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## Training Report



## Training of Trainers (ToT) for KESNIK Trainers on Disaster Resilient Construction Technologies

29–31 October 2019, KESNIK Corporate Office Campus,  
Thiruvananthapuram, Kerala

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## 1. BACKGROUND

According to the Post Disaster Needs Assessment (PDNA) of the Kerala floods 2018, the housing sector suffered an overall loss of Rs. 5,443 Crores. Although rebuilding the damaged houses poses a huge challenge, it also gives the opportunity to build back better. This requires reaching out to multiple stakeholders and orienting them on the need to adopt disaster resilient construction practices.

The PDNA also calls for creating 'green jobs' based on the principles of environmental sustainability and cost effectiveness. It also mentions that skill development would be a critical component, both in the recovery period and beyond. It is in this context that UNDP proposes to provide an intensive training for class XII pass youngsters to mould them into barefoot engineers. Youngsters, from remote areas, when trained as barefoot engineers can assist and supervise construction activities which would eventually lead to better buildings in such areas. These trainings are also envisaged to familiarize them in multi-hazard resilient construction techniques. The Kerala State Nirmithi Kendra (KESNIK), the implementing agency for conducting the 70-day barefoot engineers course, requires their trainers (who are engineers and masons) to be trained in multi-hazard resilient construction practices. A ToT is, hence, needed to equip the selected KESNIK trainers.

It is against this backdrop that UNDP India is conducting trainings for Hazard resistant shelter construction for Engineers, Masons and Volunteers. This particular training, facilitated by RedR India is for Kerala State Nirmithi Kendra (KESNIK) engineers and affiliated masons.

## 2. OBJECTIVE

The 3-day ToT programme had the following objectives:

- Help familiarize engineers and masons on multi-hazard resilient construction techniques.
- Share good construction practices of Kerala and have common understanding on hazard resilient features.
- Train engineers and masons as Trainers such that they are able to practice and propagate safe construction practices in their work and in future training courses that they facilitate.

## 3. ABOUT THE TRAINING

This 3-day training was designed as a ToT, combining technical elements of construction practices and adult learning principles, which helps participants to uncover and develop their skills for imparting training courses. The sessions were designed in a manner to have better understanding of DRR concepts, technical features of hazard resistant construction by engaging participants through brainstorming, group work and hands-on practical session, apart from class room learning.

## **4. PARTICIPANTS' PROFILE**

The training was attended by a total of 10 participants (1 female and 9 males), which included 5 Civil Engineers from KESNIK, 3 Head Masons and 1 Draftsman. The list of participants has been attached at the end of the document.

## **5. TRAINING METHODOLOGY**

In line with the Adult Learning Principles, the facilitators adopted a variety of training methods suiting the diverse learning styles of participants. An appropriate learning environment was created using available facilities and resources at the training venue. The facilitators adopted short group discussions, group activities, videos, and presentations, besides PowerPoint presentations.

As part of training methodology, the module was designed in such a way so as to have the first session of every day from Day 2 onwards on recapitulation of the key learnings of the previous day. The purpose of recap sessions was to enable the participants to summarize the important messages and learning points of the previous day.

The sessions were delivered in English, Tamil and Malayalam, as suited to participants, while the training material was developed and delivered in English.

## 6. TRAINING SCHEDULE

Session Number	Timings	Name of the Session
<b>DAY ONE</b>		
1.1	0930-1015	Welcome and Introductions
1.2	1015-1130	Hazards and their Impact on Buildings (with examples from Kerala)
	1130-1150	Tea Break
1.3	1150-1300	Need for Incorporating Disaster Resilient Features
	1300-1400	Lunch Break
	1400-1415	Energizer
1.4	1415-1530	Quality of Material and Importance of Tools
	1530-1550	Tea Break
1.5	1550-1640	Assessing the Vulnerability of the Site
	1640-1700	Daily Feedback
<b>DAY TWO</b>		
	0930-1000	Recap of Previous Day
2.1	1000-1100	Techniques of Slope Stabilization (Structural and Non-structural, Traditional)
	1100-1130	Tea Break
2.2	1130-1300	Principles of Hazard Resilient Construction
	1300-1400	Lunch Break
	1400-1415	Energizer
2.3	1415-1530	Hazard Resilient Design Guidelines (Features for House Size and Configuration etc.)
	1530-1550	Tea Break
2.4	1550-1640	Group Exercise
	1640-1700	Daily Feedback
<b>DAY THREE</b>		
	0930-1000	Recap of Previous Day
3.1	1000-1130	Hazard Resilient Features for Different Parts of the Building (Structural and Non-structural)
	1130-1145	Tea Break
3.2	1145-1300	Adult Learning Principles
	1300-1400	Lunch Break
	1400-1415	Energizer
3.3	1415-1500	Training Facilitation Skills
	1500-1530	Tea Break
3.4	1530-1630	Training Design and Methodology
	1630-1700	Feedback and Course Closure



## 7. DAY WISE PROCEEDINGS

### Day 1

#### Welcome Introductions, Expectations, and Course Overview

Day 1 started with the welcome of participants by the RedR facilitator. For introduction of participants, paired introduction was adopted. The participants introduced their partners and shared facts and interests about their partners. Participants were then asked to write down their expectations from the training on flash cards, which were then displayed on the wall. The expectations shared by participants were mainly to learn the appropriate construction details for hazard resistant shelters in Kerala.



The facilitator then asked participants to set ground rules, like keeping mobiles on silent mode, ensuring punctuality, respecting others views etc. so that the training can be conducted in a smooth manner. A four-member Training Management Team (TMT) was formed, who would help facilitators to conduct training smoothly, by following ground rules, managing regrouping and arrangements during and



after the breaks, taking feedback from participants and facilitating recap of previous day. The TMT would change every day and would be responsible for the above mentioned tasks for a day.

#### Hazards and their Impact on Buildings

The main objective of the session was to build a common understanding on various hazards and their impacts on building components. However, as it was important to have common

understanding on various Disaster Risk Reduction (DRR) terminologies among participants, the session was initiated with a discussion on Hazards and Disasters.

In this session, participants were asked if they knew the differences between the terms, Hazard and Disaster. Building on the different perceptions held by participants on these terms, the facilitator emphasized on the need to have a common understanding of these terms in context to the training course. The facilitator then explained the definitions of these terms and participants illustrated examples of various hazards. Participants were also engaged in a game that demonstrated various aspects of planning and coordination in preparing for various hazards.



The terms like Risk, Vulnerability and Capacity, were also discussed with participants to enable them to get a clear understanding. The interrelation between these terms was explained by empirical formula of **Risk= Hazard x Vulnerability/ Capacity**.

Participants were then asked to list various hazards relevant in their work area and mark red spots on the list of hazards which are most frequent and damaging. This way hazards were ranked for their effect on building/ shelter in the region.

### **Need for Incorporating Disaster Resilient Features**

In this session, participants were shown a series of photographs of damage induced by floods and landslides in Kerala. Participants were to identify the damages. The facilitator then discussed the forces acting on buildings in various hazards like earthquake, flood, cyclone, landslide etc., and how it affects the behaviour of a structure. The need for incorporating hazard resilient features to save lives and reduce damage to assets was emphasised upon.

### **Quality of Material and Importance of Tools**

This session aimed at enabling participants to learn the quality of material to be maintained during construction, and the field tests to check quality at site, to ensure that the materials being used are as per the required standards. The message that was communicated to participants was that, while it is not possible to have or to carry tools and equipment that are used to test the various qualities of materials at laboratories in the field, it is still possible to ensure the quality by various field tests without any tools and equipment. The facilitator showed videos and explained the various field tests for cement, sand, coarse aggregate, bricks, steel, timber, etc. The facilitator also discussed the various tools required and their importance in construction with the participants. The key learning point that these tools help in executing



the work as per the standards, in time and by maintaining good workmanship, was emphasized upon.

### **Assessing the Vulnerability of the Site**

In this session, participants were made to understand the meaning of vulnerability to disasters and the do's and don'ts while selecting sites for constructing houses. A broad aspect of vulnerability in general was shared with the participants, the four main categories being physical, economic, social and environmental. Hazard maps related to the state of Kerala were shown to participants. In the context of housing, the facilitator discussed the various parameters that should be considered before selecting the site to ensure that the houses being constructed will be safe from hazards, as far as possible. Parameters Site selection while constructing houses on slopes and in hilly regions were also discussed by showing various slides. The key learning point that the facilitator emphasized upon was that in all new constructions the choice of material and technology will need to be based on the prevailing multi-hazard conditions in the construction areas, so that whatever is constructed should remain safe not only during floods but also in the event of other natural hazards if and when they strike the area.

### **Daily Feedback by TMT**

The day ended with the collection of daily feedback by the TMT. The feedback given has been listed below:

#### ***What went well?***

1. Informative sessions.
2. Session on disaster terminology very informative. Helped improve existing knowledge, and gained enough information to be able to pass on to others.
3. Session on 'construction tools and quality of material' very good.

#### ***What did not go so well? / Suggestions for Improvements***

1. Language barrier for masons. Translation not effective enough at times; time consuming.
2. Henceforth, it would be better to have different batches of trainings for masons and engineers.

### **Day 2**

The day began with a quick recap of key learnings of Day 1 done by participants, facilitated by the TMT.

### **Techniques of Slope Stabilization**

The main aim of this session was to explain how slope stabilization helps prevent landslides and reduce the effects of landslides in case of disasters. The participants were





taught about the meaning of the term, the purpose of stabilization, and the four types of slope failures. After the facilitator explained that landslides are the main effects of slope failures, participants were motivated to share and discuss various causes for such effects which include deforestation, risky slope, increased loading, slow weathering of rocks, soil erosion due to floods, construction of building on top of slopes, etc. Following this, the traditional and modern ways for stabilization of slopes were discussed, and a video on a modern technology for slope stabilization was also shown to the participants.

### Principles of Hazard Resilient Construction

This session began with participants working in groups to enlist various types of potential damages to building elements in various hazards. Once the damages were listed, the facilitator introduced participants to a simple method of categorising the mitigation measures or hazard resilient features in terms of ABCDE- i.e. Anchorage, Bracing, Continuity, Ductility and Enhancement. It was explained to them that this



categorisation is only for easy recalling while the participants go on to deliver trainings to others. This was followed by a discussion on the details for each term.

- a) **Anchorage:** Participants were introduced to the concept and functioning of an anchor and how this helps building components in times of severe forces acting on them during hazards. Plastic straw models were used to demonstrate effectiveness of a good anchor in foundation. Need of anchorage for roof was also discussed.



- b) **Bracing:** The facilitator explained the function of bracing. Need for bracing in a building as hazard

resilient feature was discussed. Participants were given plastic straws to make a frame with bracings. The various details of good bracing were discussed and demonstrated using the frames made by participants and showing photographs.

- c) **Continuity:** Importance of connection and continuity of building frame was discussed with participants at length. Vulnerability of connection in times of hazard forces were also discussed and some of the common damages of corners and connections were shown to participants. The ways to strengthen and secure connections were discussed.
- d) **Ductility:** Facilitator explained the differences between elasticity and ductility, and importance of this property of a material was discussed. The emphasis was laid upon how ductility of frame can save lives during hazards.

After discussing ABCD as principles of hazard resilient practices, the participants were asked to refer to the list of damages they had prepared earlier on in the session. They were asked to identify damages that may be avoided or mitigated using this ABCD formula. Participants acknowledged that most of the structural damages could be addressed by applying these principles. Only the damages induced by external factors such as site protection needed other measures. The facilitator summed up the session by explaining that these factors can be taken care of in the fifth principle of Enhancement, which would be covered in the following session.

### Hazard Resilient Design Guidelines (Building Orientation)

This session dealt with the orientation of building, shape, size, recommendations on span lengths, height of walls, location and dimensions of verandah, openings etc., which affects the behaviour of structure in times of hazards. The site specific protection measures such as drainage, retention walls, access to site, and adding disabled-friendly features were discussed using photographs and sketches.



### Practical Session

For the hands-on session, participants were divided into two groups. One group was asked to work on shelter layout and brick masonry and second group was asked to work on reinforcement details for the RCC band. The activity was disrupted by heavy rains on the site, and hence it was decided to complete the task next day. The participants were asked to share difficulties and challenges regarding the details of the activities. The standards and good practices regarding brick work, mortar mix, reinforcement details, connections etc., were discussed on the site.



Upon the request of participants, common retrofitting details were discussed in the class room. This helped them understand the retrofitting techniques for various hazards.

### **Daily Feedback by TMT**

Day 2 was concluded by a feedback session facilitated by TMT. The feedback has been listed below:

#### ***What went well?***

1. Sessions on Slope Stabilization and Principles of Hazard Resilient Construction informative.
2. Good sessions overall, easy to understand.

#### ***What did not go so well? / Suggestions***

1. It would be good to include a few case studies/examples during theory sessions.
2. Hands-on session good-would be nice to have a longer session.



*Glimpses from the Hands-on Session*



### Day 3

The third and final day started with a quick recap of key learnings of Day 2, facilitated by the TMT.

### Hazard Resilient Design Guidelines (Structural and Non-structural Measures)

Having taught various lessons about hazard and disasters, the aim of this session was to help participants understand the resilient features to be incorporated in various parts of



the house. After sharing about two types of structures namely framed structures and load bearing walls, it was discussed about foundation, basement, superstructure, roof and other finishing works. The participants were asked about the general precautions to be taken with regard to depth of foundation and height of basement for flood-prone areas. The importance of keeping electrical boxes and switches above flood level was also stressed upon. The participants learnt about the importance of vertical reinforcements to be provided at corners and junctions of walls, providing bands at plinth, lintel and roof levels, and these were explained in detail during hands-on session.

### Adult Learning Principles and Learning Styles

The TOT part of the training started with the session on Adult Learning Principles and Learning

Styles. The facilitator asked each participant to come up with a single word on what they understand or perceive by 'Learning'.

The response of participants was then divided into five categories:

Knowledge, Skill and Attitude, thus emphasizing that learning is a combination of all of these attributes and all of them are equally important. Then, the



characteristics and key principles of adult learning were discussed along with the discussion on how adults learn in a different manner than children.



Participants were asked to make paper boats and paper planes in five minutes. The facilitator observed different learning techniques of participants and shared his observations with them. Participants were explained the four major learning styles adopted by adults, i.e., Reflector, Theorist, Pragmatist and Activist. It was also explained that all adults have a combination of these styles of learning, but one style is always more dominant.

Thereafter, the adult learning process of Receiving, Processing and Using was explained. The facilitator explained various methods to make the learning environment more conducive. This included, selection of venue, seating arrangements, use of props and tools, engagement techniques and flexibility in the schedule and methods to be adopted. Dale's Cone of Learning was also explained to participants, which demonstrated the link with design of training sessions and importance of having a combination of methods to help participants.

### **Facilitation Skills**

In this brief session, participants were asked to work in three groups and list the characteristics of a good trainer and facilitator. A number of points discussed were then divided into categories of Knowledge, Skills and Attitude. The facilitator emphasised the importance of being a listener to become a good trainer/facilitator. The discussions dwelled upon the importance of having communication skills, respect for participants and the importance of being open to criticism, for becoming a good trainer.

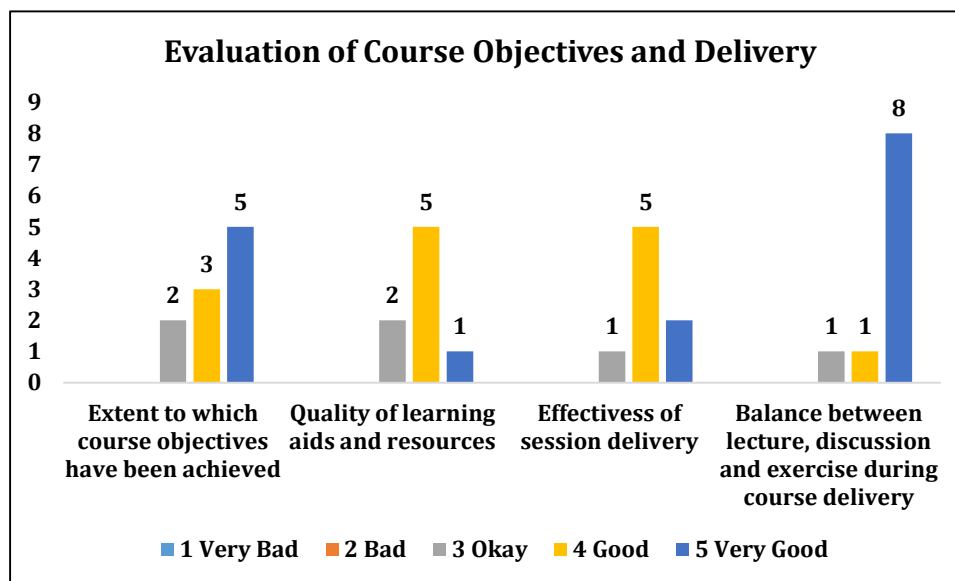
### **Training Cycle and Training Design**

Starting with a discussion on components of planning a training event, the session, essentially covered the pre-during-post activities of a training. The facilitator explained and discussed in detail the training management cycle. Participants were asked to work in groups and list the activities during all three stages of training. This was followed by a discussion, while the groups presented their list of tasks. The emphasis was also given on importance of feedback, evaluation and learning documentation from the training, which should not be neglected after training sessions are done with.

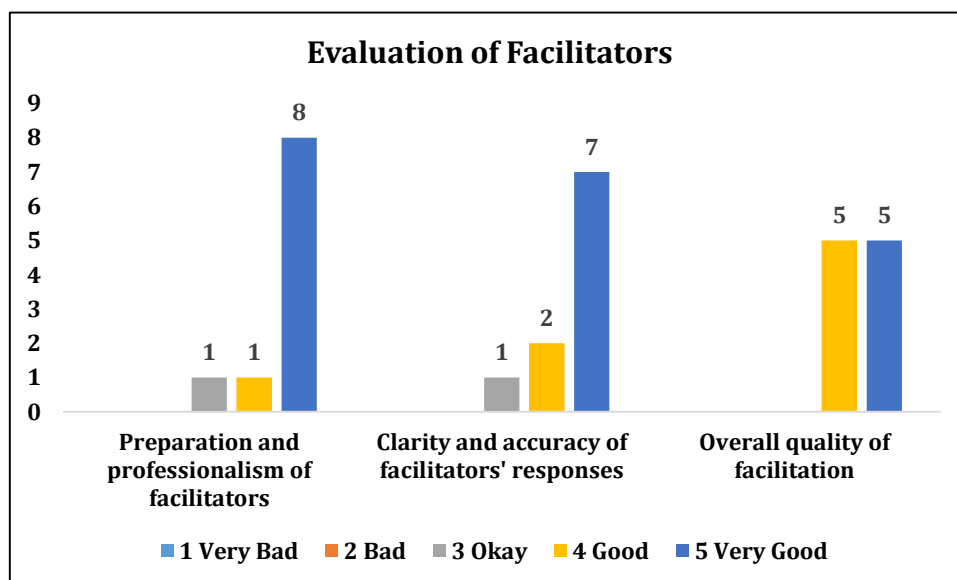
The training programme was concluded with participants filling out the RedR India standard training and trainer evaluation forms, certificate distribution and vote of thanks by UNDP, KESNIK and the RedR India facilitators.



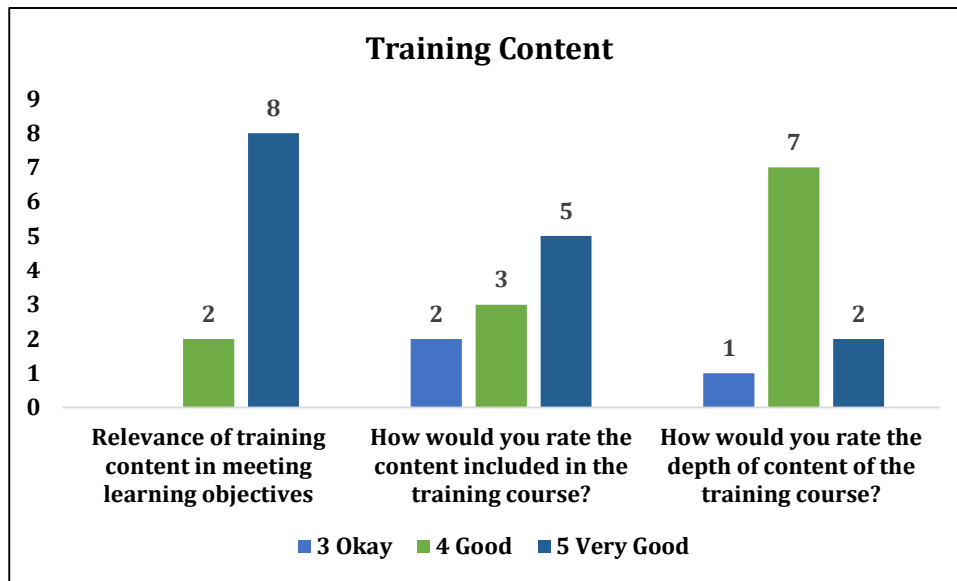
## 8. TRAINING EVALUATION



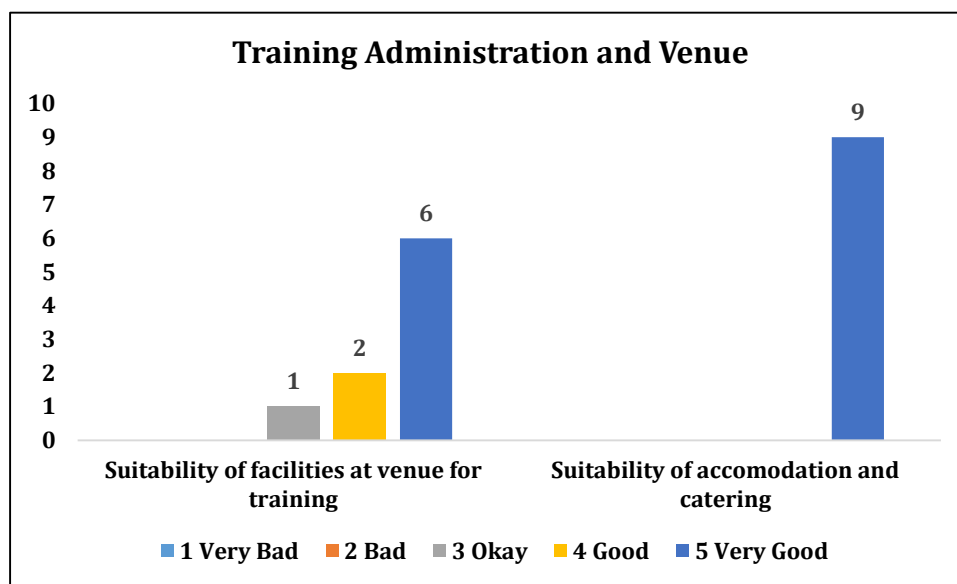
Regarding the extent to which course objectives were achieved, 5 participants (50%) rated very good, 3 participants (30%) gave a good rating and 2 participants (20%) rated okay. Overall, participants appreciated the balance between lecture, discussion and exercise during course delivery with 8 participants (80%) rating it very good, and 1 (10%) each rating it good and okay.



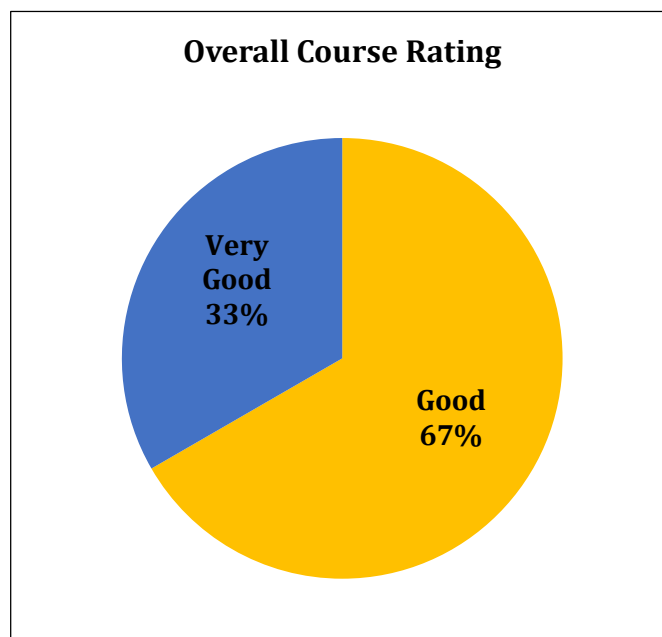
As the above graph indicates, the preparation and professionalism of facilitators was rated very good by 8 participants (80%), and good and okay by 1 participant (10% and 10%) each. The overall quality of facilitation was rated good and very good by 5 participants (50% and 50%) each.



The relevance of training content in meeting learning objectives was rated very good by 8 participants (80%) and good by 2 participants (20%). The content included in the course was rated very good by 5 participants (50%), good by 3 participants (30%) and okay by 2 participants (20%).



The suitability of facilities at the venue for training was rated very good by 6 participants (60%), good by 2 participants (20%) and okay by 1 participant (10%). The suitability of accommodation and catering was rated very good by 9 participants (90%).



33% participants gave the training programme an overall rating of very good, and 67% participants gave it a good rating.

#### **Qualitative Feedback from the Participants**

1. Gained enough information to deliver training courses in the future.
2. Enjoyed both theory and practical sessions.
3. Could have used more case studies and examples during the sessions to understand principles of disaster resilient house construction.
4. Communication language to be common to avoid wastage of time.
5. Good use of workshops and energizers.
6. The sessions, training delivery, games, behaviour of trainers, food at the venue, all very good.
7. Duration of the training could be longer.
8. Facilitators were very helpful and approachable.
9. It would be good to make use of more photos, videos, pictures, models, etc.



## 9. RECOMMENDATIONS

1. **Participant Mix:** There were senior engineers and masons together in the training. This type of combination was not conducive for achieving desired objectives, as the level of understanding, skills and practice varied highly. It is recommended to have separate training sessions for engineers and masons so that it can be designed accordingly and delivered effectively.
2. **Training Needs Assessment:** The expectations of the participants were a little different from the overall objectives of the session planned. This may also be due to it being a mixed group of participants. A few participants needed more input on RCC detailed design, while the training covered more of general measures of hazard resilient features.
3. **Language and Translation**
  - a. Many participants were not very comfortable with English though the level of understanding varied. Translation in Malayalam helped much but still at times it became difficult to convey the message effectively. Suggestions to have sessions in Tamil (by a facilitator) further helped.
  - b. Training material development should ideally be done in Malayalam, depending on the participants' profile and adequate resources may need allocation for translation and development of content.
4. **Extension of Learning:** The training provided a good learning space and experience to the participants and the scope for this learning can be extended vastly through follow-up learning capsules and sessions either through the programme team of UNDP or external resources.

## 10. LIST OF PARTICIPANTS

Sl. No.	Name	Qualification	Contact Number
1.	George S	Head Mason	9847454053
2.	Sundaran B	Head Mason	8589814117
3.	Sudhakaran B	Head Mason	
4.	Shinjesh Palakkapady	Head Mason	7012937247
5.	Santosh Kumar	Draftsman	9633666742
6.	Niju AS	Engineer	9567579160
7.	Kumaraswamy Pillai	Engineer	9495597855
8.	Ajith KR	Engineer	9847164709
9.	Girish M	Engineer	9447480273
10.	Reshma Rajan	Engineer	7012454049



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**Address**

RedR India  
Laxmi Krupa", Survey No. 77/2,  
Behind Ved Bhavan,  
Near Chitrapur Math,  
Chandani Chowk, Kothrud,  
Pune - 411 038, Maharashtra, India.  
Tele: + 91 20 25280454, +91 7028198901

For more information about RedR India, mail us at [info@redrindia.org](mailto:info@redrindia.org)