



CR Disaster MAN: A Training Curriculum Model for Area-Based Flood Disaster Management and Evaluation Outcomes in Chiang Rai Province

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Abstract

This study aimed to design and evaluate the CR Disaster MAN (Chiang Rai Disaster Management and Networking) curriculum to address the lack of area-specific disaster preparedness training in Chiang Rai province. The curriculum integrates disaster management principles, adult learning theory, community-based disaster risk management, psychological group processes, and resilience enhancement. The research employed a one-group pretest–posttest design with 200 samples, including community leaders, volunteers, government and local personnels in flood risk areas in Chiang Rai province. Data were collected using a knowledge test, satisfaction questionnaire, and training program evaluation. All collected data were analyzed using a descriptive statistics and paired sample T-test.

Results showed statistically significant improvement in disaster management knowledge after training ($p < .001$). Satisfaction with content, instruction, and technology support was at “the highest level” ($M = 4.60$, $S.D. = 0.54$). The modular design and participatory approach enable transferability to other flood-risk areas in Thailand. The study highlights the importance of structured, evidence-based training models in strengthening area-based disaster management competency.

Keywords : Disaster management; Adult learning; Community engagement; Systematic resilience; CR Disaster MAN

Introduction

Chiang Rai is one of Thailand’s most flood-prone province, located on a river basin with an annual rainfall is 1,200-2,000 mm. [1]. Flood-risk districts such as Mueang and Mae Sai consistently encounter riverine and flash floods due to hydrological, environmental, and urbanization factors. Prior studies indicate limitations in existing flood management, including gaps in data accuracy, insufficient technical personnel, and weak community-level engagement [2].

Despite integrated flood management planning, challenges persist due to incomplete datasets, governance limitations, and inadequate public participation. Consequently, the development

of area-specific training programs is essential to enhance disaster preparedness and strengthen community resilience [3].

The CR Disaster MAN curriculum was developed to address these gaps. However, evidence-based evaluation of such localized training initiatives remains limited. This study aims to design the CR Disaster MAN area-based flood disaster management curriculum, to evaluate the effectiveness of the curriculum through pre- and post-test knowledge assessment, and to assess participants’ satisfaction with the curriculum. By applying 5 theories to (1) the Disaster Management concept guides the curriculum structure across the modules on preparedness, mitigation, response, and recovery [4], (2) the Psychological

Training Groups support experiential learning and group interaction activities [5], (3) the Adult Learning Theory ensures that learning is problem-centered and relevant to real-world contexts [6], (4) the Community-Based Disaster Risk Management (CBDRM) approach frames community participation, the integration of local wisdom, and collaborative planning [7], and (5) the Resilience Theory strengthens long-term recovery capacity and adaptive skills [8]. Each framework's principles were mapped directly to training modules including surveillance, early warning, evacuation planning, community mapping, and post-flood recovery.

Methodology

Research Design

This article is partial research promoting the CR Disaster MAN disaster management platform, funded by Thailand Science Research and Innovation (TSRI) and Program Management Unit on Area Based Development (PMUA). A pre-experimental one-group pretest–posttest design was used to evaluate knowledge improvement and satisfaction after participating in the CR Disaster MAN curriculum.

Population and Sample

The population consisted of individuals who had roles in flood management in Chiang Rai province, including (1) community leaders and volunteers from flood-prone areas; (2) personnel from local administrative organizations and relevant agencies, and agencies concerned with disaster prevention and mitigation, e.g., the Department of Disaster Prevention and Mitigation, municipalities, Subdistrict Administrative Organizations, and rescue volunteers; and (3) representatives of civil society organizations participating in risk management and disaster recovery. This population plays important roles in flood response and management, as they are field-level practitioners who systematically use data for decision-making and apply practical skills.

The sample consisted of 200 purposively selected individuals from flood-prone areas. Notably, 39% were aged 51 years or older. This group was intentionally included because older adults in northern rural communities commonly serve as community leaders, village heads, and disaster volunteers. Their experience

and local authority are crucial for decision-making and mobilizing community responses during floods.

Research Instruments

Three instruments were utilized in this research.

1. The “CR Disaster MAN” curriculum was developed by the researcher based on documents, textbooks, concepts, and theories related to disaster management, psychological groups, and adult learning. Only concepts and theories that were appropriate and consistent with area-based disaster management were selected to improve area-based flood management. The content validity and consistency were evaluated by three experts in psychology, education, measurement, and disaster management, resulting in the Index of Content Validity (IOC) of 0.80-1.00. Their recommendations were adopted before piloting the curriculum with a non-sample group for 24 hours to test the appropriateness of the steps, duration, and content, and to determine flaws and improvement before implementation. Content structure and training activities included five dimensions: (1) surveillance, (2) response, (3) relief, (4) recovery, and (5) community preparedness plan based on the participatory learning & action and integration of local wisdom and international disaster management concept.

2. Knowledge assessment form for the “CR Disaster MAN” flood management training was validated by three experts in psychology, education and measurement, and disaster management to validate the consistency of questions and terminology, and to assess content validity. The findings indicated an IOC of 0.60-1.00, discrimination index of 0.54-0.97, and reliability, Cronbach's Alpha of 0.97, which indicated high reliability. The assessment form consisted of two parts.

Part 1: General information of informant
This part collects basic information, such as gender, age, education level, marriage status, income, and personal contact, to explain the qualities of the sample. It has no impact on learning achievement measurement.

Part 2: Knowledge assessment form - 20 questions with four multiple-choice
This part covers knowledge about area-based flood management

3. Satisfaction assessment form for “CR Disaster MAN” flood disaster training curriculum. This information is used to measure the participants’ satisfaction with content, teaching methods, and benefits.

Data collection

The researcher conducted the data collection following five steps.

1. Preparation

The researcher coordinated with local administrative organizations, relevant agencies, and local community leaders in flood-prone areas to select samples based on the criteria. Then, the researcher asked for permission from participants and their organizations, and provided clear information about the objectives, scope, and rights of participants.

2. Pre-test

A total of 200 samples completed a knowledge test about disaster management, which has 20 questions with four multiple-choice, to collect their basic geographic information, including gender, age, educational level, income, and direct experience in flood management.

3. Training implementation

The researcher conducted the training following the CR Disaster MAN curriculum, which covered five dimensions: (1) Surveillance, (2) Response, (3) Relief, (4) Recovery, and (5) Community preparedness plan, which implemented participatory learning & action and learning exchange among participants.

4. Post-test

At the end of the training, the sample group completed the post-test, the same test as the pre-test, to compare results. The researcher collected the data on satisfaction with the training using the 5-Likert scale questionnaire (5 = Highest, 4 = High, 3 = Moderate, 2 = Low, 1 = Lowest). The satisfaction evaluated the content, instructor, training logistics, and appropriateness of time and venue.

5. Data validation

The researcher validated the completion of the questionnaire and all sets of tests and processed the data coding to prepare for the statistical analysis.

Data analysis

Data analysis was carried out systematically to ensure accurate results aligned with the research objective. Descriptive statistics and inferential statistics were utilized as follows.

1. Descriptive data analysis

Descriptive data analysis described general qualities of the population and sample group and validated the appropriateness of the data using statistics. Frequency and percentage explained participants’ general information, including gender, age, educational level, marriage status, income, and flood management experience. Mean and standard deviation (SD) summarized the tendency and distribution of the pre- and post-scores for knowledge, competency, and skills of the sample group.

2. Inferential data analysis

Inferential data analysis tested the research hypothesis and compared the training results using statistics. A paired samples t-test was used to compare pre- and post-test knowledge scores in disaster management, to assess whether the CR Disaster MAN curriculum enhanced knowledge and skills with statistical significance. A statistical significance level of .05 ($p < .05$) was used to identify whether the difference was statistically reliable or not.

Results and Discussions

General information of the sample group

General information of 200 samples comprised gender, age, educational level, status, and income. Descriptive data analysis was applied to examine the mean and percentage. Results shown in **Table 1**.

Table 1 Number and percentage of the sample group's information (n=200)

General information of the sample group	Number (prs.)	Percentage
1. Gender		
Male	134	67.00
Female	66	33.00
Total	200	100.00
2. Age		
15-20 years	8	4.00
26-30 years	9	4.50
31-35 years	6	3.00
36-40 years	17	8.50
41-45 years	41	20.50
46-50 years	41	20.50
51 years and above	78	39.00
Total	200	100.00
3. Educational level		
Primary school	42	21.00
Middle school	20	10.00
High school	56	28.00
Bachelor's degree	50	25.00
Master's degree	8	4.00
Vocational Cert./High vocational cert.	24	12.00
Total	200	100.00
4. Status		
Single	60	30.00
Married-Separate	8	4.00
Married-Living together	97	48.50
Divorce	13	6.50
Widowed	22	11.00
Total	200	100.00
5. Monthly income		
Under 5,000 THB	27	13.50
5,001-10,000 THB	70	35.00
10,001-15,000 THB	52	26.00
15,001-20,000 THB	17	8.50
20,001-25,000 THB	10	5.00
25,001 THB and above	24	12.00
Total	200	100.00

Table 1 shows that most samples were males (67.00%), with females accounting for 33.00%. Most of them were aged 51 years and above (39.00%), followed by those aged 41-45 and 46-50 years (20.50%), 36-40 years (8.50%), 26-30 years (4.50%), 15-20 years (4.00%), and 31-35 years (3.00%). The majority of them graduated from high school (28.00%), followed by bachelor's degree, primary school, vocational certificate/high vocational certificate, middle school, and master's degree (25.00, 21.00, 12.00, 10.00, and 4.00%, respectively). Most were married and living together, followed by single, widowed, divorced, and married and separated (48.50, 30.00, 11.00, 6.50, and 4.00%, respectively). Most of them earned 5,001-10,000 THB (35.00%), followed by 10,001-15,000 THB, under 5,000 THB, 25,001 THB and above, 15,001-20,000 THB, and 20,001-25,000 THB, respectively (26.00, 13.50, 12.00, 8.50, and 5.00%, respectively).

Therefore, Samples were predominantly older adults, reflecting community leadership roles in rural flood-prone areas. Lower formal education levels in some groups may influence learning pace, reinforcing the need for visual and activity-based training.

Study of “CR Disaster MAN” curriculum training results – pre- and post-test

To analyze pre- and post-test results of the “CR Disaster MAN” curriculum training, the researcher tested the primary agreement using the normality test with Kolmogorov–Smirnov; p was .06-.11. It illustrated that the mean of pre- and post-test scores in disaster management scores had normal distribution. Then, the researcher analyzed the basic statistics to analyze the t-test for dependent samples, as shown in **Table 2**.

Table 2 Mean and standard deviation (S.D.) of pre- and post-test scores in knowledge about disaster management (n=200)

Knowledge about disaster management	Before the test			After the test		
	M	S.D.	Level	M	S.D.	Level
Knowledge about disaster management	8.72	2.29	Low	14.14	1.67	High

Table 2 shows that the mean of pre-scores in knowledge about disaster management was low ($M = 8.72$ S.D. = 2.29), while the post-test scores was high ($M = 14.14$ S.D. = 1.67).

Therefore, Significant improvement was found ($M = 8.72$ to 14.14 , $p < .001$). This aligns with adult learning and experiential group-based methods.

Table 3 Comparison of pre- and post-test knowledge about disaster management

Knowledge about disaster management	Before the test		After the test		MD	t	p
	M	S.D.	M	S.D.			
Knowledge about disaster management	8.72	2.29	14.14	1.67	5.42	45.99*	.00

Table 3 shows that the mean of post-test scores in knowledge about disaster management increased with a statistical significance of .05. The research created a bar chart to clearly present the statistically increasing mean of post-test scores in knowledge, as shown in **Figure 1**.

Figure 1: Mean Knowledge Score Before and After Training

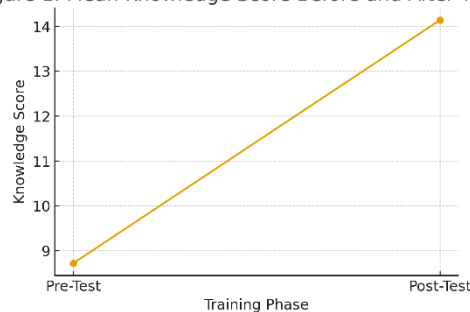


Figure 1 Mean of knowledge about disaster management before and after the training

Study the satisfaction with the “CR Disaster MAN” curriculum training

The researcher studied the satisfaction with the “CR Disaster MAN” curriculum training by analyzing mean and S.D., as shown in **Table 4**.

Table 4 Mean and S.D. of satisfaction with “CR Disaster MAN” curriculum training (n=200)

Satisfaction with training	M	S.D.	Level
Content is appropriate for the activity’s objectives.	4.67	0.65	Highest
The instructor has expertise in activity demonstration and facilitation.	4.69	0.61	Highest
The instructor conveys the content to be understood easily.	4.66	0.65	Highest
The instructor answers questions clearly and usefully.	4.70	0.58	Highest
The venue of activity is appropriate and convenient.	4.66	0.62	Highest
Equipment and technology are available and practical.	4.70	0.58	Highest
Registration and facilities are in order.	4.11	0.47	High
Activity duration is appropriate.	4.69	0.59	Highest
Overall satisfaction with the activity.	4.54	0.73	Highest
Overall satisfaction	4.60	0.54	Highest

Table 4 presents that the mean of overall participants’ satisfaction with the “CR Disaster MAN” training curriculum was 4.60, and the S.D. was 0.54, representing the highest level. When considered by aspects, the highest mean was the instructor answers questions clearly and usefully and equipment and technology are available and practical ($M = 4.70$, $S.D. = 0.58$), followed by the instructor has expertise in activity demonstration and facilitation and activity duration is appropriate ($M = 4.69$, $S.D. = 0.61$ and 0.59), content is appropriate for the activity’s objectives ($M = 4.67$, $S.D. = 0.65$), the instructor conveys the content to be understood easily and the venue of activity is appropriate

and convenient ($M = 4.66$, $S.D. = 0.65$, 0.62), and the overall satisfaction with the activity ($M = 4.54$, $S.D. = 0.73$), respectively. The lowest mean was for registration and facilities are in order ($M = 4.11$, $S.D. = 0.47$).

Although not statistically tested with ANOVA, observed patterns indicated that participants with previous flood experience showed slightly higher baseline knowledge, and overall satisfaction was at the highest level ($M = 4.60$, $SD = 0.54$). Instructor clarity and equipment availability scored highest.

Subgroup Analysis

Although the study did not employ formal statistical tests such as ANOVA due to the pre-experimental design, an observational subgroup analysis was conducted to explore patterns among demographic groups. The results suggested several noteworthy trends:

1. Age Groups

Participants aged 51 years and above demonstrated slightly higher pre-test scores compared to younger groups. This pattern is consistent with their longer experience in local flood response roles, such as village leaders and community volunteers. However, the magnitude of improvement from pre-test to post-test was similar across all age groups, indicating that the curriculum was effective regardless of age-related learning differences.

2. Education Levels

Participants with higher education (bachelor’s degree and above) showed marginally higher pre-test knowledge. Nevertheless, participants with lower education levels exhibited greater relative improvement after the training, suggesting that the experiential and activity-based learning approach effectively supported participants of diverse educational backgrounds.

3. Prior Flood Experience

Individuals with previous direct experience in flood response tended to score higher on the pre-test. After the training, the gap between experienced and inexperienced participants decreased substantially, indicating that the curriculum helped build foundational knowledge for those without past disaster management exposure.

4. Gender

No meaningful difference was observed between male and female participants in either

baseline knowledge or improvement trends. Overall, these subgroup observations support the conclusion that the CR Disaster MAN curriculum is suitable and effective across demographic groups, particularly in diverse rural contexts with mixed ages and education levels.

Discussions

The results on the “CR Disaster MAN” training curriculum illustrated that participants’ knowledge and skills in disaster management increased with a statistical significance after the training, from 8.72 to 14.14. Firstly, the increasing knowledge scores reflects the appropriateness of the curriculum design that aligns with the adult learning theory by [6]; adults learn effectively when the content is related to their direct experience, and it can be a solution in their real life. Therefore, an integration of experiential learning and problem-based learning within the curriculum is crucial for accumulating and developing participants’ spatial competencies and skills. Secondly, the CR Disaster MAN curriculum is comprehensively designed to include five aspects of the disaster management process: surveillance, response, mitigation, recovery, and community planning. This is consistent with the disaster management concept that emphasizes all-phase integration: preparedness, mitigation, response, and recovery [4]. The design enhances a participants’ holistic understanding, so they see the overall picture of disaster management clearly. Thirdly, the research findings exhibit the community engagement and resilience enhancement as the curriculum supports people and local leaders to engage in a risk assessment, planning, and actions, which is in line with the community-based disaster risk management (CBDRM) by [7]. In addition, it is consistent with the resilience theory by [8] that highlights strengthening adaptive and restorative capacity of the community during disasters. Consequently, the integration of local leaders and volunteers is critical for upgrading spatial resilience. Another key point is that the participants’ satisfaction was at “the highest level” ($M = 4.60$, $S.D. = 0.54$), particularly with the instructor’s expertise, availability of equipment and technology. This aligns with [9], who

pointed out that group learning elevated experiential exchange, co-learning, and behavioral competency development efficiently. As a result, the satisfaction reflects the quality of design and training facilitation that effectively fulfills the learners’ needs.

Anyhow, multiple limitations and challenges should be considered. For example, the mean of registration and facilitation was lower than other aspects, implying restrictions in system management. Additionally, most of the samples were elderly people (39% were 51 years old and above). For this reason, the learning and adaptation may differ from working-age participants, even though they have direct experience in disaster management. Therefore, it is necessary to design the learning activity to suit different age groups. After comparing with other relevant studies, the research results are in line with the work of Prabhakar [10], who reported that enhancing personnel competency via participation increased preparedness for disaster response. Moreover, results were in accordance with studies in the Thai context, which affirmed that developing the training curriculum and community networking were key factors for flood impacts mitigation, such as the study on flood preparedness literacy by [11], and flood resilience in Thailand by [12].

The findings signify the necessity for the government agencies, especially the Department of Disaster Prevention and Mitigation (DDPM) and local administrative organizations, to include the CR Disaster MAN curriculum in the enhancement planning for personnel competency in disaster management to set a sustainable training standard that elevates spatial management potential efficiently. In the policy perspective, it is recommended to allocate sufficient and continuous budget to support long-term training, especially in provinces with flood risk, such as floodplains in Northern and Central Thailand, which have repeated flooding issues [12]. In addition, the government sector should establish cross-collaboration between agencies, including the government, private, and civil society sector, to link a holistic data management, resource allocation, and disaster response [4]. In regard to operational recommendations, simulation exercises and field-based practice should be included to

enhance crucial skills for disaster management, such as decision-making skills, leadership, and communication skills during a crisis [9]. Furthermore, learning media and manuals that are appropriate for target groups, such as aging people, community leaders, or local administrative organization staff, should be made available for equal knowledge access [11]. In addition, the integration of digital technology and online platforms for surveillance and real-time reporting will facilitate the speed and precision of data communication [4]. Meanwhile, the voluntary networks for CBDRM should be supported to decentralize authority and responsibility within the community [7], and the CR Disaster MAN can be adapted to other disasters for academic purposes, e.g., landslide, wildfire, or cold hazard, to assess the appropriateness and for a complete curriculum. Additionally, a study on the role of demographic variables affecting the training efficiency should be considered [13] to improve activity patterns and the learning process to suit multiple needs within the different geographical and social contexts.

All in all, this research not only demonstrates the CR Disaster MAN curriculum efficiency but also emphasizes a significance of curriculum design that is founded on the integration of adult learning, holistic disaster management, community engagement, and systematic resilience concept. This curriculum serves as a role model for curriculum training development to upgrade disaster management potential in other high-risk areas across Thailand.

Therefore, results confirm that the combination of adult learning, group psychology, and CBDRM principles contributed to substantial learning gains. The most effective curriculum components were experiential mapping exercises, simulation-based response drills, and peer-learning group sessions.

However, behavioral change and resilience improvement were not directly measured, representing a limitation. The study relied on knowledge tests and self-reported satisfaction, which may not fully reflect long-term skill application.

Comparison with prior studies [2] shows that CR Disaster MAN is unique due to its integration of local wisdom and psychological group learning within a rural Thai context.

Conclusion

The CR Disaster MAN curriculum effectively strengthened area-based disaster management knowledge among participants in Chiang Rai province. The significant improvement in posttest scores and high satisfaction levels confirm its potential as a scalable training model for other flood-risk areas.

Research results reflect the efficiency of a training curriculum model for area-based flood disaster management in developing decision-making skills, leadership, and communication during the crisis. Based on the development process, people who have the roles related to flood management in Chiang Rai should establish and support the efficient disaster surveillance and reporting (flood) by having the local volunteers as a center for precision and swiftness. It should be the practical system that integrates cooperation to build the mechanism promoting systematic collaboration between the government sector and other sectors, aiming for inclusive and sustainable disaster management.

The policy provision should aim to include training curriculum. For example, the Department of Disaster Prevention and Mitigation (DDPM) and Provincial Administrative Organization (PAO) include the disaster training curriculum that covers decision-making, leadership, and communications skills in the personnel development plan. Moreover, the organizations should allocate a sufficient and constant budget, particularly for the areas with the risk of recurrent flooding.

The integrated collaboration between the government, private, and civil society should be promoted to link data and resource management and disaster response efficiently and cohesively.

Research and development for area-based disaster monitoring and reporting technologies should be supported constantly to obtain empirical data that is useful for policy planning and execution.

A longitudinal study should be conducted to assess the knowledge and skills obtained from the training, how they can be practical in the real flood situation, and how they can mitigate spatial losses.

Research methodology to confirm the empirical results that it can upgrade the

community's potential and competency in disaster management should be designed. A comparative study should be applied to compare the area with the training and that without the training. Similarly, the correlational research should be adopted to study the impact of the demographic factor on the direction and intensity of training effectiveness.

Research results should be extended to the predictive research using data from CR Disaster MAN. It will lead to a design of the model to predict the trend or influence on flood situation in other areas

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