING. ARCH. OLGA MARIA BATISTA SARABIA

SITUATION

Brief technical description of the affectation

The General Plan of Urban ordering in Palma Soriano (PGOU) was first approved by the Municipal Assembly of People's Power in 1999 and updated in 2010 by the Municipal Department of Physical Planning, therefore, in this occasion, 2013, the new document had the novelty of upgrading habitat and sanitation situations with an environmental approach, taking into account disaster risk reduction and climate change. The preparation of the plan was designed from a large institutional, administrative, governmental and peoples' participation, and upon sectorial institution fell the responsibility of presenting their diagnoses and proposals, aimed at strengthening the skills of the population referred to the General Plan of Urban ordering in Palma Soriano, Santiago de Cuba province, through the consolidation of mechanisms for community participation in decision-making processes, as the main actors to guide their own local development by means of the mobilization of endogenous potential, with the objective of preparing themselves for the identification of disaster risks and climate changes and thereby improving their standard of living.

SOLUTION TO THE PROBLEM

PStep 1. Technical preparation of the Consultation: Training people and administrative representatives, key in decision-making processes to solve problems related to the Habitat (housing-basic services - public spaces) and urban sanitation (drinking water supply, collection and treatment of liquid and solid wastes and pollution sources).

Step 2. Creation of thematic groups: These work groups are created with the presence of the institution and residential sector, with the aim to assess what is reflected in the General Plan of Urban Ordering - the current situation (Diagnosis) and to present possible solutions, agreed by consensus among all and on the basis of the own territory potential.

Step 3. Elaboration of the proposal Document: once a consensus on the topics that will be discussed in the consultation has been agreed, it is necessary to develop a document that will describe the process, the reasons why the consultation has been convened and what will be the themes to submit for consideration. It should also contain the diagnosis of the current problems and possible solutions.

Step 4. Approval of the proposal document by the CAM: the document is submitted to the consideration and approval of the CAM before being presented to the Public Consultation, as the maximum representative of the Government and the administration of the territory.

Step 5. Public Consultation: It is an event where the main local actors meet to deliberate and agree

on the territory priority issues. It allows a diverse group of people having a wider awareness of the Plan of territorial and urban ordering with an

approach on risk reduction and climate change, with the objective of actively involving the population in the planning and urban management of the territory, to develop a culture of responsibility towards and with the territory. It also seeks the development of well- finished planning, with the incorporation of criteria not only from a professional standpoint but also considering the experience and people's initiative, where their goals and aspirations are reflected.

The Consultation took place in the headquarters of the Municipal OPP with a large people and key institutions 'participation. In the discussions of the Thematic Groups, new solution proposals from the community experiences were made, which showed the warmth of this process at grass-roots level. The contributions of the participants according to the priorities were included in the different stages of the Plan, which are crucial for the construction of scenarios as an element in the structuring of the Model of Urban Planning.

MATERIAL NEEDS

Office Materials: paper boom, toner, water color pen, flipchart sheet, plastic folders, paper clips, pens.

Snacks and lunches.

COST

2500 CUC to the preparation of the consultation in previous workshops and on the same day of the consultation, spent in office and printing materials, and food.

EXECUTION TIME

The process was developed in three months, while the public consultation was developed in a day.

16.

COMMUNITY BRIGADES FOR THE PLACEMENT OF CEILINGS IN HOUSES AFFECTED BY THE HURRICANE SANDY IN PALMA SORIANO MUNICIPALITY

BENEFICIARIES: AFFECTED POPULATION RESIDING IN: 6.434 HOUSES WITH TOTAL COLLAPSE OF CEILINGS AND 15.155 HOUSES WITH PARTIAL COLLAPSE

DONORS AND PARTNERS: UNITED NATIONS DEVELOPMENT PROGRAM (UNDP), OXFAM

NATIONAL IMPLEMENTER: PROVINCIAL INVESTMENT UNIT OF HOUSING (UPIV) IN SANTIAGO DE CUBA AND MUNICIPAL INVESTMENT UNIT OF HOUSING (UMIV) IN PALMA SORIANO

LOCATION: PALMA SORIANO, SANTIAGO DE CUBA PROVINCE

CONTACTS: UPIV SANTIAGO DE CUBA, EMAIL: upiv@upiv.scu.inv.cu
UMIV PALMA SORIANO, PHONE NUMBER: 501108.

SITUATION

The severe impact of the hurricane Sandy in the province of Santiago de Cuba, and in particular in the municipality of Palma Soriano, caused the totally or partially destruction of houses to more than 21.500 families, which seriously compromised the normal subsistence of affected people and created a difficult challenge to municipal and provincial governments.

Immediately, it begins to flow the assistance and support of the Cuban Government, and at the same time International Cooperation brought up emergency solutions, which were concentrated in ceiling materials and technology. The United Nations Development Program (UNDP) and OXFAM Canada donated plastic sheeting ceilings for the damaged houses; but it was necessary the quickly creation of local work capacities for its placement, since the existent brigades were insufficient, thereby it was crucial to look for solutions in community brigades, involving affected people.

SOLUTIONS IMPLEMENTED

To give solution to the work demand, municipality People's Councils made the appeal to the Delegates of constituencies to summon the community to answer to this need.

The People's Councils are the key organs of People's Power in Cuba and act in its territorial demarcation, through the constituencies or cells led by delegates with the population. These People's Councils exercised special powers in emergency situations.

In Palma Soriano, the Municipal Government created 19 community brigades in People's Councils under the criteria of:

• Willingness: Members of the community who formed part of the brigades shall not receive remuneration. They worked without a spirit of lucre, prevailing the solidarity and assistance to affected people.

• Existence of local skills associated with reconstruction works: masons, carpenters, welders and other

• Incorporation of non-affected people. This allowed the altruistic and solidarity spirit

10-members brigades were formed, mainly by people with skills: a head of the brigade , a mason, 2 roof carpenters, a welder and 5 construc-

Fotos 1 y 2. Talleres de capacitación a las brigadas comunitarias impartidos por técnicos de la Unidad Provincial Inversionista de la Vivienda en Santiago de Cuba.

tion assistants; but who demanded theoretical and practical training on technical solutions for roofing (Photos 1 and 2). Practice showed a multi-skill concept (Figure 1).

The implementation of the Community Brigades constituted an effective solution within the specific problems under the immediate emergency, and achieved complementary between formal state and non-state solution tasks, promoting solidarity in the community and the empowerment of the local government.

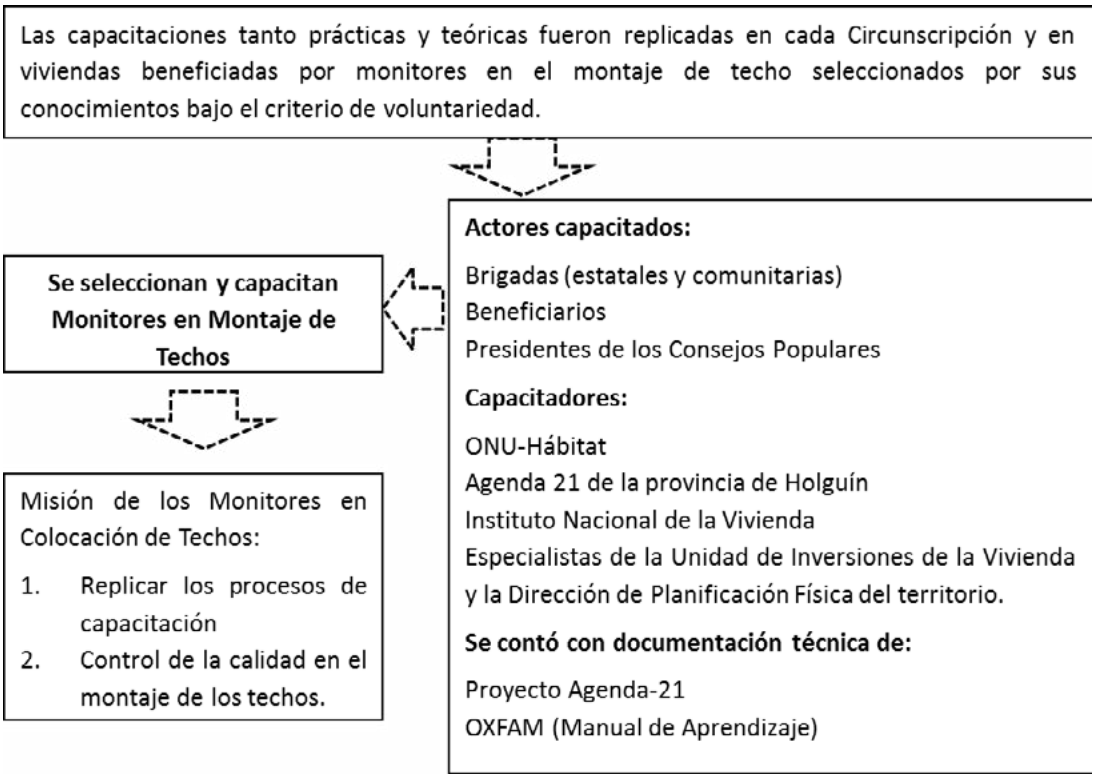


Figura 1. Modelo de selección y preparación de los monitores de montaje de techos, en las Brigadas Comunitarias. Experiencia Santiago de Cuba, huracán Sandy

Means of protection and tools for 1 Brigade		
Means of protection	U	Qty.
Industrial leather gloves	par	10
Protecion eyeglasses	U	10
Protection helmet	U	10
Tools and accessories		
Universal pliers	U	5
Scaffold (2 sections c/ 2 platforms)	U	1
Powerdriver c/ pta	U	2
Chisel for concrete	U	10
10 m-measuring tape	U	10
8 lts- brickwork bucket	U	2
Trowel 8"	U	4
Electrician's knife.	U	2
Aluminum stair	U	1
Square 24"	U	5
30m - extension cord	U	2
Rubber Rubs	U	2
Timber rubs	U	2
6-piece drill-bit set	U	8
6-piece screwdriver set	Set	8
Electrician´s neon test lamp	U	1
Power welding machine	U	1
Carpenter's hammer 16 ounces	U	4
Plastic spirit level (40 cm)	U	10
Construction shovel	U	4
Crowbar	U	1
Excavation pickaxe	U	1
Electrician´s tweezer # 8	U	1
Cast iron plumb bob	U	1
Hexagon bit 6mm	U	10
Hand carpenter's hammer	U	5
Circular saw	U	1
Hammer Drill 1/2" (1050 watts)	U	1
Vinyl tape	U	10
Construction wagon	U	2
Cutting wheels for metal	U	1
Straight scissors set for metal	U	1

COSTS

The volunteer principle for integrating Community brigades makes no indirect costs for salary or monetary remuneration. Food was ensured by the own beneficiaries and transportation costs were minimal, as the brigades acted in their own people's councils. The main costs were associated to the acquisition of tool kits, implements and means of protection (1 per brigade). It varied depending on the supplier.

Foto 3. Talleres prácticos realizados en el montaje real de viviendas beneficiadas, empleadas como casos-modelo para el entrenamiento de las brigadas.

EXECUTION TIME

The assembly of a roof by a Community brigade ranges between 1 and 2 days depending on the complexity of each house.

17.

CREATION OF RECOVERY BRIGADES FOR THE ASSEMBLY OF CEILINGS IN HOUSES AND REHABILITATION OF AGRICULTURAL PRODUCTION IN RURAL AREAS

UNIÓN EUROPEA

welt hunger hilfe

ACPA
Asociación Cubana de Producción Animal

BENEFICIARIES: 600 AFFECTED FAMILIES AND 46 AGRICULTURAL FACILITIES FROM 10 BASIC UNITS OF COOPERATIVE PRODUCTION (UBPC), 3 LIVESTOCK PRODUCTION COOPERATIVES (CPA) AND 1 CREDIT AND SERVICE COOPERATIVE (CCS).

DONOR: WELT HUNGER HILFE.

NATIONAL IMPLEMENTER: CUBAN ASSOCIATION OF ANIMAL PRODUCTION (ACPA), SANTIAGO DE CUBA.

PLACE: PEOPLE'S COUNCILS OF SIGUA, SIBONEY, PAQUITO ROSALES IN SANTIAGO DE CUBA.

CONTACTS: CUBAN ASSOCIATION OF ANIMAL PRODUCTION (ACPA). ADDRESS: HEREDIA NO. 356, BETWEEN CALVARIO AND RELOJ, PHONE NUMBER: 623601, EMAIL: acpastgo@enet.cu

SITUATION

The wake of hurricane Sandy along Santiago de Cuba province caused extensive damages in urban and rural areas and left a large amount of losses, both in houses and in productive facilities closely linked to local livelihood support activities.

In the case of productive forms of cooperative type, both in agriculture and livestock, the destruction and damages of the hurricane were extended to the collective heritage and due to the own nature of these endeavors, its members were capable of organizing early recovery actions, with the leadership of the non-governmental organization called Cuban Association for Animal Production (ACPA).

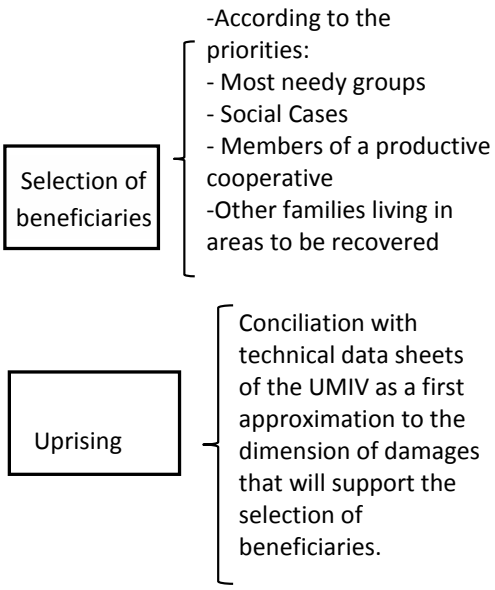
Ceiling modules and tool kits were received as donations to the disaster relief by the European Union and Welt Hunger Hilfe, which demanded labor force for a short term implementation, since at the rural level it was more difficult to receive post-disaster government assistance, given its concentration in the urban areas with a greatest weight in the emergency situation.

That is why ACPA, together with the basic units of Cooperative Production (UBPC), the Livestock Production Cooperatives (CPA) and Credit and Service Cooperative implemented recovery brigades that demonstrated its effectiveness and were instrumental in the early rehabilitation of the damages which reduced the social consequences of the hurricane.

SOLUTIONS IMPLEMENTED

The work was organized in several tasks:

• First, uprising of damages and selection of beneficiaries: for this task it was possible to have the full support of the local government structures (People's Council, constituencies, UMIV), according to the diagram below:



• Signing an agreement with 15 institutions (10 UBPC, 3 CPA, 1CCS, 1 UEB) enabled to establish a regulation and a system of documents with should be taken into account for the control and organization of the constructive works:

- Documentation for the selection of beneficiaries

- Technical uprising of houses to quantify the exact needs for materials.

- Act of responsibility of the beneficiaries to whom the brigade performed the services.

• Conformation of recovery brigades and training tasks to its members: 17 brigades were formed considering they should be permanent and possess knowledge and practical experience. The payment would be received according to their work results. These brigades intended to generate jobs and insert beneficiaries in the process of recovery, as well as to create local capacities.

Training workshops for a safe roof assembling were conceived from a theoretical and practical point of view, once the tool kits were received (Photos 1, 2, 3 and 4).

The theoretical training of the brigades consisted in:

- Theoretical workshops taught by qualified staff (from the Ministry of Construction).

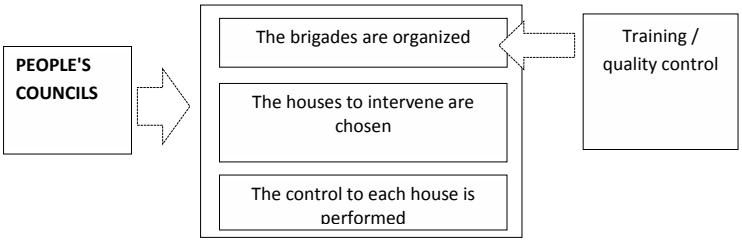
- Editing a Technical Manual of lightweight ceiling construction, more resistant to winds reviewed

Fotos 1 y 2. Capacitaciones teóricas y prácticas evitan vicios constructivos que restan calidad las ejecuciones

by specialists of the housing system and taking into account experiences of other NGOS.

The preparation from the practical point of view was made through practical workshops taught by specialist staff of the Government entities (Ministry of Construction and Housing System), once the tools and equipments were received.

• Placement of ceilings: It was undertook the reconstruction of roofs to beneficiaries, not only at productive cooperative members but also affected people in general, with the active support of the People's Councils:



The placement of roofs was structured in four phases:

- Structural solution for houses
- Placement of ceilings
- Fixing of ceilings
- Solutions for ceiling finishes

Structural solution for houses:

It was determined that the brigades would assume the placement of ceilings, but beneficiaries should run with the improvement of house's structures when necessary. The materials needed for structures improvement were supplied, to the extent possible, by the Housing System. In all cases the following scheme was carried out:

- Accuracy so as to correspond with UMIV data sheet and in cases of differences, an agreement should be reached and a new technician visit should be accomplished if necessary.

- Evaluation by the brigade and specialists on the needs for improving structures (pillars, keys and beams).

- Strengthening and improvement of structures by the beneficiary's own contribution, before the brigade came to install the ceilings (many, in the course of this time, have substantially improved the conditions of their houses).

- Analysis of specific solutions for the placement of ceilings in houses built with prefabricated systems designed to receive another solution of roofing (photos 5 and 6).

Placement of ceilings:

It was devised only total ceilings up to 70 m2. It was not applied to partial solutions as they did not solve definitively the needs, with future consequences of roofing incompatibility.

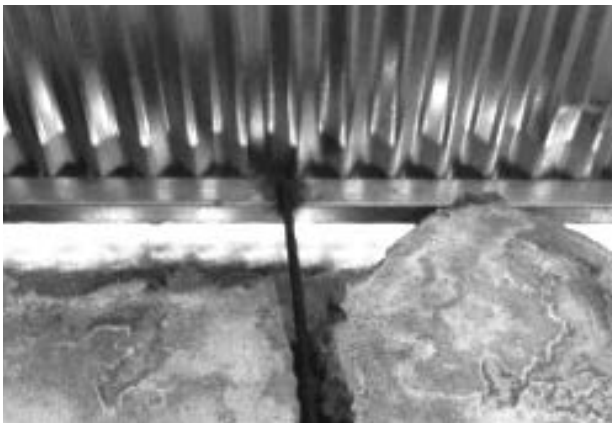


Foto 3. Solución técnica dada para la adaptación de purlings metálicos a viviendas de prefabricación ligera tipo NOVOA.

Fixing of ceilings:

The ceilings were placed with the use of clamps. It was established as a rule do not use nails in tile placement and to fulfill evaluation and monitoring processes. In some cases, the brigades pro-

Foto 4. Detalle de montaje de purlings de techo de estructura metálica sobre estructura de madera.

moted structural solutions for achieving other type of durable tie and/or strongly enough for load purlings (Photo 7).

Solutions for ceiling finishes:

With the support of the house owner, the Government and, in a lesser extent, the project, works were ended with mojinetes to ensure a better closure (Photos 8 to 11).

Fotos 5 y 6. Vivienda beneficiada antes (arriba) y después (abajo) de la intervención.

Fotos 7 y 8. Instalación agropecuaria beneficiada antes (izquierda) y después (derecha) de la intervención.

MATERIAL NEEDS

The brigades were equipped with modules of basic tools:

Tool Module for a brigade		
TOOLS AND EQUIPMENTS	**u/m**	**Total**
Chainsaws Sthil 46	u	1
Chainsaw Oil	g	3
Portable electric welder equipment 110/220 Volt plus means of protection	u	1
Oxy-cut equipment	u	1
Power drill (cable 20m)	U	1
Battery Drill with spare batteries	U	1
Kit of tungsten auger and drill bit	U	1
Cutting wheels for metal	U	1
Disks for cutting wheels equipment	U	20
Carpenter's hammer	U	4
Carpenter's saw	U	2
Hand Hacksaw	U	1
Hacksaw blade	U	20
Tip shovel	U	3
Square shovel	U	3
Construction Wagons	U	3
5 pounds Axes	U	2
Pickaxe with handle	U	2

Electrician´s tools (Tweezers , screwdrivers etc)	Set	1
10 foot stair	U	1
Machetes 22	U	6
Flat 8" Limas with handle	U	12
Chapaletas	U	1
Pry bars	U	1
5 pounds Hoe	U	1
Means of protection (helmet, eyeglasses, gloves, footwear)	set	10

Other specifications are detailed in Annexes 1 and 2.

COSTS

The cost of tool modules ranges from 3500 to 4500 € according to the characteristics, and composition of the brigade, including work clothes, footwear and means of protection.

The average cost of ceiling solutions in houses of 70m2 was 670 €.

18.

LOCAL TECHNICAL TRAINING AND ASSISTANCE TO THE INSTALLATION OF CEILINGS

BENEFICIARIES: AFFECTED PEOPLE OF BÁGUANOS AND CUETO MUNICIPALITIES

DONOR: JAPANESE COOPERATION, CARE FRANCE.

NATIONAL IMPLEMENTER: NATIONAL INSTITUTE OF HOUSING (INV), NATIONAL UNION OF ARCHITECTS AND ENGINEERS FOR THE CONSTRUCTION OF CUBA (UNAICC), LOCAL GOVERNMENTS AND MUNICIPAL INVESTMENT UNIT OF HOUSING (UMIV) OF BÁGUANOS AND CUETO MUNICIPALITIES, PROVINCIAL INVESTMENT UNIT OF HOUSING (UPIV) IN HOLGUIN.

PLACE: BÁGUANOS MUNICIPALITY (PEOPLE'S COUNCIL S OF BÁGUANOS, SAN GERÓNIMO, TACAJÓ, BIJARÚ, UNIÓN 6, LOS HATICOS, POTRERILLO, EL MANGUITO) AND CUETO (PEOPLE'S COUNCIL S OF ALTO CEDRO Y MARCANÉ).

CONTACTS: UNAICC, - MSC. ARCH. RAUL REYES FIGUEREDO, PHONE NUMBER: 0124 454830, EMAIL: raul@hlg.unaicc.cu

SITUATION

The extensive damages and losses caused in the eastern region of Cuba by Hurricane Sandy stimulate various donor agencies to begin a flow of assistance to support national and local institutions in charge of the tasks of emergency response. Given the large volume of damages in house roofs in the provinces of Santiago de Cuba and Holguin, one of the significant supporting items was to send modules for roofing affected houses, thus mitigating the social and human problems derived from the disaster.

The Cuban Government also took extraordinary measures, establishing a national emergency strategy for the provision of aid to the affected provinces, as well as other actions of a special character to support damaged families, as it was the price reduction and discounts to building materials, and the swiftly granting of credits and subsidies to the neediest people; in addition to the mobilization of resources of the country and the support of various international organizations.

In this context, donor agencies such as CARE France and the Japanese Cooperation began to favor the arrival of roof modules for the rehabilitation of damaged houses, which was joined to Government tasks of uprising affectations and organization of the distribution developed by the INV, and its provincial and municipal dependencies. In the province of Holguin, the wake of hurricane Sandy left a great destruction of houses and ceilings and severe construction damages in the municipalities of Rafael Freyre, Banes, Antilla, Báguanos, Cueto, Mayarí, Urbano Noris and Sagua de Tánamo.

The challenge was then to achieve a rate in ceiling placement, within post-disaster emergency phase, in accordance with the extent of the problem and the need for roofing upon quality criteria allowing resilient and secure actions in the rehabilitation process.

In this sense, CARE International in Cuba together with UNAICC, and within the framework of the Emergency Assistance Programme to people affected by Hurricane Sandy in the province of Holguin, established a technical assistance and work agreement, with the aim of preparing a response to the emergency caused by this hurricane.

SOLUTIONS IMPLEMENTED

Given the level of affectations in the municipalities of Báguanos and Cueto, in the province of Holguin, where ten People's Councils concentrated the largest volume of damages and affected families, while it was stabilized the flow of resources for the assembly of roof modules it was necessary to raise and deploy a schema of consulting and training close to the community and the brigades created for the rehabilitation, in such a way that in a short time, within the urgency of the emergency phase, the proper technique quality was achieved.

The solution implemented was to apply and establish a method of local consulting and training that would enable the accessibility of the staff responsible for roofing, including at the same time the affected population, also involved in rehabilitation tasks. This was made along with the Municipal governments, the institutional actors, and the UNAICC of the province of Holguin that in its condition of a professional non-governmental organization of the Cuban civil society could offer a selfless and trained assistance to post-disaster recovery actions.

The methodological schema of consultancy and training was developed in a process of several steps or stages:

1st: Selection of the affected families that would be benefited with this project.

2nd: Visiting the benefited families, technical-constructive actions for the preparation of houses were recommended.

3rd: Elaboration of the technical- executive project for each selected house.

4th: Creation and training of people's brigades supporting the placement of ceilings.

5th: Selection of houses to perform pilot exercises of ceiling placement and training families through demonstrative workshops.

6th: Placement of ceilings with the participation of the created brigades and the beneficiary families.

First stage:

The starting point was the selection of the beneficiaries, which was carried out along with the UMIV and the Local Government (Photos 1 and 2).

Second stage:

In the second stage, the working team composed of a technician in housing, an architect of the UNAICC, and the president of People's Council or, in his absence, the delegate of the constituency, visited each selected house, where the needs were evaluated and technical recommendations were made to families to prepare their houses to ensure a proper roofing on structures capable of supporting not only the weight of the ceiling but also the impact of strong winds. These visits enabled government to make decisions and take steps to support families in the actions of preparation, such as, strengthening the structures and building mojinetes in the case of masonry houses (Photo 3).

Foto 2.

Third stage:

Then, and taking as a basis the assessment of needs, the project of each cover to 330 houses was carried out. Two architects of UNAICC designed the structures and technical details in addition to a descriptive report explaining the steps to be followed to build the covers; a list of all component materials was also elaborated. Along with the design process, technical reports with

Foto 1.

Foto 3.

the general basic principles for the construction of ceilings resistant to hurricanes and models for training support were prepared (Photo 4).

Fourth stage:

An important stage was the establishment and training of People's Brigades which supported the construction of ceilings. These brigades functioned at constituency level and taking into account the number of beneficiaries. Moreover,

Foto 4.

Foto 5.

families with the willingness and ability to build school ceilings were selected. Fifteen houses and its ceilings became prototypes to be followed by the benefited communities as examples of good practices (Photos 5 and 6).

Fifth stage:

In a later stage, villagers were trained; workshop-schools were held in each prototype ceiling. Roofs with all its components and the draft for roofing were distributed to families.

The first step developed in this stage was the selection of 15 prototypes ceilings, one in each people's council of intervention. These families were trained on the underlying basic principles to build a ceiling resistant to hurricanes. The selected families and their houses met the capabilities to serve as a workshop-school.

In this initial training all family members were present; in addition, this individualized preparation allowed them to defend their own ceiling from the technical point of view.

At the end of workshop-schools, coordinated and organized by local governments, beneficiary population, community brigades, and State institutions began to be trained,

The workshops were held one in each people's

Foto 6.

council, and two in some of them due to their size and dispersion of the actions.

Models, graphics and other materials were used, all based on the core principles to build ceilings less vulnerable to strong winds. The workshops did not exceed 30 participants with the goal of achieving greater efficiency in the learning process.

Sixth stage:

The construction of ceilings by the families and the support of the created brigades, are among the most important moments of the process, being imperative the monitoring and consultancy to each family to ensure the construction of more sustainable covers.

The technicians of UMIV play in this stage a very important role in close relation with the delegate and other prepared people in the community.

COSTS

There is no estimation on cost indices or of material consumption, but the amount of the action depends on the own solutions to be established in each place.

EXECUTION TIME

Within ten months after the hurricane, training was achieved to more than 300 people and brigades contributing to the solution of 600 cases.

Annexs

ANNEX 1

Municipal Housing Division

TECHNICAL SHEET ON HOUSE DAMAGE

MUNICIPALITY: _____PEOPLE'S COUNCIL: _____CONSTITUENCY: ____DISTRICT: ____
WEATHER EVENT: _____DATE OF ASSESSMENT: _____
HOUSE ADDRESS: _____
HEAD OF HOUSEHOLD: _____
LEGAL DOCUMENT: Deed ___ Beneficial use ___ Company-owned house or premise ___ Lease ___
No status ___ ***Specifications:*****_____**
CONSTRUCTION TYPOLOGY: HOUSE ___ APARTMENT ____ HUT ____ OTHER ____
Temporary facility _____ *(in case of past weather event victims)*
PREDOMINANT MATERIAL: on the ROOF: _____ on the WALLS: _____
CONSTRUCTION TYPOLOGY: I __ II __ III __ IV __ V __
DAMAGE ASSESSMENT: TC __ PC __ TR __ PR __ Type I __ *(exclusively for Type I buildings or houses)*
HOUSE SIZE: Length _____m Width _____m Area _____m^2
TOTAL NO. OF PEOPLE _____ CHILDREN _____ ELDERLY _____

ELEMENTS AFFECTED:

Description	U. M.	Qty.
ROOF: Local tiles ( ) Asbestos cement ( ) Infinite tiles ( ) Pantile ( ) Other ( ):	m^2	
WALLS: Brick ( ) Block ( ) Wood ( ) Other ( ):	m^2	
ELECTRICAL INSTALLATION	m^2	
HYDRAULIC SYSTEM	M	
SANITARY FACILITIES	m	
BATHROOM FIXTURES	u	
CARPENTRY: Door ( ) Window ( )	m^2	
ELEVATED WATER TANK	u	
ELEVATED WATER TANK LID	u	
WATERPROOFING SYSTEM	m^2	

RECYCLABLE MATERIALS:

Materials or Elements	U. M.	Qty.

In witness hereof:

_____ _____

Name and signature of the Assessor **Name and signature of the Chief of the Defence Zone**

QUANTIFICATION OF THE MATERIAL RESOURCES REQUIRED FOR PARTIALLY DAMAGED HOUSES

Material Resources	U. M.	Qty.	Remarks

Prepared by:

_____

Name and signature of the Assessor

Approved by:

_____

Name and signature of the Director of the Housing Division

ANNEX 3

TECHNICAL BOOKLET FOR CALCULATING THE VOLUME OF MATERIALS TO BE SUPPLIED TO HURRICANE SANDY VICTIMS

LIGHT ROOFING ELEMENTS (BOTH ASBESTOS-CEMENT- AND ZINC-BASED)

The basic calculation will be made multiplying the house length by its width. In the case of mono-pitched roofs, 15% of the total area is added to the initial square metres affected. In the case of gabled roofs, 30% of the total area is added. In the case of cross gabled roofs, the percentage to be applied is the same as for gabled roofs.

ROOF CALCULATION METHOD

AFFECTED AREA (length x width) + 15% or 30% / AREA (m2) covered by one tile = NUMBER OF TILES.

ASBESTOS CEMENT TILES (1.10 m X 1.70) ---------- covering 1.47 m2

ZINC TILES (1.026 m X 2.00 m) ---------- covering 1.60 m2

ZINC TILES (1.026 m X 3.60 m) ---------- covering 3.00 m2

ZINC TILES (1.026 m X 3.80 m) ---------- covering 3.17 m2

ZINC TILES (1.026 m X 4.20 m) ---------- - covering 3.52 m2

In order to install an asbestos cement tile, 4 clamps with their respective washers and nuts are required, in addition to 3.40 m angle rafters (plump rods may be used), 3 1-m angle rafters, and 1 bag of cement per area between enclosure and roof.

WALL CALCULATION METHOD

Installation and finishing per m2 of wall.

The amount of cement and sand on the table includes placing bricks or blocks, and thick and thin cladding per m2, considering both sides of the wall for total finishing.

	Block or brick		Cement	Sand
	13 u X m^2	50 u X m^2	7 kg X m^2	0.05 m^3 X m^2
For 1 m^2 of wall	13 u	50 u	0.14 Bag	0.05 m^3

FOUNDATION AND ENCLOSURE CALCULATION METHOD

1.00 ml of foundation and tie beam measuring 0.20 m wide x 0.3 m high is equivalent to 0.06 m m3 of concrete.

	Cement	Sand	Stone	Steel
1.00 ml	25.5 Kg./0.6 bag	0.093 m^3	0.094 m^3	4 ML Ø 12 mm

COLUMN CALCULATION METHOD

1.00 ml of column with a section of 0.20 m x 0.2 m is equivalent to 0.04 m3 of concrete.

	Cement	Sand	Stone	Steel
1.00 ml	17 Kg./ 0.4 Bag	0.062 m^3	0.063 m^3	4 ML Ø 12 mm

Calculation Example:

A column that is 3.00 m high with a section of 0.20 m x 0.2 m is equivalent to 0.12 m3 of concrete.

Calculation of Materials:

	Cement	Sand	Stone	Steel
3.00 ml	1.21 Bag	0.186 m^3	0.189 m^3	12 ML Ø 12 mm

ANEXO 4

GUÍA TEMÁTICA

LA GUÍA DE EVALUACIÓN UN EJEMPLO DE LA PARTICIPACIÓN ALCANZADA EN ESTE PROYECTO POR LA COMUNIDAD.

¿Qué es la guía?

Es una herramienta de control y chequeo a pie de obra de todos los aspectos que deben tenerse en cuenta para la correcta colocación del techo, es de fácil entendimiento por parte del técnico que debe hacer esta labor, igualmente se capacita al morador para que también pueda chequear.

Cubierta metálica

SE CUMPLEN LOS ASPECTOS SIGUIENTES?	SI	NO
1- Correcto almacenaje de los componentes de la cubierta		
2- Colocación de ganchos de 3/8¨ en cerramientos		
3- Distancia entre apoyos		
4- Correcta colocación de purlings		
5- Secuencia de colocación de las tejas		
6- Pendientes o inclinación adecuada		
7- Soldadura a tope para empate de purlings		
8- Fijación de tornillos autotaladrantes a purlings		
9- Unión tejas –tejas con tornillos y arandelas de sellaje		
10- Correcta colocación del caballete		
11- Soluciones de remate		

ASPECTOS A CHEQUEAR Y CONTROLAR

GUÍA PARA LA EVALUACIÓN:

1- Las tejas deben almacenarse en estibas de hasta 5 paquetes y los purlings de hasta 4 paquetes. Ambas estructuras deben almacenarse bajo techo, lugares secos y sin humedad y separadas del suelo y entre sí mediantes calzos de madera, espaciados no más de 3 metros.

2- Los ganchos de 3/8¨deben ser anclados al acero principal del cerramiento y el otro extremo doblado, debe ser soldado al purling en el momento del montaje. Cuando la cubierta es a una sola agua, los ganchos que sujetan los purlings extremos se espaciaran a 2.00 m a lo largo del cerramiento longitudinal y en el caso de los purlings intermedios, se fijaran a los cerramientos transversales. Cuando la cubierta es a dos aguas, colocar los purlings de la parte más alta a una distancia no mayor de 15 cm de la cumbre y los del extremo inferior alineados con los muros.

3- Para apoyos hasta 3 metros, el espaciamiento máximo es de 1,5 m y para apoyos hasta 4 m el espaciamiento máximo es de 1,25 m. Cuando las paredes transversales (apoyos) estan distanciadas más de 4 metros se construirá una viga en el centro de la luz. Los purlings se embeberán al mojinete.

4- Todos los purlings deben tener el ala superior en el mismo plano para asegurar una correcta colocación de las tejas.

5- Comenzar a colocar las tejas en la dirección contraria a los vientos predominantes y bien ali-

neadas unas con otras en el extremo inferior. En el caso de la cubierta a un agua, garantizar que los voladizos extremos tengan similar dimensión. El solape entre tejas es de 1,5 ondas.

6- Pendientes de la cubierta recomendada, es mínimo del 10%.

7- En caso que haya que empatar tramos de purlings se hará una soldadura a tope y se garantizará la rectitud de las canales empatadas. Se debe soldar sobre superficie plana y con pesos colocados sobre ambas canales para evitar torceduras.

8- Las tejas se fijarán a los purlings con tornillos autotaladrantes con arandela de sellaje, a un espaciamiento de 22,8 cm en la parte baja de la onda.

9- La unión teja – teja (longitudinal) se hará con tornillos autoroscantes con arandela de sellaje espaciados a 40 cm en la parte alta de la onda.

10- El replanteo del caballete se hará desde la fachada principal al otro extremo y para fijar a las tejas se hará con tornillos autoroscantes con arandela de sellaje espaciados a 22,8 cm en la parte alta de la onda.

11- Toda la cubierta para su correcta terminación lleva detalles para dar soluciones de remate, tanto para lograr uniones correctas como en los trabajos de albañilería, evitando oquedades, indebidas separaciones y otras chapuzas que no garanticen la no estanqueidad, el cierre, la seguridad y la buena apreciación visual.

ANEXO 5

MATERIALES ADQUIRIDOS				
	U/M	**Cantidad**	**Precio €**	**Total**
Construcción material				**401.922**
Cemento	t	60	250,00	15.000
Tejas de Zinc Cal.32 (3,70 x 0,90)	U	13600	11,50	156.400
Tejas de Zinc Cal.32 (1,80 x 0,90)	U	14000	5,60	78.400
Gancho fijar tejas y/o tornillos	U	70000	0,16	11.200
Tornillos	U	200000	0,10	20.000
Caballete de zinc de 2,5 m calibre 30	U	4800	5,51	26.448
Purling metálico (6 m longitud)	U	3300	17,00	56.100
Puntillas	t	6	1.700,00	10.200
Barras de acero corrugada 3/4	t	12	1.181,13	14.174
Alfajías de 5 m de longitud	U	4000	3,50	14.000
PARA CASAS DE CULTIVO AFECTADAS				**16.720**
Malla plastificada	rollo	50	229,00	11.450
Malla antiácida	rollo	20	73,00	1.460
Malla Zaran	rollo	30	127,00	3.810
PARA RECUPERACIÓN ÁREAS PRODUCTIVAS				**47.093**
Alambre púa	rollo	1160	31,50	36.540
Grampas para cerca	kg	1600	1,02	1.632
Pinza de Cerquero	U	70	11,80	826
Machetes 22	U	400	3,94	1.576

Limas Planas de 8 pulgadas con cabo	U	800	3,94	3.152
Pico espiocha con cabo	U	70	9,44	661
Chapaletas	U	70	11,80	826
Barreta	U	70	10,00	700
Azadón de 5 libras	U	100	11,80	1.180
OTROS MATERIALES				**18.741**
Cable eléctrico nº 10	m	14800	0,26	3.848
Cable eléctrico nº 12	m	14800	0,26	3.848
Lámparas de 110V con una luminaria de 18 W (AHORRADORAS)	U	1000	3,00	3.000
Accesorios instalaciones eléctricas (interruptor, toma corriente, tape)	set	450	11,81	5.315
Electrodos	kg	1000	2,73	2.730
DOMÉSTICOS O NFI				**65.555**
colchones	U	700	52,00	36.400
sabanas	U	1400	5,70	7.980
toallas	U	1750	3,10	5.425
colchas	U	700	4,50	3.150
kit de cocina	U	350	36,00	12.600
AGUA Y SANEAMIENTO				**17.850**
filtros de agua	U	350	32,00	11.200
depósito de agua (100 L)	U	350	19,00	6.650
				567.880

MEDIOS ADQUIRIDOS PARA 10 BRIGADAS DE RECUPERACION				
HERRAMIENTAS Y EQUIPOS	**U/M**	**Cantidad**	**Precio €**	**Total**
Motosierras Sthil 46 (con accesorios y repuestos) para las brigadas.	u	10	708,70	7.087
Aceite para motosierras	g	32	20,20	646
Equipo soldar eléctrico portátil de 110/220 Volt más medios de protección	u	10	800,00	8.000
Equipo oxicorte más medios de protección	u	10	400,00	4.000
Taladros Eléctricos con cable de 20 metros	U	10	75,00	750
Taladros de pila con pila de repuesto	U	10	85,00	850
Juego de barrena de tungsteno y brocas	U	10	70,00	700
Equipo de corte (amoladora) de disco.	U	10	70,00	700
Disco para equipo de corte	U	200	0,85	170
Martillo de carpintero	U	40	6,30	252
Serrucho de carpintero	U	20	17,30	346
Segueta de mano para cortar hierro	U	10	9,00	90
Hoja de segueta	U	200	0,60	120
Palas de punta	U	30	6,30	189

Palas cuadradas	U	30	6,30	189
Vagones construcción(carretilla de mano)	U	30	55,13	1.654
Hachas de 5 libras	U	20	11,00	220
Picos con cabo	U	20	7,85	157
Herramientas de electricista (destornilladores, pinzas, etc.)	Set	10	60,00	600
Escaleras de tijera de 10 pies	U	10	78,70	787
Machetes 22	U	60	3,94	236
Limas Planas de 8 pulgadas con cabo	U	120	3,94	473
Chapaletas	U	10	11,80	118
Barreta	U	10	10,00	100
Azadón de 5 libras	U	10	11,80	118
Medios de protección brigadas (casco, espejuelo, guantes, calzado)	set	100	85,00	8.500
				37.053

ANEXO 6

AGENDA. ENCUENTRO DE EXPERIENCIAS SOBRE COLOCACIÓN DE TECHOS.

SISTEMATIZACIÓN DE LOS RESULTADOS DE LOS PROYECTOS ECHO. Hotel San Juan, Santiago de Cuba, 20 y 21 defebrero de 2014.

Objetivos de la Misión:

- Encuentro Sistematización Colocación de Techos.
- Levantamiento de testimonios e historias de vida en la colocación de techos para la realización de publicaciones y audiovisuales sobre la colocación de techos.

20 de febrero de 2014	
Hora	**Actividad**
08:30 a.m. – 09:00 a.m.	Apertura. Palabras de bienvenida. Rosendo Mesías, Oficial Nacional de Riesgos, PNUD
09:00 a.m. – 09:30 a.m.	Explicación metodológica y los objetivos del taller. Presentación de los participantes.
09:30 a.m. – 10:00 a.m.	Presentación de los resultados del levantamiento de las fechas por proyecto
Casos de Holguín	
10:00 a.m. – 11:00 a.m.	• OIKOS: soluciones recicladas de techos
11:00 a.m. – 11:15a.m.	*Coffee Break*
11:15 a.m. -12:00 p.m.	• CARE: soluciones para montaje de techos en estructura de madera
12:00 p.m. – 1:00 p.m.	• GVC: recuperación y procesamiento de madera
1:00 p.m. – 2:30 p.m.	*Almuerzo*
Casos de Santiago	
2:30 p.m. – 3:15 p.m.	• AAA-ACPA: brigadas de construcción de las cooperativas
3:15 p.m. – 4:00 p.m.	• Cruz Roja: cintas anti huracanes
4:00 p.m. – 5:00 p.m.	Sesión de preguntas y respuestas. Discusión en colectivo.
21 de febrero de 2014	
Caso Palma Soriano / Santiago de Cuba	
08:30 a.m. – 09:15 a.m.	• Soluciones de puñales, mojinetes y guardacandelas
09:15 a.m. – 10:00 a.m.	• Brigadas municipales y comunitarias
10:00 a.m. – 10:45 a.m.	• Monitores
10:45 a.m. – 11:00 a.m.	*Coffee Break*
11:00 a.m. – 12:00 a.m.	• Baños secos y filtros de agua
12:00 a.m. – 1:00 p.m.	• Consulta urbana y trabajo con los niños
1:00 p.m. – 2:30 p.m.	*Almuerzo*
Caso Santiago	
2:30 p.m. – 3:15 p.m.	• Metodología de levantamiento de información / INV –UPIV
3:15 p.m. – 4:00 p.m.	• Mecanismo de distribución de materiales de construcción/ INV –UPIV Stgo
4:00 p.m. – 4:45 p.m.	• Facilidades Temporales con materiales recuperados y cobertura ligera/ INV –UPIV Stgo
4:45 p.m. – 5:15 p.m.	Sesión de preguntas y respuestas. Discusión en colectivo.
5:15 p.m. – 5:30 p.m.	Conclusiones y orientaciones para el trabajo.

Key Stages and Components under the Housing Recovery Process, identifying the experience to be capitalized											
Assessment /Diagnosis of Victims		*Distribution of Resources*		*Technical Solution for Recovery*		*Awareness-Raising/Education*		*Technical Advisory Services for Resilient Recovery*		*Implementation of Solution*	
1- Methodology to **collect information** / INV –UPIV Santiago **XXXX**	**U. Stgo**/ Milagro	2- Mechanism for the **distribution of building materials** / INV –UPIV Santiago **XXXX**	**U. Stgo** / Milagro	**Roofs**		11- Children interaction dynamics through contests in Palma S. **¿XXXX?**	Marilyn	12- **Community monitors** to provide the population with advisory services on roofing installation **XXXX**	U. Stgo/ Marilyn	14- *Specialized, community-based* ***construction brigades*** *for roofing installation* **XXXX**	U. Stgo/ Rosendo-OXFAM
				3- Fastening **metal roof structures through wall anchoring**, tiling and fire-prevention devices	U. Stgo/ Rosendo-OXFAM **XXXX**						
				4- **Strapping** for wood roof structures / Red Cross, Santiago	U. Stgo/ Cruz Roja. Stgo **XXXX**			13- **Guide for roofing installation by the population**	U. Stgo/ Marilyn	15- **Cooperative brigades** for roofing installation	U. Stgo/ ACPA **XXXX**
				5- Assembly of **metal roof structures on wood walls**	U. Holguín / Alina –CARE **XXXX**						
				6- **Recycling of wood structures** on damaged houses for roof recovery	U. Holguín / Alina-OIKOS			16 –**Role of the local government in Palma** (president of the Municipal Administration Council and president of the People's Council in La Ceiba. Distribution commission	Stgo /palma **XXXX**		
				7- **Recovery of timber species** for roof structures	U. Holguín / Alina-GVC						
				Water and Sanitation							
				8-**Dry bathroom** / Palma. S	FNJ / Marilyn						
				9- **Water filter** /Palma. S	Fca/Marilyn						
				Shelter							
				10- **Temporary facilities** (with recycled materials and light roofs; TARPS)	U. Sgto / Milagro-Rosendo						

Acronyms

ACPA	Cuban Association of Animal Production
ACTAF	Cuban Association of Agricultural and Forestry Technicians
CAM	Municipal Administrative Council
CC	Nails for tape
CCS	Credit and Services Cooperative
CP	People's Council
CPA	Livestock Production Cooperatives
CRMI	Risk Management Initiative to the Caribbean
ECHO	Humanitarian Aid and Civil Protection department of the European Commission
LC	Láminas para el caballete
LT	Roofing sheeting
NGO	Non-Governmental Organization
OPP	People's power organ
PGOTU	General Plan of urban ordering
UNDP	United Nations Development Programme
RC	Anti-hurricane rolls of tape
UBPC	Basic Units of Cooperative Production
EU	European Union
UEB	Basic Entrepreneurial Unit
UNAICC	National Union of Architects and Construction Engineers of Cuba
UN-Habitat	United Nations Human Settlements Programme (UN-Habitat)
UNICEF	United Nations Children's Fund
UNIV	Municipal Investment Unit of Housing
UPIV	Provincial Investment Unit of Housing

UNIÓN EUROPEA

PNUD
Al servicio de las personas y las naciones

unicef
UN HABITAT
POR UN MEJOR FUTURO URBANO

Fundación Antonio Núñez Jiménez de la Naturaleza y el Hombre

care

oikos
acção humanitária

GVC
un mundo de solidaridad

ACPA
Asociación Cubana de Producción Animal

ACTAF

UNAICC
Unión Nacional de Arquitectos e Ingenieros de la Construcción de Cuba

OXFAM

JAPAN
Official Development Assistance

welt hunger hilfe

HOLGUIN