

BHIMPHEDI AWASUKA



भीमफेदी आवासुका



SERVAMUS

Rotary Club of
Kantipur

RI DISTRICT 3292



AWASUKA developers



AMICS DEL NEPAL (NGO)

- General Coordination, local infrastructure & economical follow up



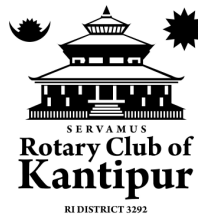
BASE-A (NGO)

- Technical & Cooperators' Coordination (Last year Architecture Students)
(Cooperators stay in Nepal: 4 months)



CCD-UPC - Center for Cooperation and Development

-Expert Advisor on Habitat Improvement Programs and Cooperatives
-Financial support to the Program: cooperators' expenses

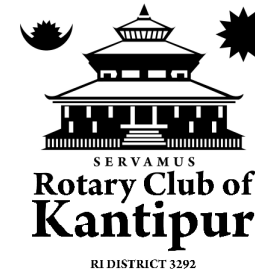


ROTARY CLUB OF KANTIPUR

- Local Parter: Legal, logistical & financial support, contact with government and other nepali institutions



AWASUKA sponsors



Col·legi d'Arquitectes
de Catalunya



Ajuntament
de Sant Quirze
del Vallès





AWASUKA initial reflection

“Natural disasters do not exist.

*Disasters are caused by the poor adaptation of man to
natural phenomena”*

Dr. Pedro Lorenzo

PhD. Architect, specialist in Cooperation
Awasuka Advisor, CCD – UPC University

AWASUKA stages

1- IDENTIFICATION TRIP *Completed*
July-2015

2- PREPARATION WORKS *Completed*
Sept-2015/May-2016

- Social and Economical Trainings Design
- Agreements with Agragaami and Rotary Club
- Working Spaces creation: Office, Storehouses and Workshop

3- PROTOTYPES' CONSTRUCTION in BHIMPHEDI – 1st STAGE *Completed*
April-2016/Sept-2017

- Organisation of Mistris & Beneficiaries Teams
- Productive Trainings' at the Workshop
- Trainings to Mistris & Beneficiaries

4- HOUSES' CONSTRUCTION & RETROFITTING in SUPIN – 2nd STAGE *Completed*

Oct-2017/June-2018 -N - Selection of Beneficiaries: **N**ew and **R**etrofitted Houses

Oct-2018/Feb-2019 -R - Trainings to Supin mistris & families
- New and Retrofitted Houses' Construction

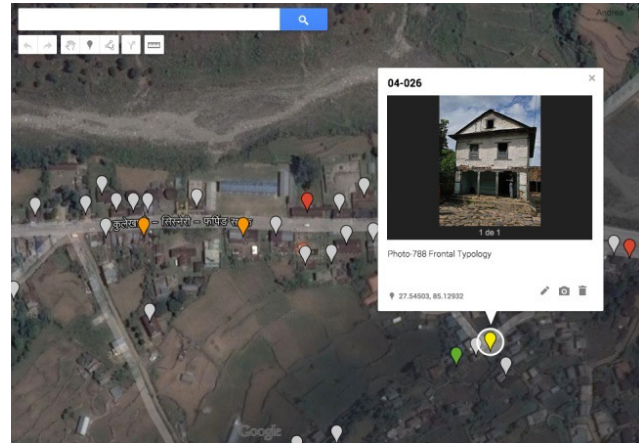
5- CHIMNEY HOODS & WATER AWARENESS – 2nd STAGE *In Progress*

April-2019/Nov-2019

1. Analysis of Traditional Architecture & Action Plan

HOUSE FORMS

HOUSES' LOCATION in GOOGLE MAPS



DAMAGE ASSESSMENT

- TOTALLY COLLAPSED. Reconstruction
- SERIOUS DAMAGE. Repairing.
- CRACKS (walls and structure) > 6mm
- SMALL CRACKS (walls) < 6mm
- Not Affected

REPORT -> ACTION PLAN



INFORME NEPAL 07/2015 VIAJE DE IDENTIFICACIÓN

Mónica Sans (Amics Nepal)
Emma Ferrer (Base-A)
Pedro Lorenzo (CCD-UPC)

COLABORADORES:
Anna Altamir (Base-A)
Andrea Llanas (Base-A)
Valeria Cid (Base-A)

Programa de mejora de la vivienda afectada por los terremotos recientes (25/4 y 12/5 de 2015) en Bhimpheedi, Nepal.

BHIMPHEDI AWASUKA
AAWAAS SUDHAR KARYAKRAM

Propuesto por:

● Associació Amics del Nepal

En colaboración con:

● Base-A Arquitectura y cooperación

● Centre de Cooperació de la UPC

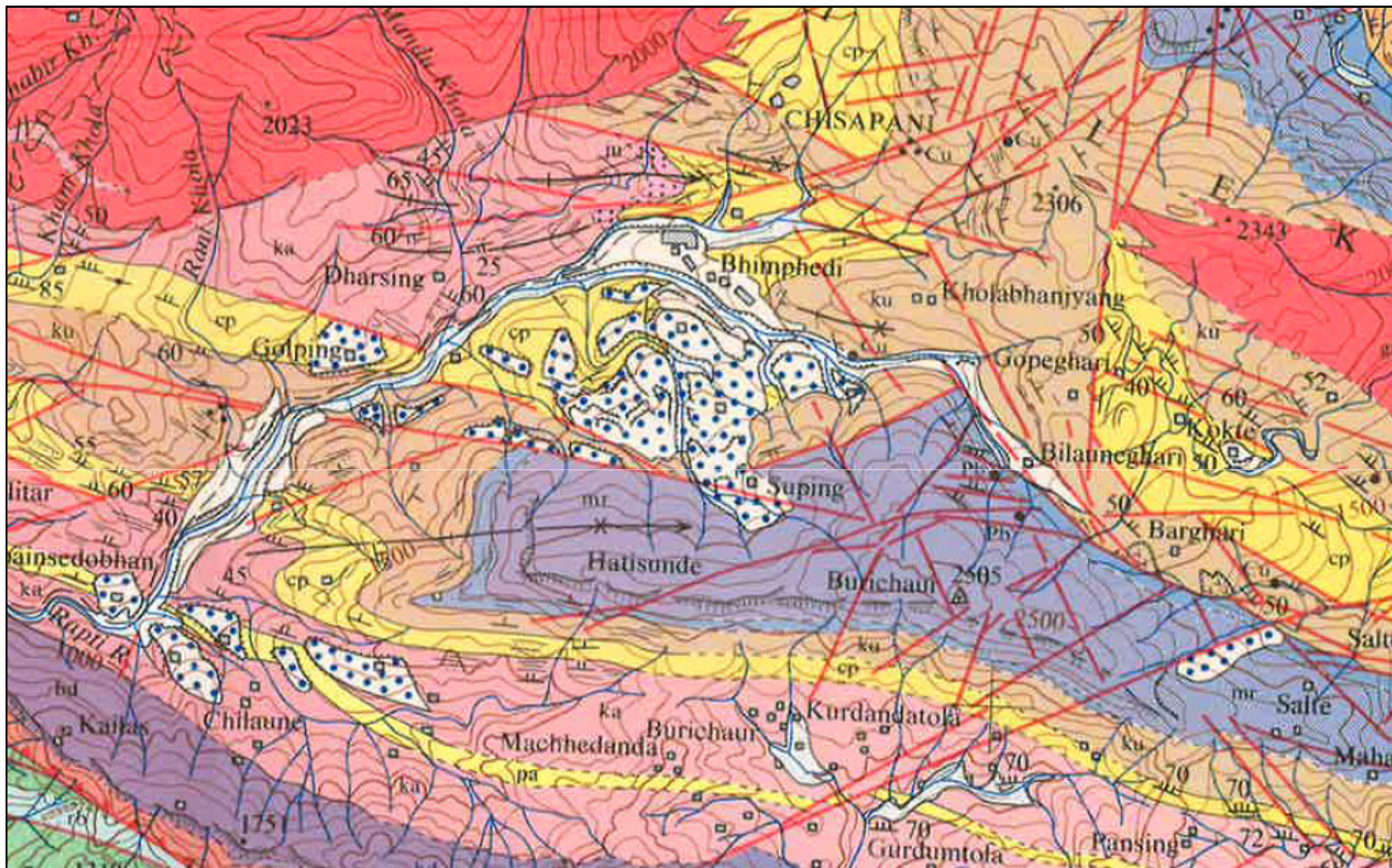
RURAL TYPOLOGIES ANALYSIS



1. Geological Assessment by Yuliya Zukh

Yuliya Zukh, Uppsala University

Geologist Yuliya Zukh was in Bhimphedi at the beginning of Awasuka Program. She collaborated with Awasuka on two geological reports: Dhunga Mato **Prototype's soil assessment** and **Supin area assessment**. The second report triggered the **decision to start the Program in Supin**, the most damaged area due to its clay subsoil.



Geological Map of Bhimphedi Area, provided by Yuliya Zukh.

2. Rana Palace Retrofitting

RETROFITTING CRITERIA

- ADD MISSING DIAGONAL BRACES in upper floor (Buikal)
- REMOVE EXCESS OF WEIGHT in upper floor: mud & stones

NOTE: Diagonal Braces had been removed in the past because of a lack of knowledge, to be used as firewood



Before



After



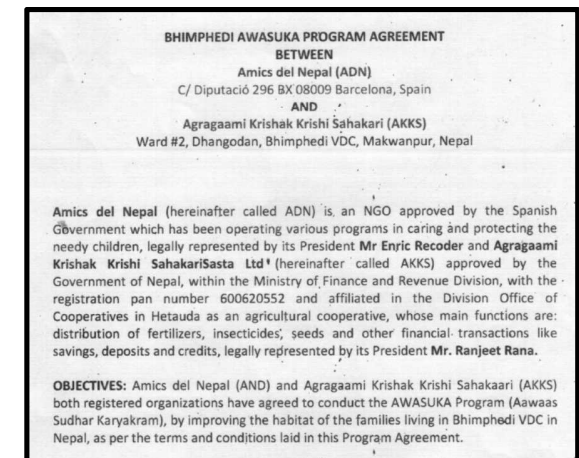
3. Agreement with Agricultural Cooperative

AGRAGAAMI KRISHAK KRISHI SAHAKARI



Awasuka and Agragaami agreed to manage the credits through their cooperative.

Rotary Club of Kantipur monitors this process through an agreement signed before the start of house construction.



4. Preparation of Awasuka Working Spaces

OFFICE

At Phohora Durbar, shared with Agragaami



Our office enjoys very good acceptance
among the children of Bhimphedi



4. Preparation of Awasuka Working Spaces

WORKSHOP + STOREHOUSE

At Simaltar, hired by Awasuka



5. Civil Engineer

LOCAL ENGINEER FOR AWASUKA

A Civil engineer from Hetauda was working in AWASUKA for 6 months.



6. Government Sawmill Wood Purchase Authorisation

GOVERNMENT SAWMILL IN HETAUDA – TIMBER CORPORATION

ROTARY CLUB OF KANTIPUR and ROTARY CLUB OF HETAUDA were very helpful in this process.

BHIMPHEDI AWASUKA
भीमफेदी आवासुका

Kathmandu, January 10th 2016

To:
Mr. Birendra Kumar Yadav
General Manager
The Timber Corporation of Nepal, LTD.

WOOD LIST for AWASUKA "DHUNGA-MATO" PROTOTYPE

Piece Name	# Units	Width	Height	Length	Cu Ft
1. RAFTERS	22 units	4" x 5"	14,5 ft	40,65	
		10cm x 12cm	4,36 m		
2. ROOF DIAGONALS.....	4 units	2" x 4"	13,5 ft	2,86	
		5cm x 10cm	4,05 m		
3. PURLINS (Middlemost)	8 units	2" x 2"	10 ft	2,08	
		5cm x 5cm	2,95 m		
4. PURLINS (Outermost)	16 units	2" x 2"	9 ft	3,74	
		5cm x 5cm	2,65 m		
5. EAVE BOARDS (Side Wall).....	4 units	1" x 6"	14 ft	2,25	
		2,5cm x 15cm	4,25 m		
6. EAVE BOARDS (Gable Wall) ...	4 units	1" x 4"	14,6 ft	1,57	
		2,5cm x 10cm	4,43 m		
7. STAIRWAY BEAMS	2 units	1,1" x 8"	14,8 ft	1,78	
		2,8cm x 20cm	4,50 m		
TOTAL CUBIC FEET					54,93



Wood-List Request
December 2016

Wood Purchase
May 2017

7. Design & Construction of 3 Prototypes. New Buildings

BLOCK



DHUNGA-MATO



PATRA



*The three prototypes are **visitable** to foster **dissemination** of earthquake-resistant construction techniques*

7. Design & Construction of 3 Prototypes. Posters

BLOCK

BHIMPHEDI AWASUKA **CONFINED BLOCK**
भीमफेदी आवासुका **EARTHQUAKE RESISTANT PROTOTYPE**
कन्फाइन्ड ब्लक
भूकम्प प्रतिरोधात्मक नमूना घर

Confined Masonry is an earthquake-resistant technique used in many countries. It can be done using different materials, but the most common one is concrete block. In Nepal concrete blocks are widely used for construction, but the lack of **confining elements** makes them very vulnerable to earthquakes. After 2015 earthquake, Awasuka team decided to implement this technique in Bhimphedi area, to **improve** the quality of these constructions:

PROBLEMS  **SOLUTIONS** 

- 1. Lack of Plinth Beam under walls**  **1. Plinth Beam connected to walls and pillars** 
- 2. Block walls not confined**  **2. Confining Elements added: Pillars and Ring Beams** 
- 3. Blocks not reinforced internally**  **3. Reinforcements added: vertically and horizontally** 
- 4. Wall corners not braced**  **4. Wall corners braced with rods** 

AWASUKA DEVELOPERS    **PROMOTER**  **LOCAL PARTNERS**  

SPONSORS          

DHUNGA-MATO

BHIMPHEDI AWASUKA **DHUNGA MATO**
भीमफेदी आवासुका **EARTHQUAKE RESISTANT PROTOTYPE**
ढुङ्गा माटो
भूकम्प प्रतिरोधात्मक नमूना घर

Dhunga Mato, stone and mud, and inner wooden structure, is the most common construction technique used in rural areas of Nepal. After 2015 earthquake, Awasuka team analyzed the Dhunga Mato structures existing in Bhimphedi VDC, finding that they already had some earthquake resistant features, but they also needed new elements to **improve** their **bracing** and **stiffness**:

PROBLEMS  **SOLUTIONS** 

- 1. Wooden Pillar Structure not Stiffened**  **1. Diagonal Braces in Pillars: Stiffening Modules** 
- 2. Horizontal and Inclined Planes not Stiffened**  **2. Diagonal Braces in Floors and Roofs** 
- 3. Horizontal Bands missing in Stone Walls**  **3. Horizontal Bands tying stone walls inside and outside** 
- 4. Wooden Joists not Braced along Wall**  **4. Horizontal Bands tying joists along wall: Ring Beam** 

AWASUKA DEVELOPERS    **PROMOTER**  **LOCAL PARTNERS**  

SPONSORS          

PATRA

BHIMPHEDI AWASUKA **PATRA KU-KATH**
भीमफेदी आवासुका **EARTHQUAKE RESISTANT PROTOTYPE**
पत्रा कु काठ
भूकम्प प्रतिरोधात्मक नमूना घर

Patra Ku-Kath is an inexpensive wood commonly used for scaffolding. As wood is expensive, Awasuka team has proposed to build a **light-quick**-construction house using prefabricated panels made of Patra. It can be used as a **temporary shelter** and as a **permanent house**. Additionally, typical temporary shelters have bad thermal behavior due to CGI sheets, whereas patra construction improves **thermal comfort**.

PROBLEMS  **SOLUTIONS** 

- 1. Lack of Plinth Beam under walls**  **1. Plinth Beam connected to wall panels** 
- 2. Wall planes not stiffened**  **2. Prefabricated panels with diagonals at corners** 
- 3. Roof planes not stiffened**  **3. Roof diagonals added at horizontal planes** 
- 4. Lack of thermal insulation**  **4. Wooden walls and insulated roof provide thermal comfort** 

AWASUKA DEVELOPERS    **PROMOTER**  **LOCAL PARTNERS**  

SPONSORS          

Educative **posters** are located in a visible place in every prototype for people's **learning** and **awareness**

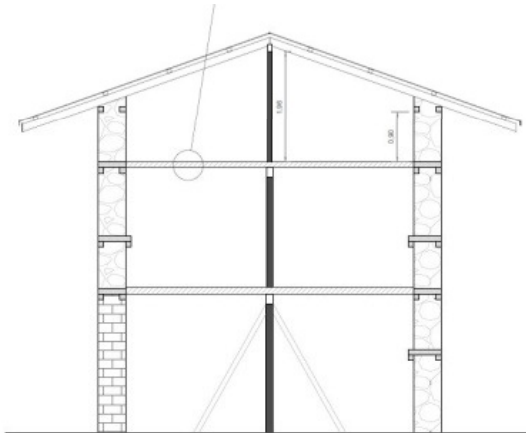
7. Design & Construction of 3 Prototypes. Inauguration

INAUGURATION OF “KHELKUD GRIHA” - DHUNGA MATO -

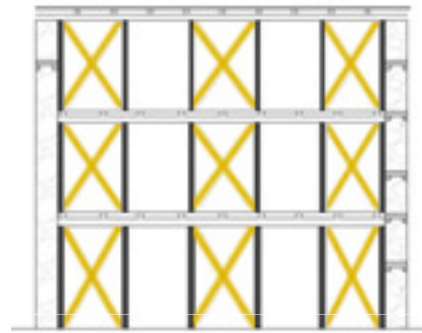


***April 2018.** The building was inaugurated by local authorities and representatives of different participant organisations*

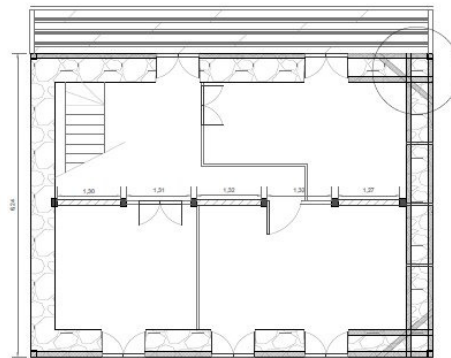
8. Design & Construction of Retrofitted Building



CROSS SECTION



LONG SECTION



FIRST FLOOR PLAN



9. Approval of Confined Block Prototype by NRA (Govt of Nepal)

APPROVAL PROCESS

ROTARY CLUB OF KANTIPUR was crucial in this process, thanks to its multi-talented members.



First Submission at NRA
July 2017



Final Approval at NRA
January 2018

10. Construction of 2 Chimney-Prototypes

KITCHEN HOODS by Shambu Adhikari

Shambu Adhikari from Hetauda assembled two chimneys for Awasuka Program: one in **Balmandir** and the other one in **Tallo Supin**. Beneficiaries were asked to prepare the bricks for the kitchen's base.



11. “Awasuka Blocks” Production, complying with NRA

HETAUDA FACTORY and TESTING LABORATORY

More than 2000 blocks were made at a Block Factory in **Hetauda**. Later the blocks were tested in **Pathlaiya** Testing Laboratory.

*The outcome was that these “Awasuka Blocks” had a compressive strenght of **7,5MPa**, while the local ones had only 2,5MPa. NRA requirement is 5MPa.*



12. Design & Construction of 7 New Houses in Supin

Aku Prasad Pudasaini



Bimala Devkota



- Social House -

12. Design & Construction of 7 New Houses in Supin

Devraj Devkota



Ghana Nath



- Social House -

12. Design & Construction of 7 New Houses in Supin

Niranjan Pudassainee



Niranjan was also Awasuka Local Coordinator for several months, once the engineer left

12. Design & Construction of 7 New Houses in Supin

Hareram Pudassainee



Chanumati Pudassainee



13. Design & Retrofitting of 5 Houses in Supin

Nirmala Banjara



Sanumaya Waiba



Borun Syangtan



13. Design & Retrofitting of 5 Houses in Supin

Hirakumari Pudassaine

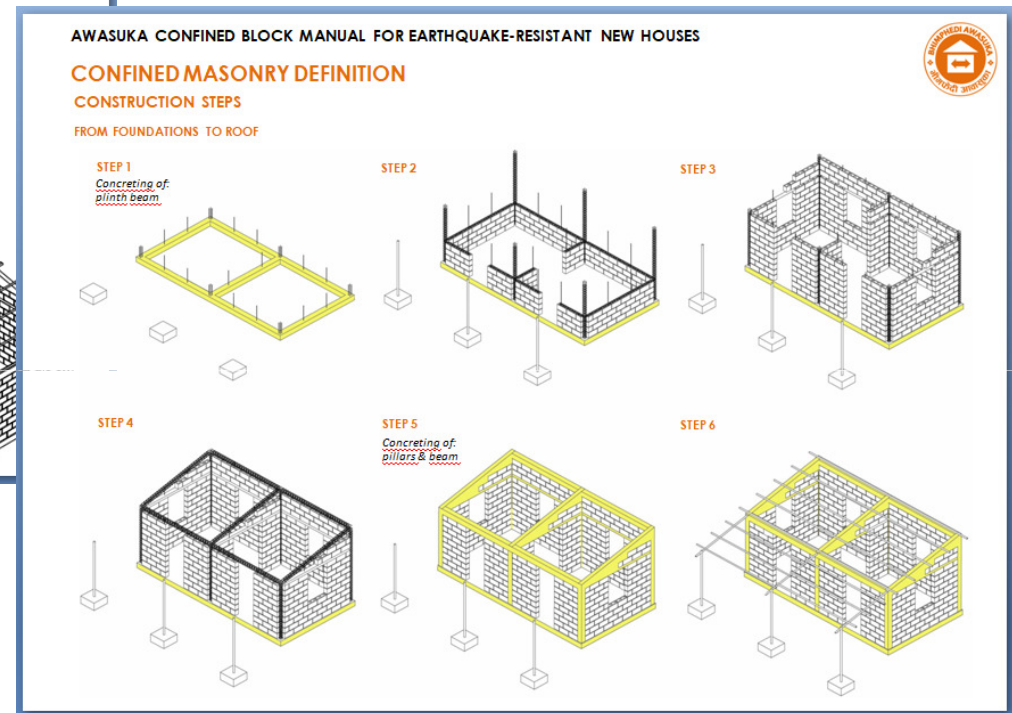
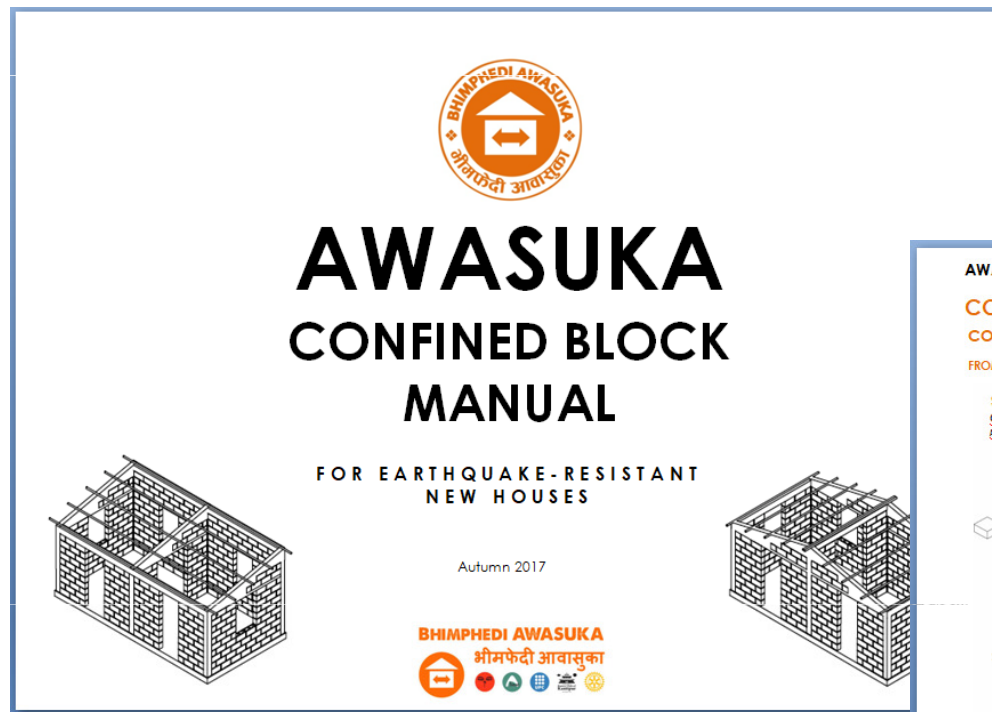


Supriya Devkota



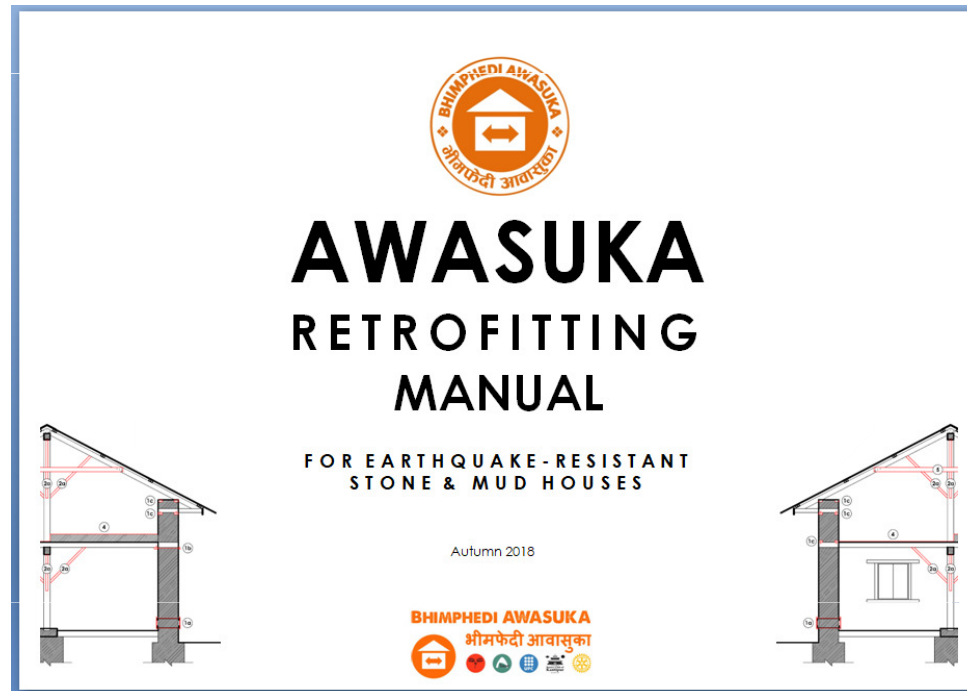
14. Creation of 2 Construction Manuals

CONFINED MASONRY MANUAL



14. Creation of 2 Construction Manuals

RETROFITTING MANUAL



AWASUKA RETROFITTING MANUAL FOR EARTHQUAKE-RESISTANT STONE & MUD HOUSES

MAIN RETROFITTING POINTS

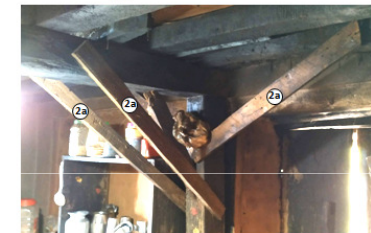
OUTER STONE-MUD STRUCTURE - WALLS

All stone & mud (*dhung-mato*) walls must be connected horizontally (1) and vertically (2) by connecting bands, like a package. These bands also connect the inner and outer wythes of the wall, avoiding delamination.



INNER WOODEN STRUCTURE - PILLARS, FLOOR & ROOF

The inner wooden structure must be stiffened horizontally (3) and vertically (2) with diagonals. The roof structure must also be stiffened with ties (5).



15. Song Composition & Recording at KJC

BLOCK, WOOD or STONE Song

The song **BLOCK, WOOD or STONE** was composed to raise awareness about earthquake-resistant techniques. It was recorded at KJC Studio with several nepali musicians in Spring 2017. A **video** of the song is intended to be shot in Fall 2018.



Mixed and Mastered by
ORIOL SERRANO, Estudi
U Producer - Barcelona

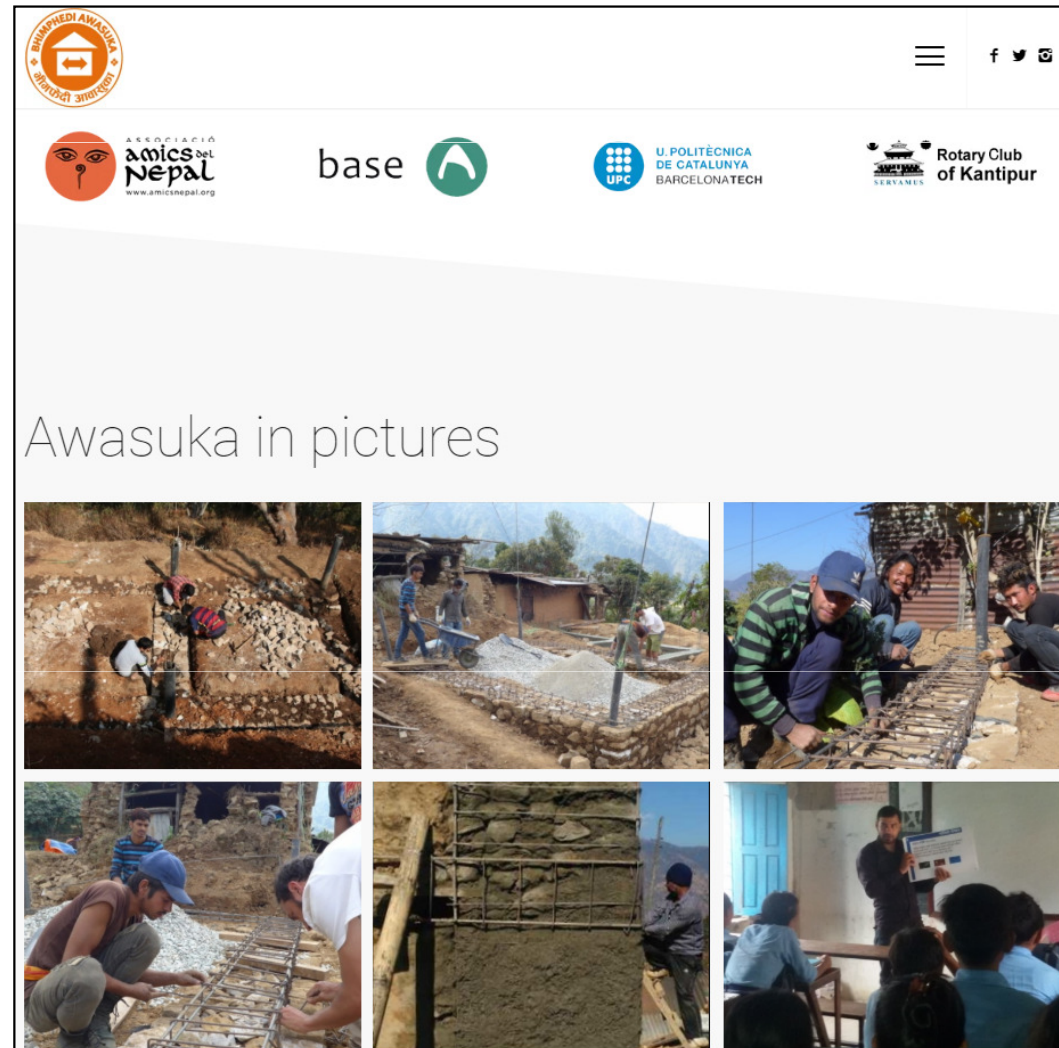
From left to right: MANZIL BIKRAM, KJC Studio producer - KIRAN NEPALI, sarangi - RAJU MAHARJAN, tabala - DANIEL SUBBA, piano - BIJENT BIKRAM SHAH, double bass & ROSHAN SHARMA – chaturangi -

16. Awasuka Website

PROGRAM DISSEMINATION:

www.awasuka.org

The website, linked to Amics del Nepal website, already available in three languages and will have all manuals and other documents available for free download.



17. Workers' Training in Prototypes' Construction



21 VILLAGERS

Hari Kumar Syangtan, Milan Pudassainee, Santosh Pudassainee, Dev Narayan Pudassainee, Dinesh Sapkota, Suresh Sapkota, Pawan Devkota, Suman Pudassainee, Niraj Pudassainee, Salikram Devkota, Sanu "Beni" Lama, Vhim Maya, Sushila Thapa, Harka Bahadur Thapa, Basu Pudassainee, Ramesh Pudassainee, Namraj Pudassainee, Ram Krishna Thapa, Niranjan Pudassainee, Deepak Pudassainee, Keshar Pulami

11 BALMANDIR KIDS

Shree Bahadur Balak, Sanu Waiba, Kul Bahadur Thapa, Kiran Chaudary, Bishnu Mandal, Ramesh Syangtan, Ramesh Thami, Ashish Malla, Sharan Praja, Ramraj Shahi, Love Rawal, Ramraj Shahi, Love Rawal



17. Worker's Certificate Distribution

ANTI-SEISMICAL TECHNIQUES DISSEMINATION



*Awasuka Program and Rotary Club of Kantipur distributed Certificates for all workers involved in the Prototypes' Construction, acknowledging their success on learning **earthquake-resistant** construction **techniques**.*



17. Workers' Training in Supin Houses' Construction



More than **35 mistris** were trained in Supin area. An average of 4-5 people per house were working under Awasuka Technical Volunteers' supervision



PARALLEL PROJECTS for HABITAT IMPROVEMENT

Multidisciplinary Fields

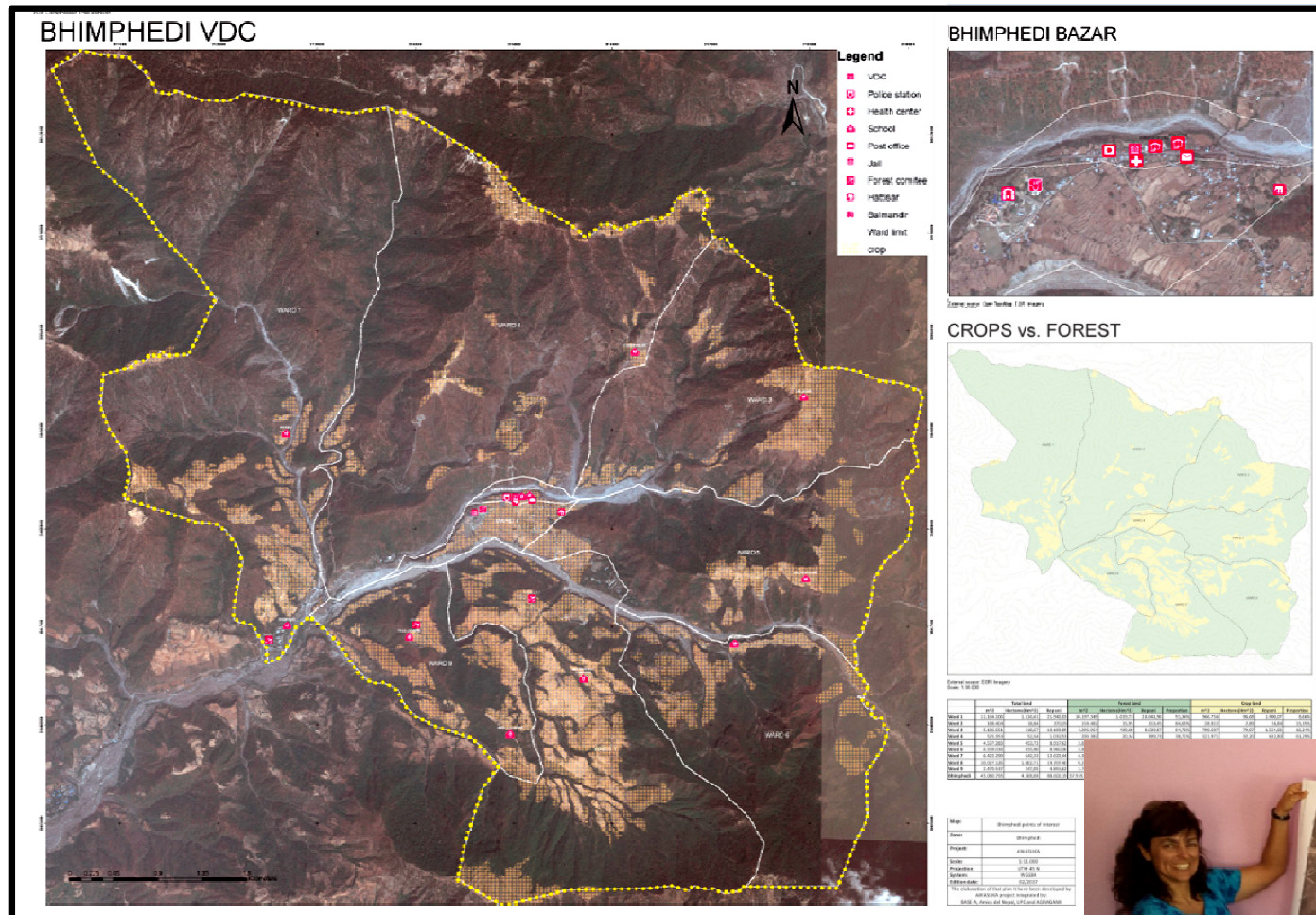
18. Water-Paani Training

BIOLOGIST



Stayed in Bhimphedi for 3 months and performed trainings on water purification awareness, based on the song **WATER PAANI**. Trainings places: **Health Center**, Public and Community **Schools** and **Balmandir**

19. Bhimphedi Satellite Maps



FIRST OF ITS KIND
IN BHIMPHEDI,
HANDED OUT
TO GAUPALIKA

MR BADRI SAPKOTA
Bhimphedi VDC Secretary,
received the map of
Bhimphedi on behalf of
Bhimphedi Gaupalika

SURVEYING ENGINEER

Stayed in Bhimphedi for 3 months and prepared several maps requested by the Gaupalika: Crops vs Jungle, etc...



20. Waste Management Report

ENVIRONMENTAL ENGINEERS

A team of 3 Environmental Engineers stayed in Bhimphedi for 6 months and analyzed the status of waste management. The outcome was a comprehensive **report** with many ideas on how to improve waste management, handed to Gaupalika.



21. Video Documentary on Awasuka's first stage

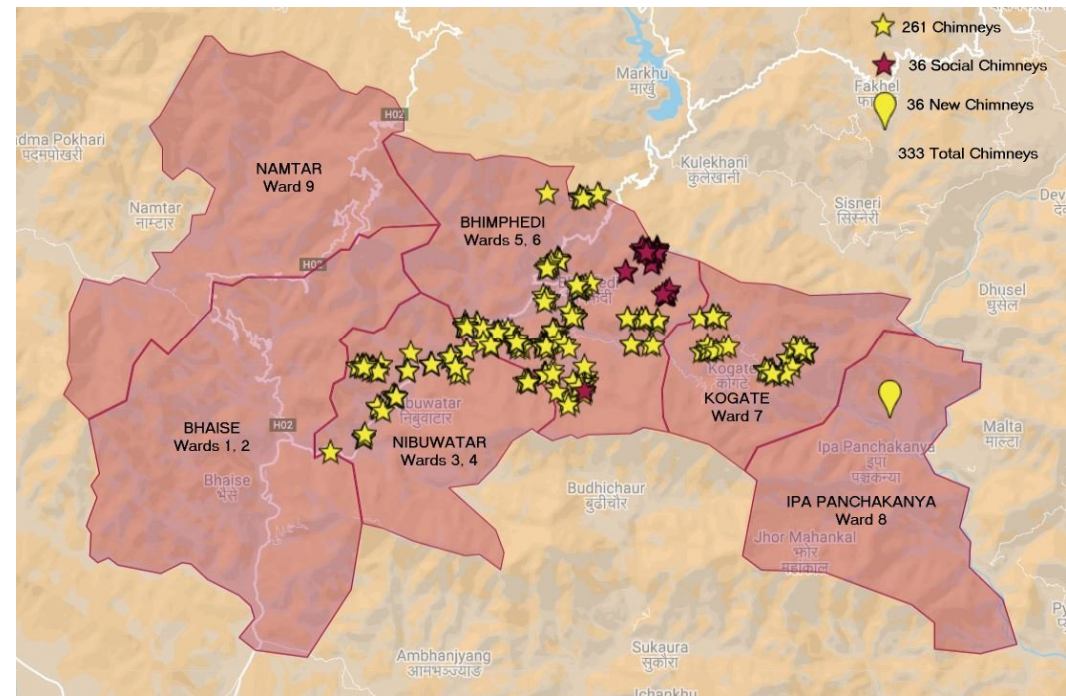


AVAILABLE ON
YOUTUBE

JOURNALISTS

Two journalists in Bhimphedi did a video documentary about the initial stage of Awasuka.

22. Chimney-Hood Construction



23. Water Awareness & Piyush Distribution





2. WATER CONTAMINATION

"WATER PAANI" SONG LYRICS


2nd VERSE:
Water is something that can be *corrupted*
It's bad for our *body*, it's bad for our soul,
Water gets grimy when the *people* neglect it,
Not burying their *wastes* in appropriate holes.

"WATER PAANI" ACTIVITY

The social *moblizer* repeats exactly the same operations, but this time with the 2nd verse. He talks about the three types of water contamination and explains that the most important one in Nepal rural areas is the biological one. Following, he explains how water from rivers and streams can get easily contaminated by the lack of "appropriate holes" or latrines.

BIOLOGICAL POLLUTION



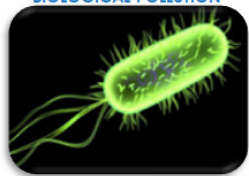
Mixing Cartoon, UNICEF

PHYSICAL POLLUTION



Suspended Solids like: Clay, Dust, Small Pieces of Leaves...

BIOLOGICAL POLLUTION



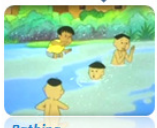
Invisible bacteria, viruses, parasites only visible by microscope

CHEMICAL POLLUTION

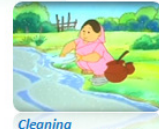


Dangerous leakages from industries, toxic metals, pesticides...

Bathing



Cleaning



Drinking



WaterPaani_02-Cut.mp3

AWASUKA team



Professor Pedro, advisor



House visits for analysis



Agragaami Assembly



AWASUKA team



Work on site, Bhimphedi



Awasuka offices: Barcelona and Bhimphedi



AWASUKA Team

Advisor & Coordinators

Pedro Lorenzo, PhD. Architect (CCD-UPC)

Berta Marín, Md Architect (Base-A) and Anna Altemir, Md Architect (Base-A)

Monica Sans Duran, Md Architect and Musician (Amics del Nepal)

Technical Team

UPC Architects: Andrea Llanas, Valeria Cid, Alex Espina, Diego Guerra, Victoria Tous, Adrian Alvarez, Alba Corbella, Andrea Martin, Andreu Llull, José Carlos Sánchez, Victòria Solina, Marc Socias, Àngel Joaniquet, Irene Gudel, Martí Domènech, Marta Guilera, Anna Gonzalvo, Arnau Montoya, Irina Berdonces, Ana Fernández, Sebastià Febrer, Emma Ferrer, Mikel Zubiaga, Nerea Gezuraga, Inés Garcia - **UPC Surveyor:** Marc Crespo, Jordi Mense and Sergio González - **Uppsala University Geologist:** Yuliya Zhuk - **UPC Civil Engineer:** Laura Coll - **Biologist (Water Paani Activities):** Eva Pubill - **UPC Environmental Engineers:** Marga López, Ainoa Plaza, Daylí Remuiñán, Maria Assens - **Journalists:** Sara Barrera & Xavi Clarà Joan Carlos Lausin - **Nepal Engineers:** Sandesh Gurung, Sumit Thapa, Rajib Maharjan, Vivek Shrestha, Amit Thakur - **Accountancy:** Dani Roig - **RC Hetauda:** Ram Prasad Sharma - **RC Kantipur SP Director for Awasuka:** Prabhat Yonzon - **Computer Scientist:** Carles Turró

AWASUKA CONTACTS. **AMICS DEL NEPAL & BASE-A**

Website: <http://www.amicsnepal.org/en/>

Email: coord.basea@gmail.com

Awasuka Blog (weekly articles): <http://base-a-org.blogspot.com.es/search/label/Nepal>





THANK YOU!

GRÀCIES!

धन्यवाद

