AWASUKA, BUILDING SAFE HOUSES IN BHIMPHEDI 2015-2019

Awasuka Program started in July 2015, after the Nepal earthquakes, and its name was created after the Nepalese words *Aawaas Sudhar Karyakram (Habitat Improvement Program).* It has been funded and developed by three catalan organizations: Amics del Nepal, Base-A and CCD, the Centre for Cooperation and Development at UPC University. Amics del Nepal has provided general coordination (Er.Arch. Monica Sans Duran), Base-A technical coordinaton (Er.Arch. Berta Marín) and junior architects in the field; and CCD financial support for these architects, as well as an expert advisor on cooperation (PhD. Architect Pedro Lorenzo). In Nepal, Awasuka has been developed through Rotary Club of Kantipur -an ideal partner in many different fields thanks to its multi-disciplinary and well-connected members- under the Project Service Director's coordination (Rtn. Prabhat Yonzon). And last but not least, a local agriculture cooperative has supported the credit lines in Bhimphedi.

SAFE HOUSES

The program's main objective has been to empower the villagers with knowledge and awareness about safe houses. This has been developed through building earthquake-resistant houses, chimney hoods and raising awareness on water treatment. House construction has been the longest and most complex part of the program, having followed different stages: local architecture analysis, prototype construction, house construction and house retrofitting.

1. Local Architecture Analysis

Around seventy houses were visited within the different areas of Bhimphedi, in order to study the relationship between damage degree and construction typology. Through this analysis some interesting findings on technical improvements were detected –for instance: the need of diagonal braces- and later applied on the prototype construction.

Analysis forms for each visited house, and respective location in Google Maps, following damage degree colours.

2. Prototypes' Construction

The choice of the prototypes' materials and technologies met these two criteria: availability of local materials and possibility of improvements. Hence, these were the selected ones:

- **Stone and Mud House,** the most common technique used in the rural areas of Nepal. Awasuka wanted to improve a number of structural issues that traditional architecture did not solve, despite of counting already with many antiseismical features.
- **Wooden Emergency Shelter**, to give alternatives to the precariousness of the existing ones. A type of inexpensive wood (formwork "patra" wood) was chosen for this prototype, following Dr Pedro's project based on modules that can be mountable and demountable very easily, suitable for villagers who do not own any land.

- **Concrete Block House**, this material is widely used in the village, but not properly tied. The "confined masonry" technique is a very cost-effective earthquake-resistant technology used world-wide, and Awasuka wanted to introduce this one in Nepal too.
- **Retrofitted Houses**, a stone and mud house was retrofitted by giving technical support to a family. As “Retrofitting” was initially not included in the government help program, Awasuka decided to fill this gap from the beginning. In this stage, Awasuka also retrofitted the Rana Palace in Balmandir compound, adding some diagonals that had been previously removed.

Conclusions after Prototypes’ Construction

Results showed that the “Confined Block” technique was the most cost-effective, fast to execute and offering simple earthquake-resistant features, as well as good thermal behaviour. From the other two techniques, Stone & Mud resulted too expensive because of the enormous manpower required, and Wood resulted expensive because of the number of treatments required for wood: anti-termites, sanding and straightening. Dr Pedro was shocked about this outcome, as he has developed this technique in many other countries and it always turns out to be the most cost-effective one… but purchased wood quality in those countries is much better, as it has previous treatments and the sawmills’ saws provide perfect straight cuttings.

From left to right: “confined block”, “stone and mud” and “wood” prototypes respectively.

Awasuka Certificates’ Distribution

Once all prototypes were finished, Awasuka distributed certificates to all workers who had learned the improved anti-seismic techniques used in stone and mud, wood and confined block. Ceremony was held in July 2017 and attended by new elected authorities of Bhimphedi Gaupalika, members of Agragaami Cooperative, members of Rotary Club Kantipur, program coordinators and expert advisor (Amics del Nepal, base-A and CCD-UPC).

Awasuka Certificates’ ceremony. Right: Pedro Lorenzo giving a certificate to a worker.

3. Houses' Construction

This was main highlight of the house-construction process: Awasuka provided credit for materials and technical support to families, while the latter had to provide manpower. Once the credit payback starts more people can benefit from the same process, thanks to the revolving fund. Thus, house construction and retrofitting can be replicated in other communities.

The building of seven new houses in Supin started in December 2017 and was completed in May 2018. Most of them used the confined block technique. All were paid with credits except two houses for disadvantaged families - entirely covered by Awasuka. The cost of materials for a 2-room house is 200,000NRS, an amount to be returned in five years by the beneficiaries. Having discussed and compared our results with many other organizations, Confined Block has proved to be the most cost-effective technique we know in Nepal until present date.


Foundations of the new houses in Supin.

Awasuka Blocks

The government also requested load-bearing tests for the used concrete blocks, which Awasuka manufactured following NRA requirements that local manufacturers do not follow. The "Awasuka blocks" showed excellent results in Pathlaiya Material Test Laboratory.



Manufacture of "Awasuka blocks" and load-bearing tests by comparing local blocks to Awaskua blocs.

4. Houses' Retrofitting

The retrofitting of five houses started in November 2018 after the monsoon break and the season holidays, and ended in February 2019. In this stage, the construction process was significantly improved, as all the team learned and drew conclusions from the previous process (houses' construction). Additionally, thanks to Rotary Club Hetauda, the materials' purchase process was also enhanced. In this case, Awasuka was also providing a credit for materials and families had to provide manpower.

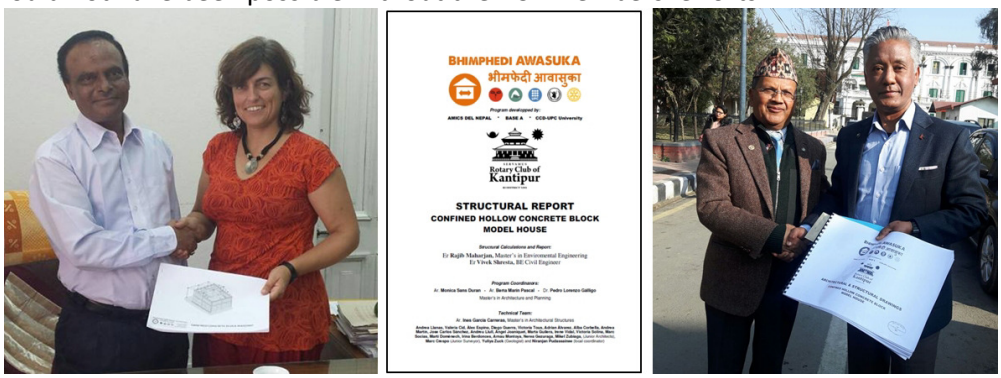
House-Retrofitting has turned out to be a very cost-effective technique (less than 1,5lakh per house, including new roof CGI sheets, excluding manpower) and it has also enjoyed a very good cultural acceptance among the villagers, compared to new houses.

The retrofitted houses almost finished, with reinforced corners and added wooden diagonals.

Parallel Processes

During the prototype and house construction processes, several other actions delayed the course of our program, especially during 2017:

- **Permission for Wood Purchase in Government Sawmills.** Started in December 2016, obtained in April 2017. Thanks to this, the stone and mud prototype was finished with considerable savings. Contribution of Rotary Clubs of Kantipur and Hetauda was crucial.
- **Government Approval for "Confined Block" House (4 Rooms)**. Began in early July 2017, approval obtained end of January 2018. Many meetings were held between Awasuka coordinators, NRA (Nepali Reconstruction Authority) and members from Rotary Club Kantipur. This would not have been possible without the RCK members' efforts.



From left to right there are seven months apart: the time the approval took to be finished.

- **Credit-Implementation Agreement for House Construction**. The drafting of this agreement, to be signed by Rotary and Agragaami, was not an easy endeavour. Thanks to the help of Rotary Club's legal adviser, it was designed in a transparent, agile and effective manner.
- **Government Approval for the "Confined Block" House (2 Rooms).** Spring 2018. Even though the confined block system had already been approved, a second approval for the two-room house was required. Again, the help of Rotary Club of Kantipur was paramount in this process.

SAFE KITCHENS AND SAFE WATER

In rural areas of Nepal many people still cook with firewood, resulting in constant smoke inhalation and upper respiratory diseases which cause about 24,000 deaths every year. On the other hand, water-borne diseases continue to be number one death-cause in Nepal, killing 13.000 children per year and many more adults. Comparatively, the earthquake caused 9,000 deaths. Therefore, Awasuka has complemented the "safe house" concept with the construction of 333 chimney-hoods in Bhimphedi Municipality's remote rural areas, where the use of firewood is still much extended. Practical Action Nepal has collaborated in this project

by subsidizing 40% of the cost, while Awasuka subsidized another 40% and supported a social mobilizer. He conducted awareness meetings in many rural communities and schools about the importance of chimney-hoods and water treatment. After the sessions, chlorine bottles were distributed to open-minded families who were committed to change.

Awasuka social mobilizer explaining the benefits of chimney hoods and water treatment.

AWARENESS ON SAFE HOUSES

One of the most important purposes of Awasuka has been to convey its knowledge to as many people as possible, beyond the context of Bhimphedi. In this sense, the approval of the "confined block" construction system is a great achievement, as it is now available nationwide. But awareness needs to be continued and, sometimes, this means inventing new communication strategies outside the traditional channels. That's why Awasuka also launched the **Social Awareness Video** and Song "Block, Wood or Stone", to disseminate important information about safe houses in an entertaining way. It was directed by Nirmal Lama from *Bhimphedi Guys*, a very popular dancer and video producer from Bhimphedi who is also involved in social work. Through their YouTube channel -very successful around the country- Awasuka reached a much higher audience, and thus, a better dissemination of the awareness message.

Regarding awareness and knowledge transfer, Awasuka **website** is being finalized these days, including all the materials to be shared with the public: prototypes' drawings, approved confined block houses drawings, construction manuals on confined block and retrofitting, historical buildings' information, videos and awareness materials, etc... Additionally, a **final report** is about to be published, which will include all the program's highlights.

"Block, Wood or Stone" video, as it appears in YouTube.

COLLABORATION WITH BHIMPHEDI GAUPALIKA

During the course of the program, some parallel collaborations were established with Bhimphedi Gaupalika (Municipality), which resulted in the delivery of these documents:

- **Awasuka "Confined Block" House Drawings**, handed to Bhimphedi engineers' office, to make this cost-effective system available to more families.
- **Photomap of Bhimphedi**, the first of its kind in the village, with some information requested by the former VDC.
- **Waste Management Report**, a comprehensive analysis on waste management in Bhimphedi, highlighting an easy and effortless proposal for waste collection from Hetauda.

- **Photograph Dossier of Bhimphedi Historical Buildings** as well as a copy of the information about these buildings from issued from the Department of Archaeology. Gaupalika also requested some help on the improvement of Hattisar Museum (Elephant Saddles), for which the contact of a French museologist was provided.

During the program development Awasuka has witnessed the demolition of several historical buildings -all in good condition- that were good examples of earthquake-resistant techniques. From Awasuka we advocate for the preservation of historical memory and these unique buildings, as they represent the identity and cultural richness of the village. At the moment, historical information about Bhimphedi is not documented anywhere, so we urge all the entities related to historical preservation to take some action.

Waste management report, Bhimphedi photomap and photographic dossier of historical buildings.

ACKNOWLEDGEMENTS

Awasuka has been carried out by a team of people working from Barcelona and from Nepal. Barcelona's main tasks have been fund-raising, agreement drafting, expense justifications, architect's training and coordination, coordination meetings… and Nepal's main works were: coordination with local partners, research activities (local materials, construction techniques, geology, construction rules, etc…), agreements with local partners, program diffusion within the population and local authorities, creation of Awasuka's spaces in Bhimphedi (office, warehouse, workshop), local engineer hiring (later replaced by local coordinators) and the construction-work development, in coordination with Barcelona team.

Amics del Nepal, base-A and CCD-UPC, as developing entities, want to thank the collaboration of all the technical volunteers of the program (more than 50 persons), all the entities that have funded this program and also all the members of Rotary Club of Kantipur.

PERSONAL THANKS

I want to thank Amics del Nepal for having granted the opportunity to lead this program from 2015 to 2019, and also to Base-A for their support during this time, as well as for offering the possibility to continue this program beyond 2019.

I am happy to have contributed in improving the living conditions of more than 350 families in the rural areas of Nepal, and I hope this will only be the beginning.

Nepal embraces you with its tectonic energy
A magic place where the impossible is possible and human warmth is truthful
After so many trips, Monica ji,
You can never stop going back to that temple.

BHIMPHEDI AWASUKA
भीमफेदी आवासुका

DEVELOPERS

Amics del Nepal. General Coordination, local infrastructure and accounting

Base A. Technical Coordination and Cooperative Volunteers

CCD-UPC. Expert Advisor in Habitat Improvement Programs and in Cooperatives
Program grants in the form of coverage of travel expenses for cooperators

Agragaami Krishak Krishi Sahakaari. Counterpart. Agriculture Cooperative: local organization and social dissemination

Rotary Club Kantipur and Hetauda. Local Partners Government procedures, legal advice, local coordination

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