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## **Awareness Workshop as an Effective Tool and Approach for Education in Disaster Risk Reduction: A Case Study from Tamil Nadu, India**

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**Abstract:** The core of empowering a community to become more resilient is rooted in disaster risk reduction and its education imparted using various educational tools, mainly through awareness and training programs. Conveying the available knowledge resources to the community by transforming it in a way that matches the local context in order to build a “culture of safety” is the hardest matter to be dealt with. It becomes the responsibility of the disaster management experts, concerned authorities, and researchers to focus more on disaster education by making the resources available to vulnerable communities. Taking this into account, this paper discusses an educational tool prepared for conducting awareness workshops. The paper particularly focuses on the educational tool application in the study area to illustrate its use in “real world” circumstances and to test its efficiency and limitations. It was found that such workshops can bring about a positive change in the level of understanding about disasters and the significance of disaster risk reduction measures. At the same time, it emphasizes that awareness generation is not a short-term affair. The sustainability of educational projects and programs is essential in inculcating disaster risk reduction as a part of people’s life and culture.

**Keywords:** disaster education; educational tools; community; sustainability

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## 1. Introduction

Impacts of natural disasters differ by nations, regions, communities and individuals because of differences in their exposure and vulnerability [1]. Meanwhile, whether a disaster is major or minor, or of national or local proportions, the people in the community suffer most of its adverse effects [2]. Disaster management initiatives, policies, and frameworks are designed and implemented as well as other community based activities are carried out by governments, along with other effective stakeholders like non-government organizations (NGOs) and civil society organizations; all aimed at empowering communities in one way or another [3]. For materializing the success of disaster management paradigms, any of these initiatives requires disaster risk reduction in its most genuine sense. Disaster risk reduction is described as the conceptual framework of elements considered with the possibilities to minimize vulnerabilities and disaster risks throughout a society, to avoid (prevention) or to limit (mitigation and preparedness) the adverse impacts of hazards, within the broad context of sustainable development [4]. In addition, always starting from people is essential if community disaster risk reduction is to flourish [5].

To ensure the sustainable empowerment of communities, educating and making people aware of risks and vulnerabilities they face and how they can better prevent these adversities through risk preparedness are ways which can even support the efforts to build a resilient community. The United Nations International Strategy for Disaster Reduction (UNISDR) places considerable emphasis on building the resilience of communities as a necessary component of disaster risk reduction (DRR) [6]. It is always better to implement DRR activities and community resilience-enhancing activities through, or along with local bodies (making the community the “core group”) and whoever is working at the grass-root levels, (which may vary by place and region and within different regions of the same country); they are more likely to know the geographical, economic, and social background in detail [7–9]. Moreover, there is a growing recognition that to be successful, such DRR efforts should encompass the knowledge and perspectives of local communities and citizens [10]. Thus, the main objective of the paper is to discuss about the educational tool prepared and its application in field by conducting the awareness workshop to illustrate its use in “real world” circumstances as well as its efficiency and limitations.

## 2. Education in Disaster Risk Reduction

Education should always be treated as a sustained learning experience for everyone throughout life [11]. Education can be both direct and indirect. Direct education being taught by institutions such as schools, colleges, universities or other similar organizations with an established structure (syllabus), but indirect education is that learned through one’s own daily activities, extra-curricular activities, traditional knowledge, and other experiences in life. Any form of education has the potential to bring about changes in the level of one’s awareness, attitudes, and critical thinking, as well as in problem-solving capacities.

It has been widely acknowledged that education takes on a pivotal role in reducing disasters and achieving human security in the attempt to achieve sustainable development [12]. Broadly based on the lessons learned from experiences, it can be said that: (i) education is a process for effective disaster

reduction; (ii) knowledge, perception, comprehension, and actions are the four important steps; (iii) schools and formal education play an important role in knowledge development; (iv) family-, community-, and self-education are important for comprehension of knowledge and implementation of risk reduction actions; and (v) holistic education includes actions at local level as well as its policy integration [13].

During the 1990s, which was designated as the International Decade of Natural Disaster Reduction (IDNDR) by United Nations, significant public education efforts emerged in many nations, and “hazard education” took root in science classes in schools [14]. Moreover, the theme of “Disaster Reduction, Education and Youth” was introduced during the UN World Disaster Reduction Campaign in 2000 [15]. After that, late in the 2006–2007 “Disaster Risk Reduction Begins at School” campaign, the UNISDR not only attempted to highlight the importance of integrating DRR into formal education, but also emphasized the importance of community participation in order to achieve sustainability within the community [16].

Besides the education provided to youth through their formal education in educational institutions, it is widely advocated that education of the community is essential to ensure sustainable DRR. Towards this, in Hyogo Framework for Action (2005–2015) in its priority of action 3, focuses on the “use [of] knowledge, innovation and education to build a culture of safety and resilience at all levels”, thus emphasizing the strength of education and knowledge in DRR [17]. In addition, it is also important to realize that the goal of developing “disaster-resilient communities” is widely understood to depend heavily on the success of DRR education [18].

DRR education can be seen to be rendered in various ways. Schools have an important role in knowledge development for building community resilience and it is also important to continuously provide disaster education in school [19,20]. The role of family and community participation is also very crucial for the enhancement and the sustainability of disaster education [21]. When it comes to DRR at the community level, it is usually addressed by forming community-based disaster organizations and training individuals in disaster management courses [5].

Living in an era of technological breakthroughs, the availability of information is plentiful but only proper sharing of information and its proper utilization can help in replicating the benefits. The efficiency of disaster education lies in sharing information, cooperation, and collaboration among various institutions, agencies, and other bodies (government, non-government, *etc.*) working towards achievement of the same goal—“DRR”. Thus, educators with a handful of information on both risk and its reduction measures are not always sufficient to ensure success in the initiatives taken. Awareness programs and formation of sustainable disaster risk management communities under the supervision of concerned authorities can be an effective way to deal with DRR and its educational needs.

Being the first respondents at any kind of disaster, it is the active participation and involvement as well as the awareness of community members that is of prime importance for the success of any initiatives. However, it is difficult to engage the public with regard to programs like emergency preparedness, as rural residents perceive the information as redundant [10] even though all the available knowledge resources will be fruitful only when the information reaches the society/community and brings positive changes to them by creating safer communities that are more empowered and resilient, which have self-help capacities to respond appropriately to the disasters yet to come. Thus, it is always recommended that planning and designing educational programs should

focus on the risk and vulnerabilities of a particular community, the feasible risk reduction activities that can be implemented, and how these measures can improve the community's social, economic, physical (resilience) status if they are adopted. This can be a way of invoking interest among community members to learn more about the possibilities and opportunities offered by DRR activities, and make them participate and practice the risk reduction approaches. Educational programs and tools like workshops and brochures can be made appealing to the target audience by including images and maps (Google maps, hazard maps showing vulnerabilities).

In order to be truly responsive to the needs of local populations, including marginalized groups, programs must involve some kind of decentralization, which is to be understood as devolution, *i.e.*, a transfer of decision-making authority from central to local governments, or a transfer of authority within central administrative structures (e.g., from the headquarters of a ministry to its district offices) [22,23]. Fund mobilization for conducting such awareness programs can be a hurdle, especially if the awareness program is conducted on a small scale in selected communities. There will be budgetary constraints for the local and district governments in making such programs happen. To this end, they have to make efforts to bring in essential policy reforms; decentralization can also be a good solution that brings about considerable impacts. It has also been advocated that populations directly affected by environmental hazards should decide on and develop policies to deal with them [24].

Along with various means of implementation, there are various disaster education materials described as “educational tools”. As one form of disaster education, awareness-raising programs and awareness workshops are widely conducted or provided by NGOs [25]. Along with the use of action-oriented, participatory techniques, due importance should be placed on the indigenous knowledge of the respective communities. However, the point to be noted is that the success level of education depends on the efficiency of the mode of execution, how the community conceives it, and their level of interest so the selection of the mode of execution is particularly important. The mode of execution and what is to be conveyed or taught should be chosen appropriately according to the target group, their needs, and existing constraints. Disaster education has to aim at shaping out empowered and resilient communities against disasters by making them realize their own potential as well as enabling them to find solutions to the problems they are facing. Partnerships or collaborations among government bodies (especially local government) and NGOs in such situations can ensure better educational initiatives which can further bring synergistic effects to the expected outcome among communities.

### **3. Educational Tools of Disaster Risk Reduction**

Following adoption of the Hyogo Framework for Action, various disaster educational materials, described as “tools” of various forms were developed; these included printed materials (booklets, leaflets, textbooks, handbooks/guidebooks, and posters) and non-printed materials (activities, games, and practices) [16]. So far, numerous institutions have developed DRR educational tools ranging from national governments, research institutions, and the UN to national as well as international NGOs. These tools are expected to be used from the international to the local level for the welfare of communities around the world [25,26].

Since the turn of the millennium, especially as a result of communication and information-sharing opportunities facilitated by the internet, DRR champions have produced a plethora of educational

materials for school children and the general public alike [27,28]. UNISDR in collaboration with other partners has developed games like Stop Disasters, Riskland and Educational Toolkit and Magnitude. The question that arises is: “Are we utilizing these educational tools in the expected way?”. The responsibility that now remains is the proper management, sharing, and use of these tools in its most appropriate way to make these tools reflect in actions at implementation of disaster reduction activities.

While converting these tools into actions, it should be assured that knowledge and information is flowing in both directions *i.e.*, from practitioners or concerned authorities to the community as well as from the community to concerned authorities regarding their indigenous knowledge, local wisdom, needs, constraints, *etc.* This can help in modifying and improving the tools further. At this point, it has to be noted that, it was only very recently that the value and necessity of exchanging scientific and technical knowledge with indigenous knowledge could be articulated [14]. Sharing of information and educational tools among communities, especially those facing similar problems (hazards) in different corners of the world, can help in multiplying the benefits and achieving the aims of each tool to a greater extent.

It is also important that the type of DRR tool fits the locality and is focused on the underlying risk; matching the local context, as hazards, vulnerabilities, risks, and capacity level will vary from region to region. So while implementing the tool, it should be altered to adapt it to the particular context. When altering an educational tool, the target audience, their cultural background, the vulnerabilities they face, and the major resources available should be the essential factors in deciding the modifications needed.

#### **4. Disaster Reduction Hyperbase-Asia Application and the Educational Tool Developed**

Disaster Reduction Hyperbase-Asia application (DRH-Asia or simply DRH) is a web-based knowledge base of disaster reduction technology information. The development of DRH-Asia was initiated by the launching of the DRH Project based on the proposal of the Japanese Government at the UN World Conference on Disaster Reduction (WCDR), 2005 [29]. DRH-Asia addressed international promotion of the “disaster reduction portfolio,” which was an effective information platforms of disaster risk reduction [29]. The proposal was intended to contribute to implementing the Hyogo Frame of Action for 2005–2015 adopted at the WCDR.

Thus the product DRH-Asia was designed as a vehicle to compile and disseminate useful disaster reduction technology and knowledge and to facilitate its implementation. DRH-Asia is being operated at <http://drh.edm.bosai.go.jp> since 2008 [29]. Disaster Management Technology Database (DRH Exercise) is one of the interdisciplinary seminars under the Global Center for Excellence—adaptation, resilience, for a sustainable/society program (GCOE-ARS) offered by Kyoto University. Students enrolled after getting acquainted with the DRH-Asia contents have to develop their own DRR educational tool. This section explains the educational tool developed for conducting an awareness workshop using DRH-Asia contents.

The title of the educational tool prepared was “Awareness Workshop: A Step towards Enhancing Community Disaster Resilience”. The main objective was to develop an educational tool for the coastal community to enhance their knowledge about disasters they usually face the significance of the disaster reduction approach, and how it can be undertaken. As the main purpose of the tool is to

generate awareness among the selected target group, the tool is designed not as a self-learning type of tool but as a training material that can be used by any NGO or any awareness-raising organizations for conducting awareness workshops. Even though the tool was prepared for the coastal community, it provides complete flexibility to the users to bring in modifications by changing the target group to any other community and to change the hazards as required.

Lecture/presentations, field trip and group discussion are the main methods to which the educational tool suggests adhere to in enhancing knowledge and awareness. Lectures can be used to generate awareness about hazards, especially those which are prevalent in that specific area. It is also important to include lessons on disaster reduction methods and their significance in the lectures. Lectures should be conducted in such a way that they invoke knowledge, interest, and desire among community members to learn about disaster, its management, and DRR approaches and processes. Instead of simply lecturing, presentations can be used as the media for conducting the lecture, which can help in attracting more attention, describing things more deeply, making the audience understand more clearly, and helping them retain more in their memory for a longer time than a lecture would.

Being an action-oriented approach, conducting field trips can help in identifying and assessing the vulnerabilities of the selected area. Group discussions can help in bringing out new ideas from the participants. As the saying goes, “A photo is worth a thousand words”, displaying original photos or newspaper clippings, downloaded images from the Internet of past disasters, its recovery and reconstruction phases of different places within the country, or best examples from other countries can help in generating curiosity to know more and improve the effectiveness of the workshop. After the workshop, it is advisable to provide pamphlets to the participants with the main points that have been covered (especially the awareness generation section), which can help in remembering the things learned after the workshop. These can always be an information capsule in a simplified form.

#### *Awareness Workshop Structure and Guidelines for Conducting the Workshop*

The proposed workshop of the educational tool has been designed to cover three days, which can be changed depending on the situations where the workshop is to be conducted and the existing constraints.

As shown in Box 1, the major activities of the workshop will be done over three continuous days. On the first day, the lecture (presentation) by the facilitator from the organizing group and the discussion based on the presentation are the activities to complete. In an introductory session, participants and the organizing group members can introduce themselves, which will help in rapport building. Subsequently, any of the organizing members can explain briefly about the workshop activities. Before the presentation, questionnaires prepared to check the awareness level of the participants have to be distributed and answers should be collected. Sample questions which can be included in the questionnaire for pre- and post-evaluation assessments are listed in Box 2.

#### **Box 1.** Major activities of the workshop.

Day 1	Lecture(presentation), group discussion based on lecture
Day 2	Field visit, group discussion, presentation
Day 3	Formation of disaster management group and group discussion

**Box 2.** Sample questions for the questionnaire.

- (1) List the natural disasters that affect your village.
- (2) Mention whether they affect annually or not? If not annually, when did that disaster last occur? (Mention the year.)
- (3) If it occurs in almost every year, in which month(s) does it occur?
- (4) Which spots in your village do you think are the most dangerous?
- (5) List other dangerous spots in your village.
- (6) Name some safe places in your village that can be used for evacuation or evacuation shelters.
- (7) Name the latest severe cyclone (any other major hazard common in that particular area) that has affected your area.
- (8) List three safety measures for each disaster you listed.

After conducting the pre-evaluation test to generate knowledge and correct understanding about disasters, risk reduction methods, and related issues the presentation can be delivered. It can be broadly divided into two parts. The first part will be for basic awareness generation about hazards. Topics that have to be covered include, for example: (i) What are disasters? How and why do they occur? (ii) Common disasters in that particular place and their timings; At which time of year does those disasters (e.g., floods) usually strike the area? (iii) Safety tips for each disaster common to that particular place.

Topics that have to be covered in the second part include: (i) familiarizing participants with existing mechanisms in other parts of the world e.g., conference mechanisms (DRH51), cyclone early warning dissemination at the community level in Bangladesh (DRH19). This will help participants to understand that around the world people are facing adversity because of disasters and how they are coping with such difficulties. This discussion will give new ideas and/or help people to develop their own management methods or adopt methods followed by people elsewhere. This can generate the attitude or will power among participants that they can also cope with disasters; (ii) The significance of DRR—this can make communities aware of how the DRR approach can make a huge difference to the impacts they have to face after the usual disasters; (iii) What should be done to ensure DRR? This can help the community to increase their coping capacities.

As preparation for the second day's activities after the presentation and general discussion, groups can be formed for the field trip. Field trips can help explore the disaster-related risk and vulnerability issues in the target area, and reinforce what participants have learned through lectures. To ensure everyone is participating efficiently, it is best to divide the total number of participants into small groups (e.g., five participants and one supporting person, NGO member, or any person from the organizing community in each group). When forming groups, try to distribute participants evenly from all categories (e.g., male, female, student, and elder) into each group. Make preparations based on the already prepared checklist (e.g., base map, markers, camera, pen, pencil, sticky notes, *etc.*).

The second day will focus mainly on the fieldtrip. To prepare, divide the whole target area (e.g., part of the village) into four sub-areas. Each group will have a predetermined time allowed (e.g., 45 min) for visiting and examining situations in each area (division of the target area and time duration for the visit can be altered according to the number of participants and the size of the target area). Activities to be done in the field include: (i) identifying the vulnerabilities/dangerous spots (for

example, Figure 1a); (ii) identifying safe spots; (iii) understanding local issues such as sanitation and waste management issues *etc.* (see Figure 1b).



**Figure 1.** (a) River mouth (b) Improper waste disposal.

Based on the field visit, discussion should be undertaken within each group about what they have seen, what can be done to reduce disaster risks in the target area, about evacuation routes to the safe places they have identified.

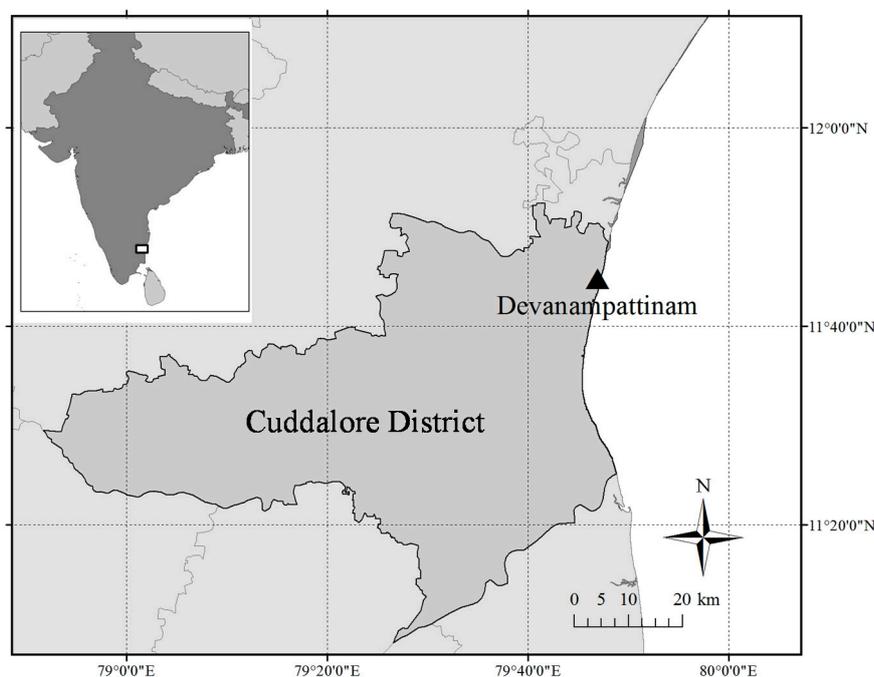
After the discussion within each group, each group should present what they have discussed and their conclusions and remarks. After that, the main facilitator can make the concluding remarks based on the presentations of all the groups, and a general discussion for further clarification and interpretation can be conducted. Formation of the disaster management group and group discussion will be the main activities on the third day. A workshop for two or three days will not be able to assure community resilience in its full sense. For building a disaster-resilient community, further actions are required from both the community and the experts in the field. The formation of permanent disaster management groups in the community can lend help in this regard.

As a part of the group formation, the selection of members has to be done. After the group formation, the next step is holding a group discussion on how to make the group work together, and for ensuring a well coordinated functioning. The role allocation for the selected members can be an added advantage for the group to function smoothly. To check the changes in their awareness level, a post-evaluation exercise has to be done using the same questionnaire; and answers have to be collected from the participants again. Finally pre-prepared pamphlets with the main points from the presentation can be distributed.

## 5. Awareness Workshop in Devanampattinam: A Case Study

With reference to the educational tool prepared for DRH, a one-day awareness workshop on “Disaster Risk and its Management” was conducted in Devanampattinam of Tamil Nadu, India on February 22, 2015. Even though the workshop proposed in the educational tool was designed for a three-day workshop, due to constraints in conducting a workshop of that length in that village, the tool was modified and a one day awareness workshop was conducted. Devanampattinam (Figure 2) is a coastal village of Cuddalore District that was severely affected in the 2004 Indian Ocean tsunami and in the 2011 Thane cyclone; it also faces cyclonic depressions almost every year. In the 2004 tsunami,

42 women and 21 men died [30] in Devanampattinam village itself. Unsurprisingly, houses were significantly damaged in this coastal fishing village built barely 50 m from the shoreline at sea level [31]. While due to Thane cyclone, 41 lives were lost in Cuddalore District [32]. The tsunami colony built for the 2004 tsunami victims also faces flooding every monsoon season owing to reconstruction failures.



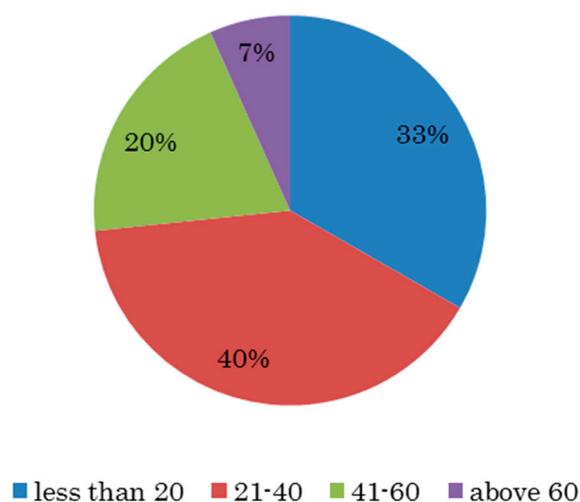
**Figure 2.** Location map of Devanampattinam.

The target participants were community members who consisted of men and women, students ranging from high school to university levels, representatives of NGOs, and village representatives. The main objective behind the workshop was to enhance their knowledge about disasters they usually face, DRR measures, their significance, and how these measures can be implemented. Media selected for the workshop included a presentation, as presentations are one of the best ways to describe things more deeply through giving more emphasis to pictures, images and illustrations; this allows the audience to understand things clearly and for information to remain in their memory for a longer time than an oral talk [33]. In addition, groups of participants were required to prepare a hazard map (Figure 3b) of their village; each group identified the safest and most vulnerable areas on the map they prepared. A total of 42 community members and four representatives of NGOs participated in the workshop. To check the general awareness level relating to disasters, an evaluation was done with a predesigned questionnaire at the beginning of the workshop (Figure 3a). In this evaluation, students who were studying below high school level and NGO representatives were exempted. Thus, a total of 30 community members took the evaluation test. The youngest participant was 12 years old and the eldest was of 62 years. The majority of the participants (40%) were between 21 and 40 years old (Figure 4).

To check the change in the awareness level of participants as well as to check the effectiveness of the workshop, a post-evaluation test was carried out with the same questionnaire and same participants at the end of the workshop.



**Figure 3.** (a) Distributing questionnaires for the pre-evaluation test (b) Preparing map.

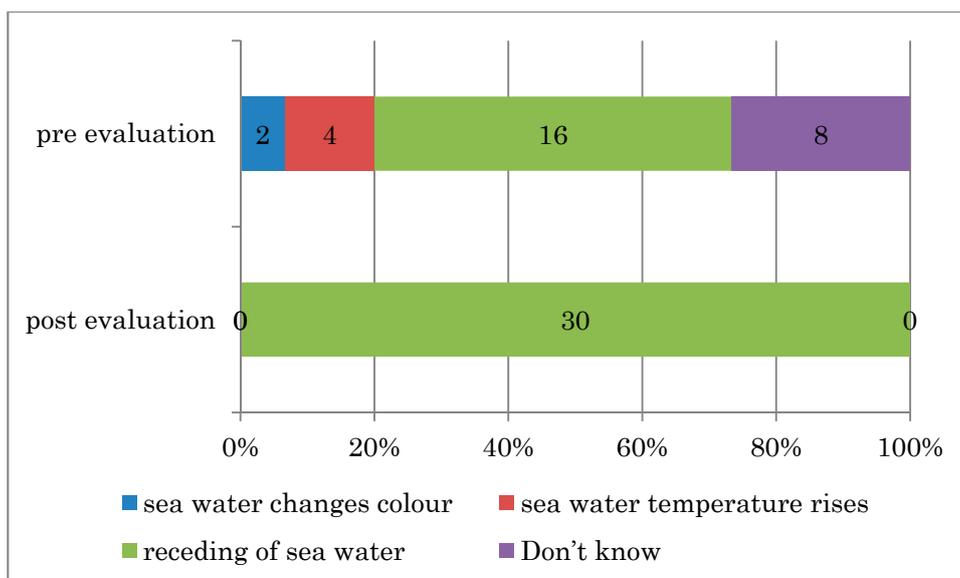


**Figure 4.** Age distribution of participants.

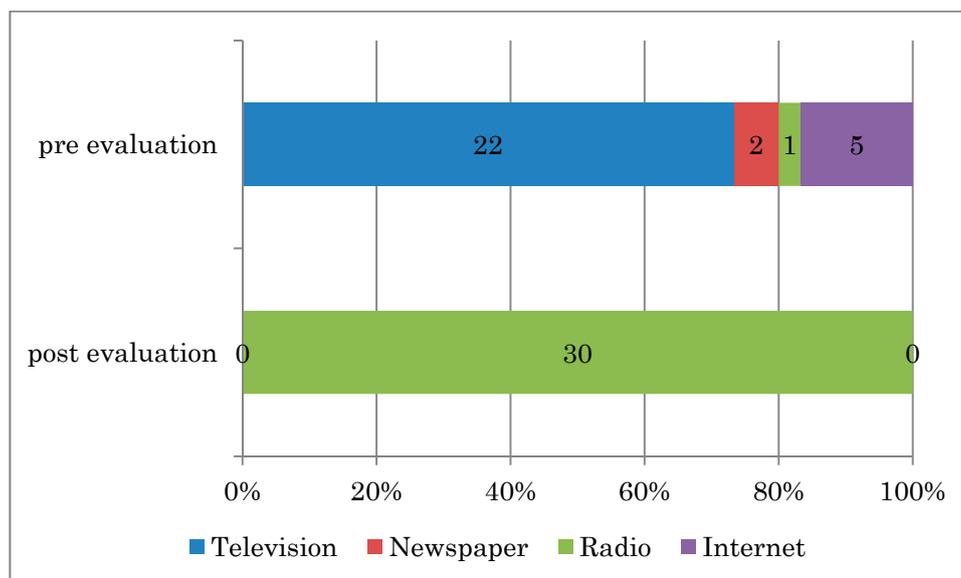
## 6. Results

In the pre-evaluation test, 53% answered correctly that receding of sea water is a natural warning sign of a tsunami while 13% and 7% answered that rise in seawater temperature, and changes in seawater colour, respectively, as the natural warning signs of a tsunami (Figure 5). The rest (27%) answered that they didn't know. However, after the workshop, 100% of the participated answered correctly that the receding of the sea water exposing the sea floor was a natural warning sign (Figure 5).

As for the most effective media to receive information and updates, participants expressed quite different opinions (Figure 6). The majority, about 73% of participants, answered that it is television that they consider the most effective media compared to the Internet, newspaper, and radio. About 17% answered that the Internet was the most effective while newspapers and radio were cited by 7% and 3%, respectively. In the post-evaluation test, 100% of the participants unanimously chose radio as the most effective media for getting disaster information and updates compared to television, newspaper and the Internet (Figure 6).



**Figure 5.** Responses in pre- and post-evaluations about natural warning signs of a tsunami.



**Figure 6.** Responses in pre- and post-evaluation tests about the most effective media to get disaster information and updates.

Though living in an area affected by flood, all of the participants stated that they had not heard about flood insurance before (Figure 7). After the workshop, there was a change in the response level (from 0 to 90%) among those who responded that they had heard about flood insurance (Figure 7).

As the workshop was organized for a coastal community, their opinion about which was the better alternative livelihood option, marine or non-marine resources, was asked. The primary response during the pre-evaluation test was that 70% had an opinion that marine resources were a better choice for an alternative livelihood. Another 13% chose non-marine resources as better while 17% responded that they did not know which was better (Figure 8). However, in the post-evaluation test, 97% agreed that non-marine resources were better than non-marine resources (Figure 8) as they can lessen the pressure on existing marine resources, and income can be earned even in the off season (the “rough season” is

almost five to six months annually, when people usually do not go to sea for work). Meanwhile, 3% still answered that they didn't know which was better between marine and non-marine resources.

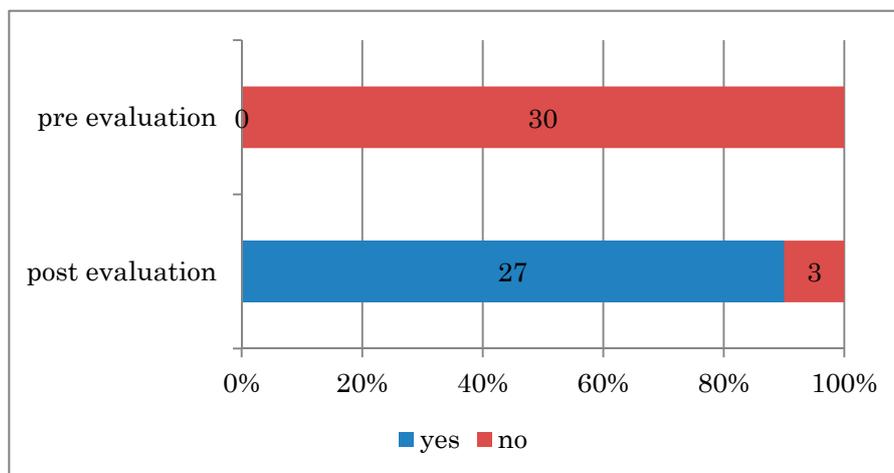


Figure 7. Responses in pre- and post-evaluation tests about awareness of flood insurance schemes.

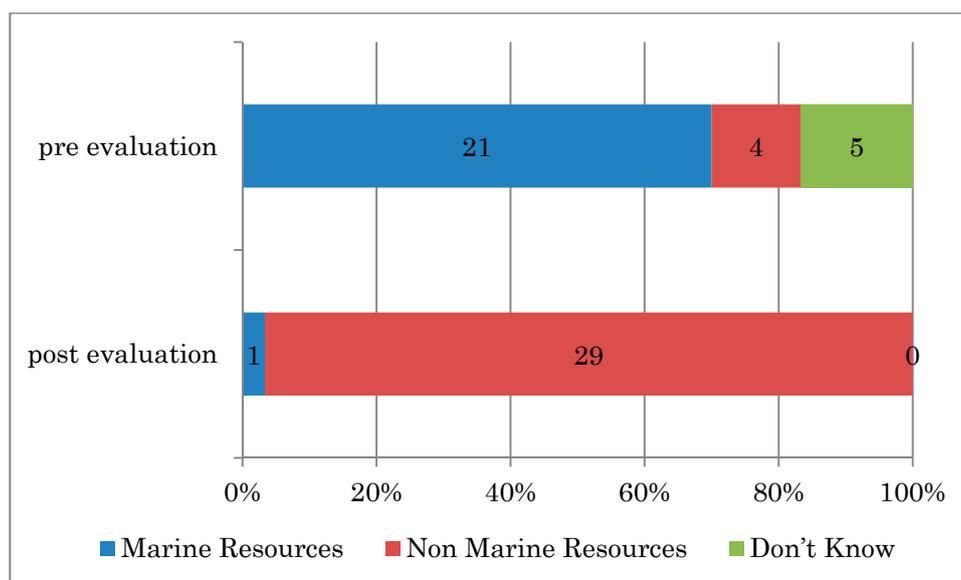
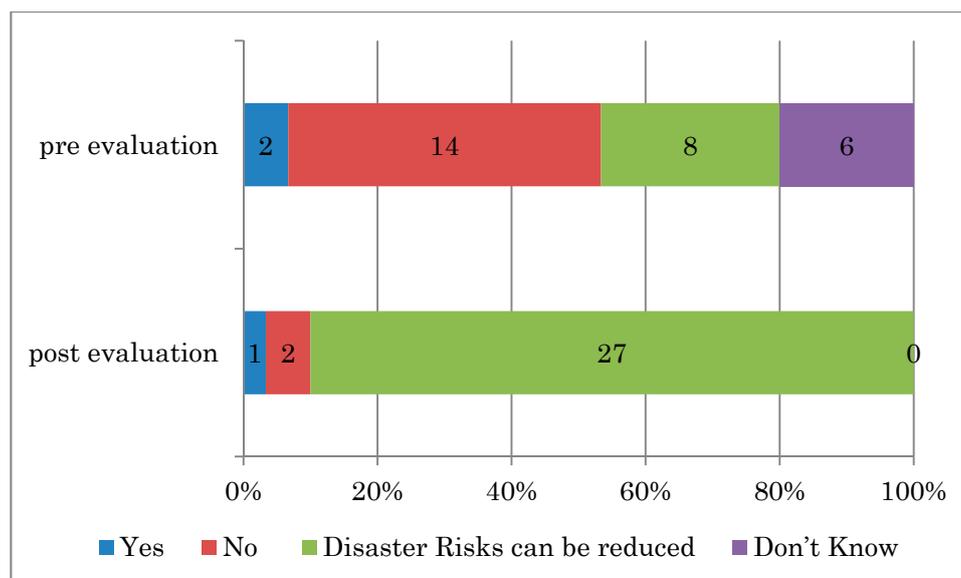


Figure 8. Responses in pre- and post-evaluation tests about better resources for alternative livelihoods.

To check the perception of participants about disaster occurrences, they were asked to select the most appropriate statement among the following options: yes, we can stop disasters; no, we cannot stop disasters; and, disaster risks can be reduced. In the pre-evaluation test, 46% participants answered that disasters cannot be stopped, which is quite understandable, but more significantly, the appropriate statement, given the options, is that disaster risk can be reduced, and only 27% of participants selected this as their answer. Of the other options, 7% answered that disasters can be stopped and 20% didn't know. Drastic variation was found in the post-evaluation answers, in which 90% believed disaster risk could be reduced, and 7% believed disasters could not be stopped. The rest, 3%, expressed the belief that we can stop disasters (Figure 9).



**Figure 9.** Responses of pre- and post-evaluation tests about the most appropriate answer to the statement: “we can stop disasters”.

## 7. Discussion

Considerable difference was found in the answers between the pre- and post-evaluation test. As explained earlier, pre-evaluation test was taken before the workshop and in the workshop, topics regarding the prevalent disaster risk issues in the village, possible disaster preparedness, mitigation and risk reduction methods were discussed. The participants were also made to discuss those topics and their perceptions. So, this could be the reason for the considerable variation, shown in their answers of post-evaluation test taken after the workshop.

A community should be aware of all the possible disasters that may affect their community and more importantly, the early warning signs of each of them. Even though not a frequent disaster; as a disaster that has badly affected the community, the awareness of warning signs of a tsunami was checked through the evaluation test. Unsurprisingly, the majority (53%), gave the right answer in the pre-evaluation test itself. Regarding the case of effectiveness of media; during the workshop, the merits and demerits of each type of media for getting disaster updates and information were explained and discussed. The effectiveness of media can vary with the local conditions. As per the Cuddalore District Government Report on the Thane cyclone (2011) [32], the entire district suffered a lack of power, and it took one entire month to restore the power supply. In such cases, depending on television or the internet is ineffective. In such situations, battery-powered radios are most effective. The participant’s change in perception regarding this can be seen as evident in their response (Figure 6).

Awareness of possible mitigation measures is always necessary in a disaster prone community. Insurance is one such non-structural mitigation measure that can help the victims recover back to their normal lives. Various insurance policies are available these days each serving specific purposes. India being a country where over 40 million hectares of area are prone to floods, it is not a surprising fact that flood insurance is available [34], though not so popular in rural areas. This is mainly because of their weak economic condition which makes it difficult for them to buy insurance. In such cases, micro-insurance facility can be a big boon in solving the issue. For micro-insurance options to serve

the community in their hard times, especially in situations like disasters, government, insurance companies and NGOs have to work hand in hand in establishing special schemes availing the needs of communities and popularizing the schemes among communities. Under such circumstances, proper awareness has to be given to vulnerable communities about the available insurance provisions and their significance. This should be considered part of the authorities' responsibilities as it can bring about positive effects to the societies concerned. Lack of such awareness in the community was able to be seen clearly in Figure 7. While coming to alternative livelihoods, they can act as the backbone of a society in hard times, especially if the society is depending mainly on one or two resources for their income, and especially if they are not dependent on the formal sector (such as government jobs) for income. Dependence of a community on the resources available for their livelihood and alternative livelihood purposes can be detrimental in the wellbeing of the community as such. The knowledge they gained regarding the selection of resources for their alternative livelihood, reflected in the results as well (Figure 8). To confirm statistical significance of the results, a McNemar-test, which is a simple and robust statistical test for paired nominal data and which would be appropriate to verify the results was applied in each of the results of Figures 5–9, and all results were found statistically significant with  $p < 0.001$ .

Preparation of hazard maps by the participants in different groups and the presentation by each group proposing the evacuation route to the safest places they had identified provided an opportunity for them to discuss each group's perceptions and to come to conclusions about the most dangerous and safest areas in their village, and the route they have to consider as an evacuation route during disasters (Figure 10). Discussions like this can help in building the community's capacity to express their views as well as help increase their problem-solving capacities. There is already a growing recognition that to be successful, DRR efforts should encompass the knowledge and perspectives of local communities and citizens [35]. Platforms such as this allow an opportunity to directly hear from the community about their perception and concerns, which can further help the organization to guide them along the right path.



**Figure 10.** Presenting the prepared map with the proposed evacuation route.

Usually, in awareness workshops, criteria for selection of participants will be mainly based on age, gender, students, occupation (e.g., teachers, fishermen, social workers), *etc.* However, for the current workshop, first of all, there were no such criteria, members of that particular community of different age groups, gender and occupations were selected. It was done like this as authors believe that for

generating a better exchange of thoughts, followed by sound discussion, as well as generation of new ideas, requires participants of all age groups, gender and various occupational backgrounds. Secondly, not all awareness workshops did the evaluation test, especially before and after the workshop, but, for this also, considerable importance was given in the present workshop conducted. Authors consider both of these positive indicators of the current workshop developed, which makes it different from other usual workshops.

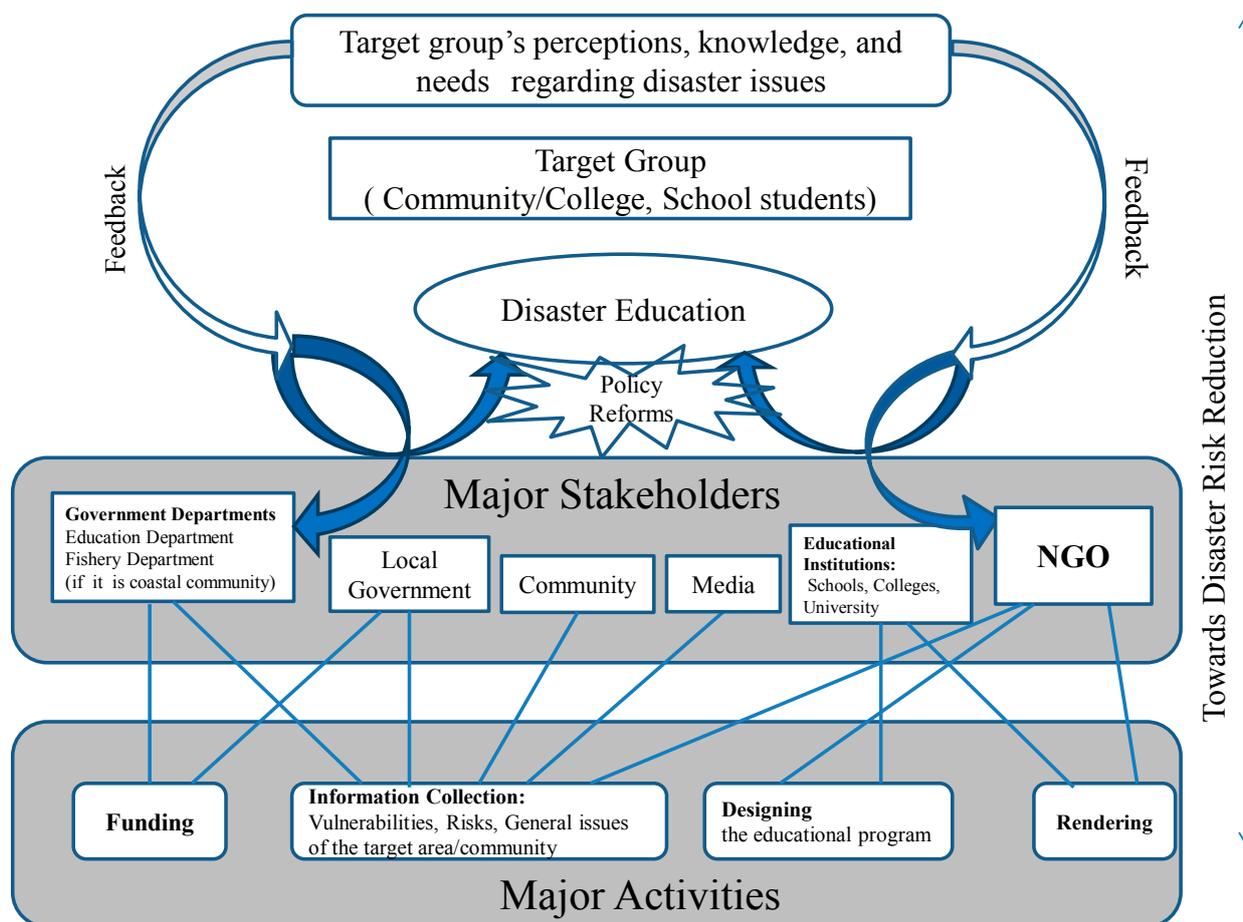
When it comes to the limitations found in the workshop, it was (apart from students) the non-participation of men that was identified. The main reasons behind this may be the requirement on men to be the main income earners in the family as well as the low economic status they give more importance to work rather than such awareness programs. Communities that are still striving to attain their basic necessities have less likelihood of showing interest in, and placing importance upon protecting themselves against disasters through risk preparedness well in advance of such occurrences. Lacking even the basic necessities for life, the implementation of risk preparedness programs in these communities will be ineffective in a way, and can bring some element of dissatisfaction into the community [36]. Another reason for lack of participation could be the low level of risk perception among men. This fact can be clearly explained as if the public does not perceive the presented risks as real, no action will be taken and the information will be ignored [37].

Another possible concern regarding the participants of the workshop would be; even though Devanampattinam is a big village with a population of more than 9000 [38], the number of participants who attended the evaluation test were only 30 in number. The main reason behind this is that it is always advisable to have a control over the number of participants and to keep it around 10 to 30 [39,40] especially in an awareness-raising kind of workshop, as, if the number of participants increases further beyond this, it will be difficult to ensure active participation of each participant [39]. At the same time, for confirming the awareness of that (an) entire village, it will be better to consecutively conduct such workshops with certain time intervals as well as with different set of participants, because awareness raising is not a short term affair.

For the formation of educational institution-based disaster management clubs, an absence of funding authorities was identified as an obstacle. Such groups, if formed, can be useful in the pre-disaster phase for preparedness and risk reduction activities as well as in the post-disaster phase for rescue, rehabilitation, and recovery activities that can help assure the sustainability of DRR educational initiatives. Ensuring the sustainability of disaster education is a task that cannot be compromised, and UNESCO has emphasized the importance of facilitating networking and collaboration among stake holders involved in it [41]. Such disaster management groups can also improve social cohesion that, in turn, can improve the communities' social resilience.

For ensuring expected outcomes from such awareness programs, proper designing and execution of community-specific educational programs has to be undertaken by building collaboration between educational institutions, and the community as well as other important stakeholders (Figure 11). First of all, major activities to be done for community-specific educational tool selection have to be determined. Depending on how this is done, stakeholders who will be capable of justifying the activities have to be identified. Together, the appropriate combination of stakeholders can design the tool by discussing and consulting over the requirements to be satisfied. While designing and executing disaster educational programs, special focus should be given to the social, economic, and physical

vulnerabilities of a particular community, how it contributes to disaster risks, and the risk reduction measures that are feasible. Along with this, as mentioned earlier, the approach taken should never be one-sided. Information and knowledge should flow in both directions from stakeholders to the target group as well as *vice versa*, a point that can further help in modifying the educational tool. More importantly, this measure can help in bringing about necessary policy reforms for a more promising DRR continuum. On the whole, disaster education and DRR are complementary to each other.



**Figure 11.** Disaster education and disaster risk reduction framework.

In spite of the availability of various frameworks and approaches of public education on disaster emergency management and DRR, past efforts taken to educate and inform the public have had mixed results [42–44]. Compared to successful public education initiatives such as the seat belt campaign, it is safe to say that disaster emergency education has not always been as successful [43]. Even though efforts to build resilience can ensure DRR to a greater extent, the concept of building resilience has actually been considered key to reducing the risk of disaster [5].

*Ensuring Sustainability*

From the results of the workshop, we can see that it is hard to change community understanding completely all of a sudden. In itself, this indicates that awareness generation is not a one-day event or short-term affair. It takes time to inculcate correct understanding about disasters, risk reduction

measures and for people to act accordingly. Thus, the sustainability of awareness-generating programs is a significant factor in helping communities overcome such situations by maintaining continuation in disaster education projects and programs (Figure 11).

For ensuring the sustainability of disaster resilience in the community, it is important to work further through all possible measures and consider innovative ideas [45]. At the school level, continuity of the activities can be maintained through formation of disaster management clubs in schools, and collection of materials regarding disaster preparedness, mitigation, vulnerability assessments, types of responses, management strategies from newspapers, the internet or other sources; these can be presented or used to prepare posters, competitions (poem writing, essay writing, slogan writing), and games (like cross words). In the community as a whole, continuity can be maintained through monthly meetings of direct and indirect users who can review activities done, plan preparedness activities, for example, to be taken before the usual flood season, and update information on the number of vulnerable people (e.g., old people, children, disabled) and damage caused.

Even though there are disaster preparedness measures and safety tips to bring all these activities into effect, it requires working with these and making them more familiar to the community through engaging their participation. At the regional level, the disasters, vulnerabilities, and available resources vary. Thus, it is advisable to prepare work/action plans specific to each vulnerable area under the supervision of concerned authorities or stakeholders. On top of everything, there should be an assessment of how far DRR and education about it has contributed in improving community resilience.

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### **Author Contributions**

The first author (Asharose) prepared the educational tool. Later, the first author and Izuru Saizen (the academic supervisor and second author) modified the educational tool and designed the structure of the awareness workshop that was conducted in the field. The first author and third author (Praveen Kumar Chakkalathundiyl Sasi) conducted the workshop and the survey as well as the analysis thereafter. The first author wrote the paper, and it was edited by second author.

### **Conflicts of Interest**

The authors declare no conflict of interest.

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