JAPAN INTERNATIONAL COOPERATION AGENCY

THE GOVERNMENT OF
THE ISLAMIC REPUBLIC OF PAKISTAN

THE PROJECT FOR STRENGTHENING OF
FLOOD RISK MANAGEMENT IN LAI NULLAH BASIN

FINAL REPORT

December 2009

JICA Expert Team

GED
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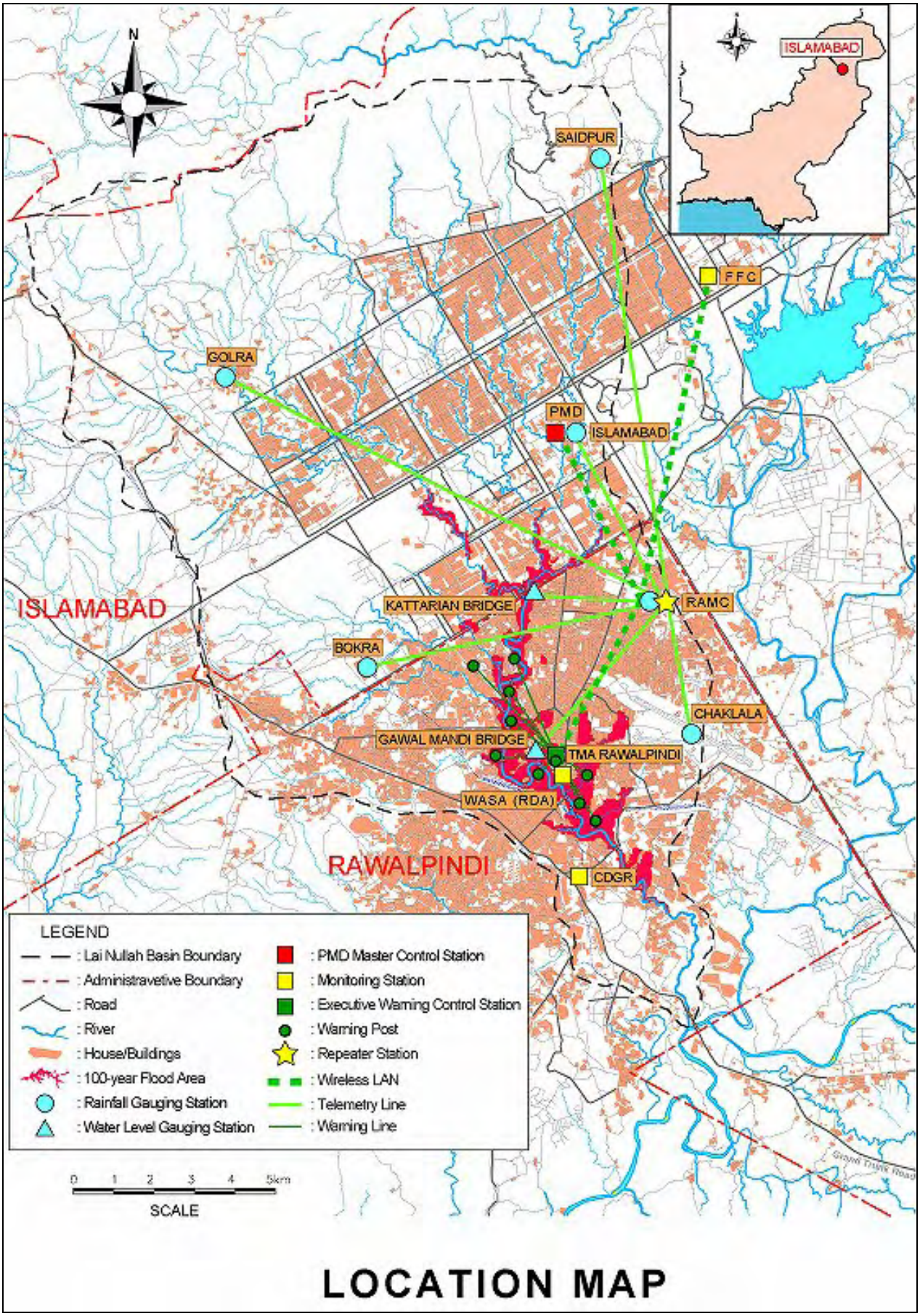
09-127



LOCATION MAP

 The 1st JCC Meeting, Dec. 13, 2007	 The 1st Monthly C/P Meeting, Jan. 29, 2008
 Outline explanation of the Project and Debriefing Session for O/M on FFWS in PMD, Feb. 8, 2008	 Outline Explanation of the Project at Rescue1122, Feb. 9, 2008
 Seminar on Outcome of Hydrological Training and Future Tasks, Apr. 14, 2008	 Workshop on Revision of FRP with CDGR-Revenue, Civil Defense, Apr. 23, 2008
 The 1st Awareness Program on C/P, May 8, 2008	 The 4th JCC Meeting, June 18, 2008

 Awareness Program at Pilot Area-UC-46, Jun. 20, 2008	 Evacuation Drill at Pilot Area UC-46, Jun. 20, 2008
 Exercise of Warning Siren Activation, Jun. 20, 2008	 Map Exercise at Pilot Area UC-36, Jul. 10, 2008
 The 7th Monthly C/P Meeting, Sep. 3, 2008	 Meeting with New CDGR-DCO, Project Manager, Sep. 6, 2008
 The 1st JCC Meeting, Jan. 27, 2009	 The 2nd JCC Meeting, Feb. 17 2009

 Workshop on Apr. 7, 2009 - (1)	 Workshop on Apr. 7, 2009 - (2)
 Awareness for Elementary School Sec-2, Feb. 13, 2009	 Awareness for Civil Defense Volunteer, Mar. 25, 2009
 Awareness for Zone 6, Apr. 15, 2009	 Awareness for Zone 7, Apr. 18, 2009
 Awareness for Rawalpindi Chamber of Commerce & Industry (RCCI)-1, Apr. 25, 2009	 Awareness for Zone 1, Apr. 28, 2009

 Awareness for School in Zone 4 , May 8, 2009	 Awareness for School in Zone 3, May 21, 2009
 Awareness for School in Zone 1, May 30, 2009	 Awareness and Evacuation Drill for Zone 4, June 13, 2009 (1)
 Awareness and Evacuation Drill for Zone 4, June 13, 2009 (2)	 The 4th Monthly C/P and 3rd JCC Meeting, June 15, 2009
 Meeting with DCO,June17 2009	 Awareness for Markazi Jamia Masjid in Zone 5, July 14 2009

 The 5th Monthly C/P Meeting, Jul. 18, 2009	 Task Force Meeting, July 22, 2009
 Awareness for NGO, August 1, 2009	 Seminar on Nov. 3, 2009 - (1)
 Seminar on Nov. 3, 2009 - (2)	 The 5th JCC Meeting, Nov. 5 2009
 PMD O/M member and Evaluation Team Nov. 6, 2009	 Rescue 1122 O/M member, Nov. 10, 2009

Abbreviations

Abbreviation	:	English
ADB	:	Asia Development Bank
AFCC	:	Army Flood Control Center
CBFCC	:	Control Board Flood Control Center
C/D	:	Capacity Development
CDA	:	Capital Development Authority
CDGR	:	City District Government of Rawalpindi
C/P	:	Counterpart
DF/R	:	Draft Final Report
DFCC	:	District Flood Control Center
DPCC	:	District Prevention Control Center (in TMA)
F/R	:	Final Report
FFC	:	Federal Flood Commission
FRC	:	Flood Relief Committee
FFWMC	:	Flood Forecast and Warning Master Control Center
IC/R	:	Inception Report
IT/R	:	Interim Report
JCC	:	Joint Coordination Committee
JICA	:	Japan International Cooperation Agency
LFCC	:	Local Flood Control Center
M/M	:	Minutes of Meeting
M/P	:	Master Plan
O/M	:	Operation and Maintenance
PDM	:	Project Design Matrix
PMD	:	Pakistan Meteorological Department
PO	:	Plan of Operation
PR/R	:	Progress Report
RCB	:	Rawalpindi Cantonment Board
R/D	:	Record of Discussion
TMA	:	Thesil Municipal Administration Rawalpindi
WASA	:	Water and Sanitation Agency of Rawalpindi Development Authority

Definition

Expert Team	:	JICA Expert Team
FFWS Project	:	The Project for the Improvement of the Forecasting and Waning System for Lai Nullah Basin
Project Team	:	C/P collaborate with Expert Team
The Project	:	The Project for Strengthening of Flood Risk Management in Lai Nullah Basin

Measurement Units

(Length)

mm	:	millimeter(s)
cm	:	centimeter(s)
m	:	meter(s)
km	:	kilometer(s)

(Area)

mm^2	:	square millimeter(s)
cm^2	:	square centimeter(s)
m^2	:	square meter(s)
km^2	:	square kilometer(s)
ha	:	hectare(s)

(Weight)

g, gr	:	gram(s)
kg	:	kilogram(s)
ton	:	ton(s)

(Time)

s, sec	:	second(s)
min	:	minute(s)
h, hr	:	hour(s)
d, dy	:	day(s)
y, yr	:	year(s)

(Volume)

cm^3	:	cubic centimeter(s)
m^3	:	cubic meter(s)
l, ltr	:	liter(s)
mcm	:	million cubic meter(s)

(Speed/Velocity)

cm/s	:	centimeter per second
m/s	:	meter per second
km/h	:	kilometer per hour

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CHAPTER 1 OUTLINE OF THE PROJECT

1.1 Background of the Project

In response to the request from the Government of the Islamic Republic of Pakistan, the Preparatory Study Team (hereinafter referred to as "the Team") organized by Japan International Cooperation Agency (hereinafter referred to as "JICA"), conducted the preparatory study from 13 August to 1 September, 2007, for the purpose of working out the details of the technical cooperation program concerning the Project for Strengthening of Flood Risk Management in Lai Nullah Basin (hereinafter referred to as the 'Project'), in the Islamic Republic of Pakistan. During the study, the Team exchanged views and had a series of discussions with the Pakistani authorities concerned with respect to desirable measures to be taken by JICA and the Government of the Islamic Republic of Pakistan represented by Federal Flood Commission (hereinafter referred to as 'FFC'), City District Government of Rawalpindi (hereinafter referred to as 'CDGR'), Pakistan Meteorological Department (hereinafter referred to as 'PMD') and other organizations concerned, for the successful implementation of the above-mentioned Project. As a result of the discussions, the Team and the Pakistani authorities concerned agreed to recommend to their respective Governments the matters. Minutes of Meeting was signed on 30 August 2007.

Phase-I of the Project was implemented from December 2007 to November 2008 and Phase-II had been starting since December 2008. The first JCC Meeting of Phase-II was held on 27 January 2009. During the discussion of JCC Meeting, major modification of activities and action schedule of Phase-II were explained and it was decided to give some evaluation time until next JCC Meeting for all the concerned agencies. The 2nd JCC was conducted at CDGR-DCO meeting room on 17 February 2009 and the new modified Project Design Matrix (PDM) and activities schedule of Phase-II was approved and Minutes of Discussion was signed on February 17 2009

1.2 Overall Goal and Purpose of the Project

1) Overall Goal

Flood damage and victims are mitigated in the target area.

2) Project purpose

System and structure which enables mass evacuation at the event of floods is established in the target area.

3) Project Target Sites

The Project target site is Lai Nullah River Basin, where a serious flood was occurred in 2001.

1.3 Project Design Matrix (P0)

Project Title : The Project for Strengthening of Flood Risk Management in Lai Nullah Basin

Period : 2007.12 ~ 2009.11 (2 years)

Target Group : Staffs in related organizations and people living in the target area

Project design matrix is shown in Table 1-1.

Table 1-1 Project Design Matrix ver.0

Narrative summary	Objectively Verifiable Indicators	Mean of Verification	Important Assumption
Overall Goal Flood damage and victims are mitigated in the target area.	- Number of human victims at the event of the flood	1. Report of FFC 2. Report of National Disaster Management Authority	
Project Purpose System and structure which enables mass evacuation at the event of floods is established in the target area.	1. Revised flood relief plan is authorized 2. Flood relief plan is used by related organizations 3. Hazard map and evacuation places are known among people 4. Continuity of evacuation drills with initiative of Pakistani side	1. Minutes of meetings of JCC 2. Questionnaire to the people 3. Hearing to the people in the pilot area	1. Flood situation in the target area will not get drastically worse.
Outputs 1. Capacity of PMD and CDG is strengthened enough to utilize flood early warning system effectively and issue warning properly. 2. Capacity of local authorities is developed enough to promote people's awareness and preparedness for the floods. 3. Capacity of related organizations is strengthened enough to mitigate the damage of flood.	**Indicators** 1-1. Number of staff who understand runoff mechanism 1-2. Number of exercises conducted 1-3. Number of staff who can utilize flood simulation model 1-4. Revised criteria for the warning 2-1. Hazard maps prepared 2-2. Manual for evacuation drill prepared 2-3. Number of workshops and drills held 2-4. Number of people who participate in workshops and drills. 3-1. Revised flood relief plan for each year 3-2. Number of meetings held among flood relief committee	1-1. Record of the system operation 1-2. Report on the exercises 2-1. Progress Report of the Project 2-2. Report on workshops and drills 3-1. Progress report of the Project	1. Institutional and financial arrangements of the organizations concerned will be done as planned. 2. Mandate of each organization will not be changed.

1.4 Modification of PDM

Based on the achievement of Phase-I, PDM shall be modified for activities of Phase-II. One of the big reasons is the multi-purposes of output, in which Output 1 requires two purposes i.e. hydrological and O&M skill improvements. Hydrological improvement is aimed for PMD and O&M has to consider PMD and Rescue1122, therefore it is difficult to use the same indicator for evaluation of output. Draft modification of PDM portion was proposed to C/P at monthly meeting on 24 September 2008 and it is under study. Modified portion is colored Yellow and listed in below table:

Original Sentence	Modified Sentence
Outputs 1. Capacity of PMD and CDG is strengthened enough to utilize flood early warning system effectively and issue warning properly. 2. Capacity of local authorities is developed enough to promote people's awareness and preparedness for the floods. 3. Capacity of related organizations is strengthened enough to mitigate the damage of flood .	**Outputs** 1. Capacity of PMD is strengthened enough to utilize flood forecasting system effectively and issue warning properly to concerned agencies. 2. Capacity of CDGR (Rescue1122) is strengthened enough to utilize flood early warning system effectively and issue warning properly to residents. 3. Capacity of local authorities is developed enough to promote people's awareness and preparedness for the floods. 4. Capacity of related organizations is strengthened enough to mitigate the damage of flood.
Indicators 1-1. Number of staff who understand runoff mechanism 1-2. Number of exercises conducted 1-3. Number of staff who can utilize flood simulation model 1-4. Revised criteria for the warning 2-1. Hazard maps prepared 2-2. Manual for evacuation drill prepared 2-3. Number of workshops and drills held 2-4. Number of people who participate in workshops and drills. 3-1. Revised flood relief plan for each year 3-2. Number of meetings held among flood relief committee	**Indicators** 1-1. Upgrading more than 3 staff into a teaching level in PMD who understand of runoff mechanism 1-2. Exercise of flood simulation model at least once a week as based on the training schedule 1-3. Upgrading more than 3 staff into a teaching level in PMD who can utilize of flood simulation model 1-4. Revised criteria for the flood warning code 1-5. Conduct of operation and maintenance of the system based on the O/M Manual properly 2-1. Review criteria for the flood warning code 2-2. Conduct of operation and maintenance of the system based on the O/M Manual properly 2-3. Conduct of operational drill for warning system at least once for each duty group 3-1. Hazard maps prepared 3-2.Guideline for Disaster Awareness Activities prepared 3-3. Trainings and workshops on how to facilitate awareness activities for counterpart 3-4. Conduct of awareness activity at least once in each zone 4-1. Revised flood relief plan for each year 4-2. Method for information sharing
Means of Verification 1-1. Record of the system operation 1-2. Report on the exercises 2-1. Progress Report of the Project 2-2. Report on workshops and drills 3-1. Progress report of the Project	**Means of Verification** 1-1. Result of the examination by Expert. 1-2. Final Report of the Project 1-3. Result of the examination by Expert. 1-4. Progress Report of the Project 1-5. Final Report of the Project 2-1. Final Report of the Project 2-2. Final Report of the Project 2-3. Final Report of the Project 3-1. Progress Report of the Project 3-2. Guidelines for Disaster Awareness Activities 3-3. Progress Report of the Project 3-4. Final Report of the Project 4-1. Revised Flood Relief Plan 4-2. Progress Report of the Project

Activities	Activities
1-1. Holding lectures on basic knowledge of runoff mechanism to engineers. 1-2. Conducting exercises on operation of flood simulation model. 1-3. Improving parameters of the flood simulation model. 1-4. Accumulation of meteorological/hydrological data obtained from the warning system. 1-5. Reviewing criteria for the warning. 2-1. Conducting social survey. 2-2. Preparing hazard maps. 2-3. Select pilot areas. 2-4. Developing manual for evacuation drill. 2-5. Conducting awareness programs and evacuation drills in the pilot areas. 2-6. Reflecting lessons learnt from activities in the pilot areas to the manual and plan. 2-7. Holding workshops on how to facilitate awareness programs and drills for counterpart agencies 2-8. Conducting trainings on how to facilitate awareness programs and drills for counterpart agencies. 2-9. Conducting awareness programs and evacuation drills in other areas. 2-10. Reflecting lessons learnt from activities in other areas to the manual and plan. 3-1. Reviewing institutional structure of flood relief committee. 3-2. Revising flood relief plan through flood relief committee. 3-3. Conducting operational drills among related organizations based on the flood relief plan. 3-4. Monitoring operation of related organizations during monsoon season. 3-5. Reviewing response of related organizations to floods after monsoon season through flood relief committee.	1-1. Holding lectures on basic knowledge of runoff mechanism to engineers. 1-2. Conducting exercises on operation of flood simulation model. 1-3. Improving parameters of the flood simulation model. 1-4. Accumulation of meteorological/hydrological data obtained from the observation system. 1-5. Reviewing criteria for the flood warning code. 1-6. Managing operation and maintenance of forecasting system. 2-1. Reviewing of flood warning code. 2-2. Managing operation and maintenance of warning system. 2-3. Conducting operational drill for warning system. 3-1. Conducting social survey. 3-2. Preparing hazard maps. 3-3. Select pilot areas. 3-4. Developing guideline for disaster awareness activity. 3-5. Conducting awareness programs and evacuation drills in the pilot areas. 3-6. Reflecting lessons learnt from activities in the pilot areas to the manual and plan. 3-7. Holding workshops on how to facilitate awareness programs and drills for counterpart agencies 3-8. Conducting trainings on how to facilitate awareness programs and drills for counterpart agencies. 3-9. Conducting awareness programs and evacuation drills in other areas. 3-10. Reflecting lessons learnt from activities in other areas to the manual and plan. 4-1. Reviewing institutional structure of flood relief committee. 4-2. Revising flood relief plan through the secretariat of flood relief committee. 4-3. Conducting operational drills. 4-4. Monitoring operation of related organizations during monsoon season. 4-5. Create a shared method of flood risk management among related organizations through the counterpart agency meetings, a workshop and a seminar.

1.5 Modification of PDM (P1)

Based on the result of Phase-I, JICA Expert and Counterpart had several discussions and it was decided to modify PDM for Phase-II. Modified PDM (P1) is shown in Table 1-2.

Project Title: The project for Strengthening of Flood Risk Management in Lai Nullah Basin

Period: 2007.12 ~ 2009.11 (2 years)

Target Group: Staffs in related organizations, People living in the target area

Table 1-2 Project Design Matrix (P1)

Narrative summary	Objectively Verifiable Indicators	Mean of Verification	Important Assumption
Overall Goal Flood damage and victims are mitigated in the target area.	- Number of human victims at the event of the flood	1. Report of FFC 2. Report of National Disaster Management Authority	
Project Purpose System and structure which enables mass evacuation at the event of floods is established in the target area.	1. Revised flood relief plan is authorized 2. Flood relief plan is used by related organizations 3. Hazard map and evacuation places are known among people 4. Continuity of evacuation drills with initiative of Pakistani side	1. Minutes of meetings of JCC 2. Questionnaire to the people 3. Hearing to the people in the pilot area	1. Flood situation in the target area will not get drastically worse.
Outputs 1. Capacity of PMD is strengthened enough to utilize flood forecasting system effectively and issue warning properly to concerned agencies. 2. Capacity of CDGR (Rescue1122) is strengthened enough to utilize flood early warning system effectively and issue warning properly to residents. 3. Capacity of local authorities is developed enough to promote people's awareness and preparedness for the floods. 4. Capacity of related organizations is strengthened enough to mitigate the damage of flood	**Indicators** 1-1. Upgrading more than 3 staff into a teaching level in PMD who understand of runoff mechanism 1-2. Exercise of flood simulation model at least once a week as based on the training schedule 1-3. Upgrading more than 3 staff into a teaching level in PMD who can utilize of flood simulation model 1-4. Revised criteria for the flood warning code 1-5. Conduct of operation and maintenance of the system based on the O/M Manual properly 2-1. Review criteria for the flood warning code 2-2. Conduct of operation and maintenance of the system based on the O/M Manual properly 2-3. Conduct of operational drill for warning system at least once for each duty group 3-1. Hazard maps prepared 3-2.Guideline for Disaster Awareness Activities prepared 3-3. Trainings and workshops on how to facilitate awareness activities for counterpart 3-4. Conduct of awareness activity at least once in each zone 4-1. Revised flood relief plan for each year 4-2. Method for information sharing	1-1. Result of the examination by Expert. 1-2. Final Report of the Project 1-3. Result of the examination by Expert. 1-4. Progress Report of the Project 1-5. Final Report of the Project 2-1. Final Report of the Project 2-2. Final Report of the Project 2-3. Final Report of the Project 3-1. Progress Report of the Project 3-2. Guidelines for Disaster Awareness Activities 3-3. Progress Report of the Project 3-4. Final Report of the Project 4-1. Revised Flood Relief Plan 4-2. Progress Report of the Project	1. Institutional and financial arrangements of the organizations concerned will be done as planned. 2. Mandate of each organization will not be changed.

1.6 Collaborative Management with C/P by using PDM

For the effective and successful implementation of the Project, JCC was established in order to fulfill the following function with concerned agencies

- To review the progress of the Project.
- To exchange views and ideas on major issues arise during the implementation period of the Project.
- To evaluate PDM during the course of the Project and suggest revision, if necessary.
- Any other related issues.

Based on the approved PDM, activities were managed by C/P and JICA. The project organization is shown in Fig. 1-1.

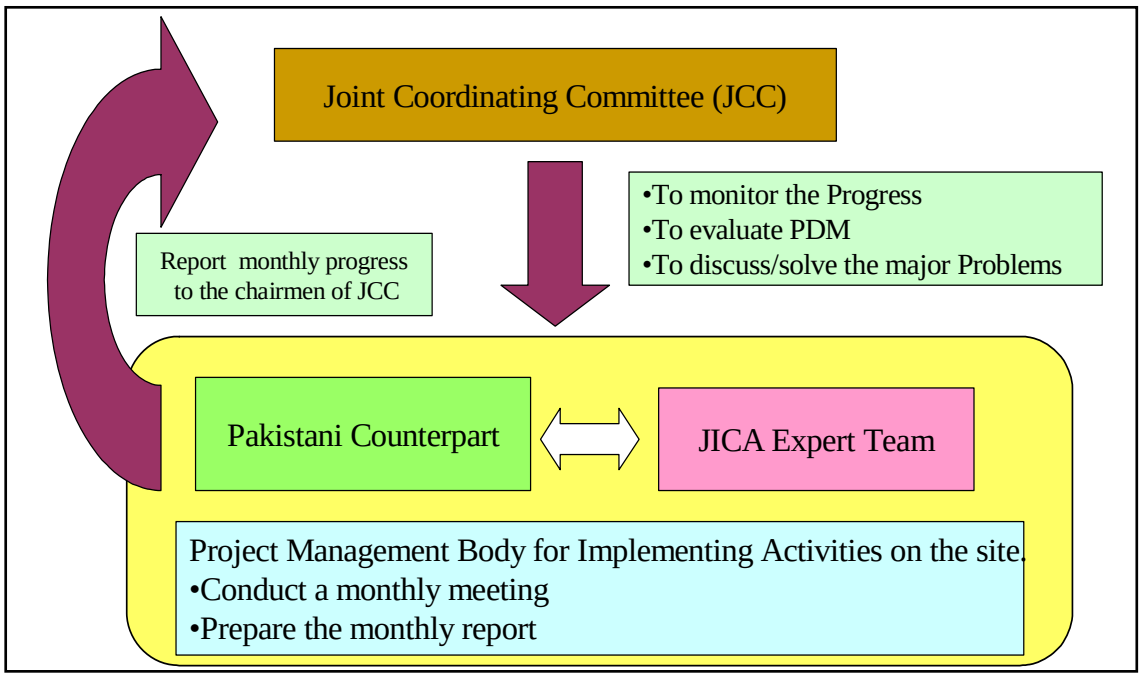


Fig. 1-1 Implementation Organization of the Project

Both JCC and C/P meeting were chaired by FFC and it was clearly mention by the chairmen to request all concerned agencies to fix a focal person during the implementation of the Project. However, due to the particularity of the technical cooperation project, participants of JCC meeting were also represented by the C/P member most of the time.

1.7 Counterpart (C/P) in Pakistan and Management Board

List of C/P for each activity was submitted to JICA Expert Team after the 1st C/P Monthly Meeting. During the 2nd C/P Monthly Meeting, CDA officially joined as one of the members of counterpart, and participating in activities of Outputs 2 & 3. As of 14 May 2008, list of C/P is listed in Table 1-3.

Role and responsibilities for C/P was confirmed with JICA Expert Team during the 1st C/P Monthly Meeting. C/P Meeting shall be held on a monthly basis, and shall discuss (1) progress of the Project, (2) problems during implementation of the Project, and (3) activities for next month. The results of the Monthly C/P Meeting shall be reported to the Chairman of JCC.

On the other hand, National Election was conducted on 18 February 2008, the election resulted in reshuffling of government organization. The reshuffling activities started from national level in March 2008 and reached Punjab Province at the end of April 2008. The new administrative

setup entailed in changes of several personnel of this Project, i.e. Project Manager, Assistant Project Manager and TMA Officer. This issue was discussed in the Monthly C/P Meeting on 29 April 2008. Comments from members are as follows:

- Change of personnel can be ordered by higher authorities with short notice.
- Government officer cannot reject the order.
- Change of C/P members will affect the achievement of this Project.
- Besides the abovementioned personnel, there are other C/P members who have also transferred to other government offices.

Based on above comments, all the agencies concerned have to check the status of C/P member and report to FFC before 20 May 2008.

Subsequent to the above event, on 3 September 2008, the Project Manager was replaced for another time. In the Phase-II, member of C/P was continuing changed as shown in Table 1-3.

Table 1-3 Counterpart member of this Project

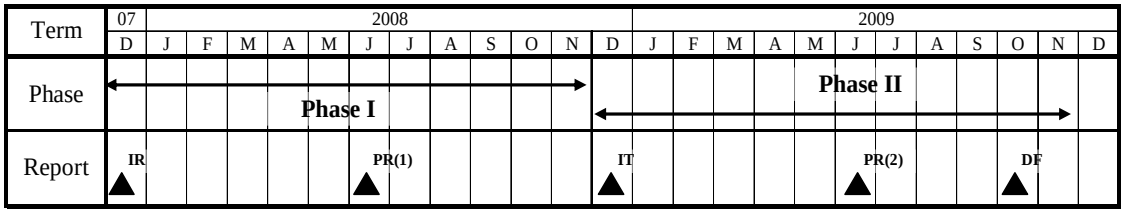
Role of Counterpart	Position and Office	Name
Project Director	Chief Engineer (Flood), FFC	Mr. Asjad Imtiaz Ali
Project Manager (until 28 April 2008) (until 3 September 2008) (until 13 March 2009) (until 18 March 2009) (until 3 April 2009)	District Coordination Officer, CDGR	Mr. Irfan Elahi (replaced) Mr. Jamal Mustafa Syed Mr. Imdad Ullah Bosal Mr. Muhammad Asif Qureshi Mr. Jamal Mustafa Syed Mr. Imdad Ullah Bosal
Flood Risk Management Planner	Chief Engineer (Dam safety Council), FFC	Mr. Ahmed Kamal
Flood Risk Management Planner (until 17 July 2009) (until 17 August 2009)	Executive District Officer (Revenue), CDGR	Mr. Muhammad Asif Qureshi Mr. Jamal Mustafa Syed Mr. Muhammad Zubair Khan
Flood Risk Management Planner (until 30 October 2009)	Director, Forecasting, PMD	Mr. Akram Anjum Dr. Muhammad Hanif
Community Mobilizer (until 09 May 2009)	District Emergency Officer Rawalpindi from Punjab Emergency Services, Rescue1122	Dr. Tanveer Akhter Dr. Abdur Rehman
Community Mobilizer (until 08 June 2009, Part Time) Full Time	District Officer (Civil Defense), CDGR	Mr. Raja Liaquat Mr. Tayyaman Raza Mr. Tayyaman Raza
Hydrologist	Senior Engineer (floods), FFC	Mr. Qazi Talat Mahmood Siddiqui
Hydrologist (until 20 April 2009)	Deputy Director, PMD	Mr. Jan Muhammad Khan Mr. M. Aleem ul Hassan
Meteorologist (until 30 October 2009)	Deputy Director, PMD	Mr. Zaheeer A. Babar Mr. Muhammad Farooq
Operation and Management Staff	Electronic Engineer, PMD	Mr. Imran Aslam
Assistant Project Manager (until 24 April 2008) (until 11 October 2008)	Executive District Officer (Finance and Planning), CDGR	Mr. Saqib Zafar（replaced） Ms. Noreen Bashir Mr. Saqib Manan
Operation and Management Staff	Emergency Officer (Operation), Rescue1122	Mr. Ali Hussain
Flood Risk Management Planner	Managing Director, WASA	Mr. Lt. Col. Islam-ul-Haq
Community Mobilizer (until October 2009)	Teshil Municipal Administration (TMA) Rawal Town	Mr. Malik Mumtaz Ahmed Mr. Syed Nasir Ali Shah
Flood Risk Management Planner (until 28 March 2009)	Director (Regional Planning), CDA	Mr. Ayub Tariq Mr. Khaliq ur Rehman
Flood Risk Management Planner (until 24 November 2008) (until 04 March 2009)	Director Municipal Administration, CDA	Mr. Momin Agha Dr. Wasim Hayat Mr. Mansoor Ahmed Khan

1.8 Project Schedule

Project schedule is shown in Fig. 1-2. The Project duration is twenty-four (24) months from December 2007 to November 2009, and it is divided into two (2) phases as follows:

Phase-I : Twelve (12) months from December 2007 to November 2008

Phase-II : Twelve (12) months from December 2008 to November 2009



Legend: IC: Inception Report PR: Progress Report IT: Interim Report
DF: Draft Final Report F: Final Report

Fig. 1-2 Project Schedule

1.9 Schedule of JICA Expert

The members of JICA Expert and the schedule of assignments are shown as follows:

Table 1-4 JICA Expert Team Members

Name	Person in charge
Mr. KAKU Shuji	Leader/Early Warning and Evacuation Planning
Mr. SUGIURA Tomonobu (Phase-I) Mr. SAKURAI Toshiyuki (Phase-II)	Flood Disaster Management Planning
Mr. HAMADA Yuichiro	Community-Based Disaster Management
Mr. SASAHARA Takeshi	Flood Forecasting and Warning System
Mr. MITSUKURA Makoto	Hydrology
Mr. ONUMA Takashi/Mr. FONG Wee Kean	Coordinator

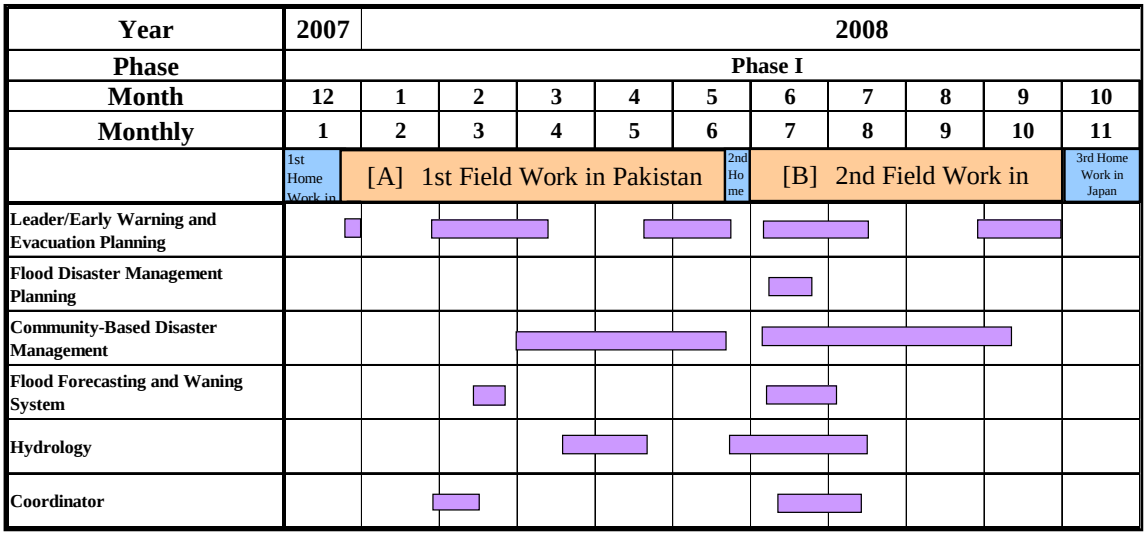


Fig. 1-3 Assignment Schedule (Phase-I)

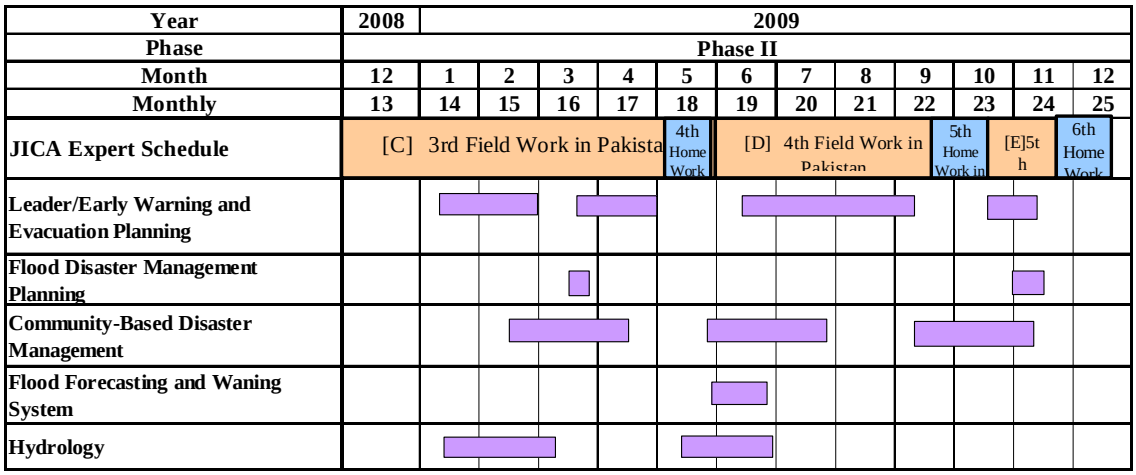


Fig. 1-4 Assignment Schedule (Phase-II)

1.10 Inputs from Japanese Side

During the activities of the Project, inputs from Japanese side, except JICA Experts, were listed in Table 1-5.

Table 1-5 Inputs from Japanese Side

Fiscal Year*	-JFY 2007	-JFY 2008	-JFY 2009	Total
Counterpart Training in Japan	-	7 persons*	8 persons	15 persons
Equipments	1,027,000 yen (914,030 PKR)	-	120,000 yen (106,800 PKR)	1,147,000 yen (1,020,830 PKR)
Poster, Pamphlet, Billboard and other awareness materials	-	1,287,000 yen (1,145,430 PKR)	810,000 yen (720,900 PKR)	2,097,000 yen (1,866,330 PKR)
Workshop and Seminar	-	120,000 yen (106,800 PKR)	783,000 yen (696,870 PKR)	903,000 yen (803,670 PKR)
Recommission with local consultants	-	6,568,000 yen (5,845,520 PKR)	1,034,000 yen (920,260 PKR)	7,602,000 yen (6,765,780 PKR)
Hazard Map	-	823,000 yen (732,470 PKR)	538,000 yen (478,820 PKR)	1,361,000 yen (1,211,290 PKR)

Note: Fiscal year in Japan is from April to March.

Exchange rate 1 yen = 0.89 PKR (as of October 2009)

*: 2 persons were jointed group training in Tsukuba on September 2009.

1.11 Equipment List

Equipment from Japanese side had two types, one is for providing to the Project another is for using the activities of the Project. List of equipment is shown in Table 1-6.

Table 1-6 List of Equipment from Japanese Side

Item	Quantity	Unit	Specification
Provide for the Project			
- Digital Camera	2	Pc	Olympus (u795SW)
- Personal Computer	2	pc	Acer Verton 1000/1GB Memory, 160GB HD, 17inch LCD, Acer Verton M464/2GB Memory, 160GB HD, 17inch LCD
- Software	1	Pc	Adobe Illustrator CS3
- Color Printer A4	1	Pc	HP 2820/A4 （printer, scan, copy） with stabilizer & hub
- Color Printer A3	1	Pc	HP pro k850/A3 inkjet
- UPS	2	Pc	Alfa-1000CH/1kVA
Carry from Japan for the Project			
- Microphone	15	Pc	Noboru Electric Company
- Search-light	2	Pc	Geepas GSL 7803
- walkie-talkie	2	Sets	Motorola
- Fax Machine	1	Pc	KXFL 402C/Laser fax
- Hand Siren	30	Pc	Tokyo Siren Company Ltd
- Stopwatch	2	Pc	
- Field glass	2	Pc	
- Chemical light	100	Pc	
- Stabilizer	2	Pc	Servo/2kVA

CHAPTER 2 COMMON ACTIVITIES

2.1 Flow chart of the Project

The Project activity flow chart for Phase-I and Phase-II are shown in Fig. 2-1 and Fig. 2-2 respectively.

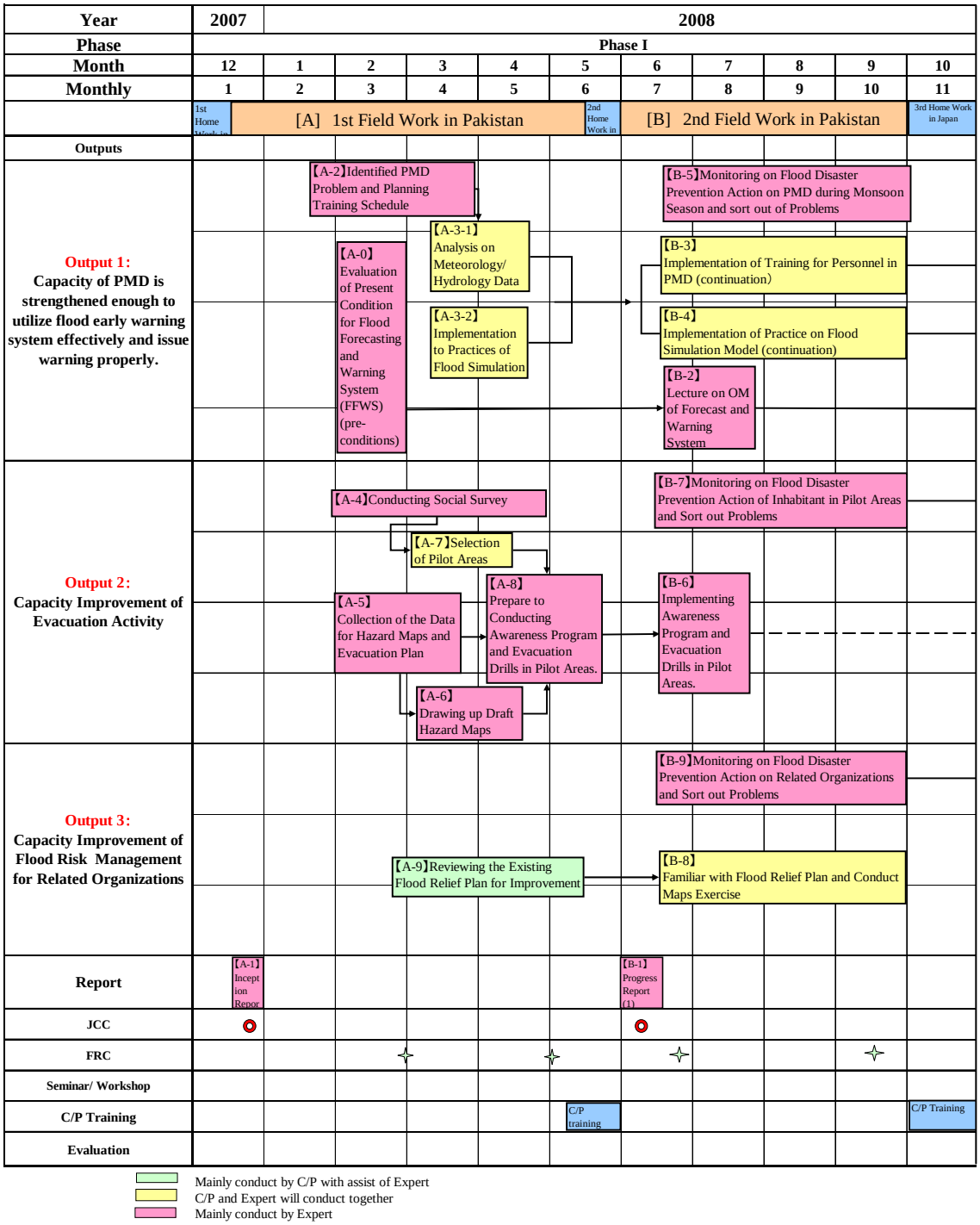


Fig. 2-1 Activity Flow Chart of the Project (Phase-I)

Phase-II flow chart of the project is shown in Fig. 2-2.

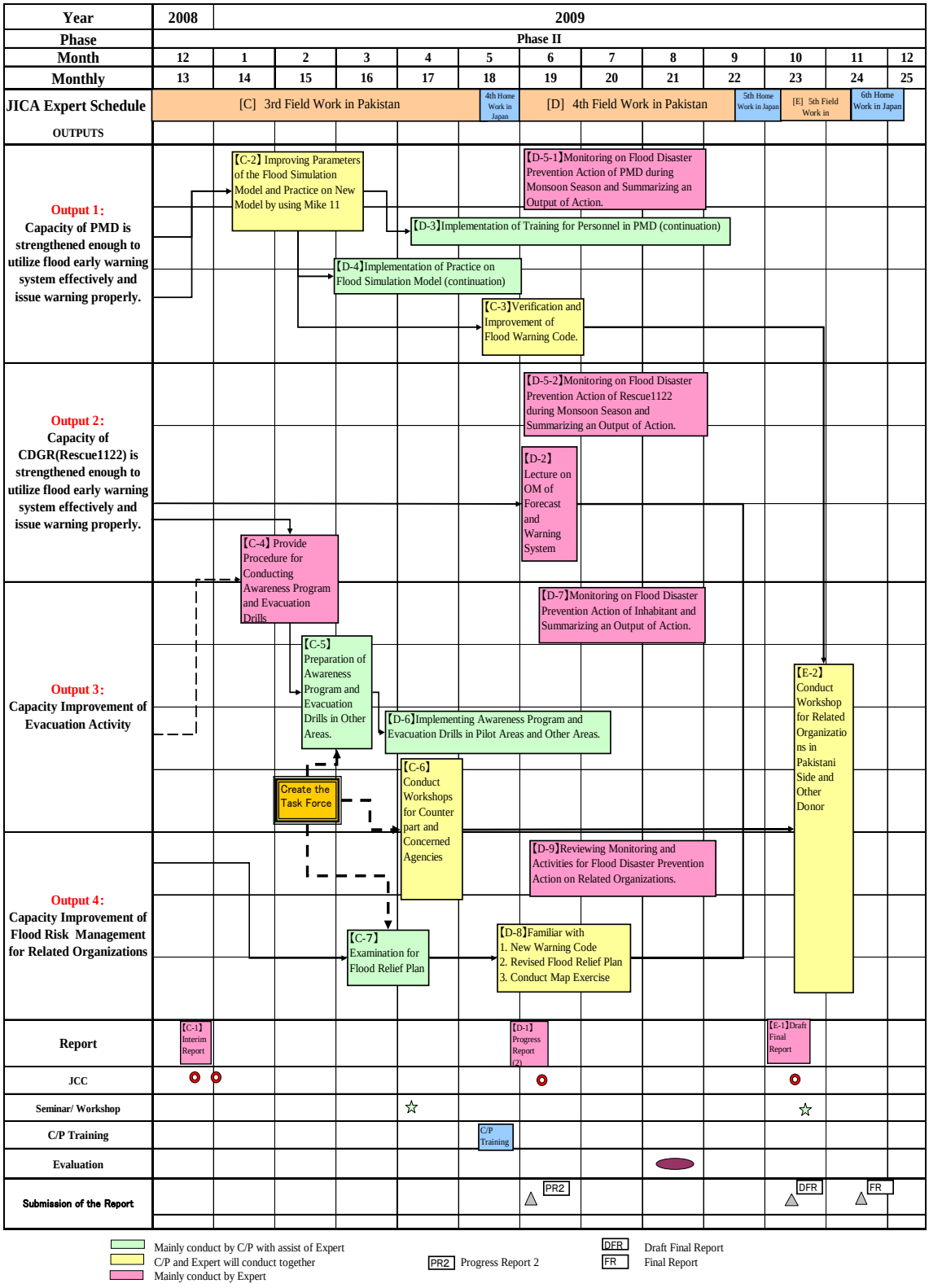


Fig. 2-2 Flow Chart of the Project (Phase-II)

2.2 Common Activities and Progress

2.2.1 Confirmation of C/P Members and Support Staffs

JCC Meeting on 18 December 2007, JICA Expert requested all concerned agencies to submit the list of C/P members and support staffs. The list of C/P members was submitted to JICA Expert at the end of January. During the 1st Monthly C/P Meeting, CDA was newly joined in as C/P and mainly to participate in activities of Outputs 2 & 3. As of 23 September 2008, the list of C/P member is shown in Table 1-3. List of attendance for JCC and C/P monthly meeting in Phase-I and Phase-II are shown in Table 2-1 and Table 2-2 respectively.

Table 2-1 Attendance of JCC and Monthly C/P Meeting Phase-I

S#	NAME & Designation	Office	C/P	C/P	JJC	C/P	C/P	C/P	JJC	C/P	C/P	C/P
			29-Jan	29-Feb	7-Mar	1-Apr	29-Apr	18-Jun	18-Jun	8-Jul	3-Sep	24-Sep
1_1	Mr. Asjad Imtiaz Ali, Chief Engineer (Floods)	FFC	o	o	o	o	o	o	o		o	o
2_1	Mr. Imdad Ullah Bosal District Coordination Officer	CDGR		o				Δ	Δ	Δ		
3_1	Mr.Ahmed kamal Chief Engineer (DSC) /S.E (F)	FFC	o	o	o	o	o	o	o	o	Δ	o
4_1	Mr. Asif Ali Qureshi EDO (Revenue),	CDGR		o	o	o	o	Δ	Δ	Δ		Δ
5_1	Mr. Akram Anjum Director	PMD	o	o	o	o	o	o	o	o	o	o
6_1	Dr. Tanveer Akhter District Emergency Officer	Rescue 1122	o	o	o	o	o					
7_1	Mr. Raja Liaquat District Officer (Civil Defence),	CDGR	o								Δ	
8_1	Mr. Qazi Tallat Mahmood Senior Engineer (Floods),	FFC	o		o	o	o	o	o	o	o	o
9_1	Mr. Jan Muhammad Khan Deputy Director	PMD	o			o						
10_1	Mr. Zaheer A. Babar Deputy Director	PMD						o	o		o	o
11_1	Mr. Imran Aslam Electric Engineer	PMD		o								
12_1	Miss Noreen Bashir Executive District Officer (F & P),	CDGR	o				o	o	o			
13-1	Mr. Ali Hussain Emergency Officer (Operation)	Rescue 1122	o	o	o	o	o	o	o		o	o
14-1	Lt. Col. (Retd) Islam-ul-Haq Managing Director	WASA	Δ	Δ				Δ	Δ		Δ	
15-1	Mr. Malik Mumtaz Ahmed Teshil Municipal Officer,	TMA	Δ		Δ	Δ		Δ	Δ	Δ	Δ	Δ
16-1	Mr. Ayub Tariq Director (Regional Planning)	C D A	o		o			o	o			
17-1	Mr. Momin Agha Director (Municipal Administration)	C D A										

o	Attendant by Self
Δ	Representative

Table 2-2 Attendance of JCC and Monthly C/P Meeting Phase-II

S#	NAME & Designation		JCC	JCC	C/P	C/P	W/S	C/P	C/P	JCC	C/P	C/P	C/P	C/P	JCC	JCC
		Office	27-Jan	17-Feb	17-Feb	28-Mar	7-Apr	23-Apr	15-Jun	15-Jun	18-Jul	18-Aug	12-Sep	17-Oct	17-Oct	5-Nov
1_1	Mr. Asjad Imtiaz Ali, Member Technical	FFC	O	O	O	O	O	O	O	O	O	O		O	O	O
2_1	Mr. Imdadullah Bosal District Coordination Officer	CDGR		O	O	Δ		Δ						Δ	Δ	Δ
3_1	Mr.Ahmed Kamal Chief Engineer (Floods)	FFC	O	O	O	O	O	O	O	O	O	O	O	Δ	Δ	O
4_1	Mr. Muhammad Zubair Khan EDO (Revenue),	CDGR	O	O	O	Δ	Δ		O	O		Δ				
5_1	Mr. Akram Anjum Director	PMD	O	O	O							O	O	O	O	O
6_1	Dr Abdur Rahman District Emergency Officer	Rescue 1122	O	O	O		O							Δ	Δ	Δ
7_1	Mr. Tayamman Raza District Officer (Civil Defence),	CDGR		O	O		Δ	Δ	Δ	Δ	Δ	Δ		O	O	O
8_1	Mr. Qazi Tallat Mahmood AEA (Civil),	FFC	O	O	O	O	O		O	O	O	O	O	O	O	O
9_1	Mr. M. Aleem ul Hassan Meteorologist	PMD		O	O		O	O	O	O	O	O	O	O	O	O
10_1	Mr. Zaheer A. Babar Deputy Director	PMD	O	O	O	O	O	O	O	O	O					
11_1	Mr. Imran Aslam Assistant Electric Engineer	PMD				O	O	O	O	O	O					
12_1	Mr. Saqib Manan Executive District Officer (F & P),	CDGR						O								O
13-1	Mr. Ali Hussain Emergency Officer (Operation)	Rescue 1122	O			O	O	O			O			Δ	Δ	O
14-1	Lt. Col. (Retd) Islam-ul-Haq Managing Director	WASA	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ		Δ	Δ	
15-1	Mr. Irfan Saleem Butt Teshil Municipal Officer,	TMA	Δ	Δ	Δ	Δ	Δ	Δ				Δ		Δ	Δ	Δ
16-1	Mr. Khaliq ur Rehman Director (Regional Planning)	C D A	Δ						Δ	O						
17-1	Mr. Abdur Rahim Senior Engineer	RCB	Δ			Δ			Δ	Δ			Δ			Δ
18-1	Mr. Mansoor Ahmed Khan Director (Municipal Administration)	C D A														

JCC	Joint Coordination Committee	O	Attendant by Self
C/P	Counterpart	Δ	Representative
W/S	Workshop		

During the activities of Phase-I, JICA Expert Team prepared several questionnaires and surveys were carried out. Respondent for questionnaire survey are listed in Table2-3.

Table 2-3 Respondents of Questionnaire Surveys Phase-I

S#	NAME & Designation	Office	1	2	3	4	5	
1_1	Mr. Asjad Imtiaz Ali, Chief Engineer (Floods)	FFC						
2_1	Mr. Imdad Ullah Bosal District Coordination Officer	CDGR						
3_1	Ahmed kamal Chief Engineer (DSC)	FFC	√	√	√	√	√	
4_1	Mr. Asif Ali Qureshi Executive District Officer (Revenue),	CDGR		√	√	√	√	
5_1	Mr. Akram Anjum Director	PMD	√	√		√	√	
6_1	Dr. Tanveer Akhter District Emergency Officer	Rescue 1122	√	√		√	√	
7_1	Mr. Raja Liaquat District Officer (Civil Defence),	CDGR			√			
8_1	Mr. Qazi Tallat Mahmood Senior Engineer (Floods),	FFC	√	√	√	√	√	
9_1	Mr. Jan Muhammad Khan Director	PMD	√			√	√	
10_1	Mr. Zaheer A. Babar Deputy Director	PMD	√	√		√	√	
11_1	Mr. Imran Aslam Electric Engineer	PMD	√	√	√	√	√	
12_1	Miss Noreen Bashir EDO (Finance & Planning),	CDGR						
13-1	Mr. Ali Hussain Emergency Officer (Operation)	Rescue 1122	√	√	√	√	√	
14-1	Lt. Col. (Retd) Islam-ul-Haq Managing Director	WASA						
15-1	Mr. Malik Mumtaz Ahmed Teshil Municipal Officer,	TMA						
16-1	Mr. Ayub Tariq Director (Regional Planning)	C D A						
17-1	Mr. Momin Agha Director (Municipal Administration)	C D A						

1	Questionnaire	4. Capacity Assessment Check List (Start of Project)	
2	Evaluation Form	5. Capacity Assessment Check List (Individual) as end of Phas	
3	Flood Risk Management Form		

2.2.2 Understanding the Role and Responsibilities of C/Ps

During the JCC Meeting on 13 December 2007, using the Inception Report, JICA Expert has explained the roles and responsibilities of C/P. In addition, though the FFC, the JICA Expert sent a letter to all concerned agencies with attachment of the roles and responsibilities. Based on the above understanding, C/P meeting shall be conducted on a monthly basis and the location of meeting shall be rotated among FFC, PMD and CDGR since February 2008. Record of JCC Meeting, C/P Monthly Meeting and FRC Meeting on Phase-I are shown in Tables 2-4, 2-5 and 2-6. Phase-II of JCC Meeting, C/P Monthly Meeting, CDGR Meeting and WASA Meeting are shown from Table 2-7 to Table 2-10 respectively.

Table 2-4 Record of JCC Meeting Phase-I

No.	Date	Location	Main Subject	Participant
1	December 13,2007	FFC	• Explanation of IC/R • Additional JCC member • Confirm Role of Rescue1122 • Office space for JICA Expert	JCC Member
2	December 18,2007	FFC	• Role and Responsible of C/P • Sign of MM for Activities	JCC Member
3	March 07,2008	FFC	• Explain of Training Program in Japan • Role of CDA • Training schedule for PMD • Monitoring System for Rescue1122	JCC Member
4	June 18,2008	FFC	• Preparation for Monsoon Season • Explain the modified Warning Code • Presentation of Trainees to Japan	JCC Member and C/P Member

Table 2-5 Record of C/P Monthly Meeting Phase-I

No.	Date	Location	Monthly Progress and Main Subjects	Participant
1	January 29 2008	FFC	• Role and Responsible of C/P • Explain of Phase-I Activities • Additional C/P CDA	C/P member
2	February 29 2008	FFC	• Repair of Warning Post Station • Confirm O&M Cost and payment of electric fee for Warning Post	C/P member
3	April 1 2008	PMD	• Hydrology Training Schedule • Implementation Schedule for Social Survey • Confirm Pilot Area (Zone 3)	C/P member
4	April 29 2008	CDGR	• Progress of Hydro Training • Modification of Flood Relief Plan • Identified issue of Warning Code • Schedule of Awareness Program	C/P member
5	June 18 2008	FFC	• Prepare for Monsoon Season Activities • Explain the modified Warning Code • Flood Relief Plan 2008Version • Countermeasure of river bed rising • Awareness Program, Evacuation Drill and Map Exercise Activities • Confirm FFWS (FFC and Rescue1122)	C/P member
6	July 8 2008	PMD	• Monitoring of system operation during July 5 2008 flood and review mistake • Progress of Awareness Program, Evacuation Drill and Map Exercise • O& M Manual for FFWS 2008	C/P member
7	September 3 2008	FFC	• Approve the Simple Hazard Map • Propose Task Force for Phase-II activity • Evaluation of Phase-I Output	C/P member
8	September 24 2008	FFC	• Explain Phase-I achievements • Implementation Schedule of Phase-II • Propose the Revised PDM(draft)	C/P member

Table 2-6 FRC Meeting Phase-I

No.	Date	Location	Main Subject	Participant
1	June 20 2008	FFC	• Countermeasure for river bed rising • Draft Flood Relief Plan 2008 • Compliance of modified Warning Code	C/P member
2	June 23 2008	CDGR	• Flood Relief Plan 2008 • Modified Warning Code • Flood Risk Management for Monsoon Season • Confirm hazardous place in Lai Nullah	FRC Member

Table 2-7 Record of JCC Meeting Phase-II

No.	Date	Location	Major Topics	Attendance
1	January 27 2009	FFC	• Explanation of Interim Report • Modification PDM • Task Force for awareness activities • Budget for Phase-II • O&M for FFWS	JCC Members
2	February 17 2009	CDGR	• Signature for Minutes of Discussion • Announcement of Task Force member • Budget for Task Force activities • O&M for FFWS (repair works)	JCC Members
3	June 15 2009	FFC	• Explanation of Progress Report 2 • Modification of Warning Code 2009 • Activities of each Output • Presentation of Trainee in Japan • Preparation of coming Monsoon season	JCC Members
4	October 12 2009	FFC	• Explanation of Draft Final Report • Evaluation and sustainability of the Project • Budget for Task Force Activities • Schedule of Project Evaluation Team from Japan	JCC Members
5	November 5 2009 (Appendix 2-1)	FFC	• Comment for Draft Final Report • Evaluation and Recommendation for the future • Results of Seminar • Evaluation results by joint evaluation team • Signing of MM	JCC Members

Table 2-8 Record of C/P Monthly Meeting Phase-II

No.	Date	Location	Major Topics	Attendance
1	February 17 2009	CDGR	• Role and responsibilities of Task Force • Siltation in Lai Nullah • Workshop schedule • Counterpart training in Japan • Budget for repair of equipment by C/P agencies • Progress of each output	C/P Members
2	March 28 2009	FFC	• Progress of each output by C/P member • Budget for Task Force activities and repair works • Presentation by JICA short expert • Outline of Workshop • Dredging works for Lai Nullah River	C/P Members
3	April 23 2009	PMD	• Progress of each output by C/P member • Budget for Task Force activities and repair works • Result of Workshop • Repair of KWLGS • Transfer of Monitoring System to DCO-CDGR	C/P Members
4	June 15 2009	FFC	• Progress of each output by C/P member • Budget for Task Force activities and repair works • Preparation for coming Monsoon season • Evacuation Drill	C/P Members
5	July 18 2009	PMD	• Progress of each output by C/P member • Budget for Task Force activities and repair works • Result of Communication Drill • Agreement of O/M between PMD, CDGR and Rescue 1122 • Sustainability of FFWS	C/P Members
6	August 18 2009	FFC	• Progress of each output by C/P member • Pre-completion Survey for C/P • Rule of Business for Task Force	C/P Members
7	September 12 2009	FFC	• Result of Pre-completion Survey • Issue for Sustainability of the Project • Evaluation and Seminar Schedule	C/P Members
8	October 12 2009	FFC	• DEMC 2009 • Remaining Works & Seminar • Project Evaluation Team	C/P Members

Table 2-9 Record of Meeting with DCO-CDGR

No.	Date	Location	Major Topics	Attendance
1	January 14 2009	CDGR	• Briefing the project purpose and activities • Explanation of progress the project • Modification PDM • Budget foe Phase-II • Siltation problem in Lai Nullah • Hazard Map and damaged hazard map • Establishment of Task force • Support for Task Force activities • Equipment for real time for PMD • Damage of LCD monitors at TMA • Monitoring system in WASA	CDGR-officer • DCO • EDO(Revenue) • EDO(MS) • EDO(IT) • Rescue1122 • CD • WASA • TMA
2	June 3 2009	CDGR	• Pre-flood Meeting Arrangement • Siltation problem in Lai Nullah • Budget for Task Force	Same as above
3	June 17 2009	CDGR	• Modified Warning Code 2009 • Budget of Task Force • Repair of Warning Facilities • Preparation Works for coming Monsoon Season • Proposed Flood Relief Plan 2009 • OM Budget for FFWS	Same as above (including Task Force member)

4	July 27 2009	CDGR	• Result of Communication Drill and Improvement of system • Released Budget of Task Force (rule of business)	• Member of FRC • Task Force
5	November 2 2009	CDGR	• Releasing Budget for Task Force • Joint Evaluation of the Project Achievement • OM Budget for the Warning System of FFWS	• EDO (P&F) • EDO (SW) • DDO (R) • Task Force

Table 2-10 Record of Meeting with WASA

No.	Date	Location	Major Topics	Attendance
1	May 20, 2009	WASA	• History of dredging in Lai Nullah • Phase-I Short tern dredging / desilting plan • Phase-II Long term dredging / desilting plan • Budget for Dredging	• MD (WASA) • Director (WASA) • JICA Expert • PMD • FFC • TMA • RCB • DDO (R) • JICA
2	June 04, 2009	WASA	• The total area Divided in 4 reaches • Explains Reach-1, 2 ,3 & 4 • Progress of Dredging • Encroachments in TMA Area • CDA contribution in Nullah Lai	• MD (WASA) • Director (WASA) • JICA Expert • CDA • TMA • RCB
3	June 11, 2009	WASA	• Progress of Dredging • NOC for dredging in Cantonment Area • Annual budget for Dredging • Waste material of dredging must be dump in proper place	• MD (WASA) • Director (WASA) • JICA Expert • FFC • CDA • TMA • RCB • DDO (R)
4	June 18, 2009	WASA	• Progress of Dredging • Encroachments removed by TMA • Dredging in Cantonment Area • Role of CDA in Nullah Lai	• MD (WASA) • Director (WASA) • JICA Expert • FFC • PMD • CDA • TMA • RCB
5	June 26, 2009	WASA	• Progress of Dredging • TMA –Encroachment are removed • Cantonment area dredging completed • Slop of River bank 1:1	• Director (WASA) • JICA Expert • FFC • PMD • CDA • TMA • RCB
6	July 02, 2009	WASA	• Progress of Dredging • Cleaning of Water Level Gauging Stations • Usage of Budget for Short term and remaining • Annual budget for Dredging of Nullah Lai • FFWS of Working	• MD (WASA) • Director (WASA) • JICA Expert • FFC • PMD • CDA • TMA • RCB

2.2.3 Baseline Survey

In order to understanding the C/P's understanding of the Project, JICA Expert conducted a baseline questionnaire survey for all C/P members. Total answerer is 29 persons who are consist of 3 persons of management, 14 persons Technical Engineers, 1 Hydrologist, 2 Telecommunication Engineers and 9 other supporting staffs.

2.2.4 Indicators for Outputs

Based on the result of baseline survey, JICA Expert conducted a capacity assessment survey with C/P members to determine the indicators for Outputs. Capacity assessments are focusing on personal capacity, organization structures and social involvement. This survey is conducted by interviewing C/P members. However, personal intentions for this Project are varying hence it is difficult to have a same capacity assessment form for all C/P members. Therefore, assessment form was prepared in two types; One for FFC and PMD group, and other for CDGR, Rescue1122, WASA and TMA.

Capacity Assessment Checklist (Organization): Rescue1122

Capacity	Item	Evaluation	Achievement		Comments
			Present	Target	
Organization Structures, Roles, Management, Leadership and Problem Consciousness	Mission of Flood Relief Plan (FRP)	1. Clear Mission of FRP on Flood Risk Management(FRM) 2. Existence of a Plan to achieve the Mission 3. Existence of a Plan to achieve the Mission but not operated yet 4. Implementation of the Plan to achieve the Mission of FRP	2	4	FRM is including ordinary and floods activities
	Coordination with other agencies	1. Few (limited) coordinate with other agencies 2. Sending the information based on the request 3. Open the information without response 4. Open the information and good relation with other agencies	2	3	
	Influences and Leadership of the FFWS	1. Few influence for the people/other organization 2. Understanding the FFWS Roles/Task 3. Recognition of the FFWS as the leadership organization on Flood Risk Management 4. Implementation of the Integrated Management by the FFWS	2	3	
	Collaboration Level among the Related Organization (in ordinary time)	1. Few Collaborations 2. Collaborations among FFC, PMD, CDGR and RCB 3. Collaborations among FFC, PMD, CDGR, RCB and Related Municipality 4. Collaborations among all related organization including Private Sectors, NGO and Communities	2	3	
	Manpower for FFWS activity	1. Enough manpower but low skill 2. Not enough manpower can only operate the system 3. Enough manpower for operation but need improve a skill 4. Enough manpower and skill for all FFWS activities.	3	4	
	Equipment for FFWS activity	1. Not enough and no plan to improve 2. Not enough but there is a plan to achieve 3. Existence of a plan but not operated yet 4. Implementation of the plan to achieve the activities	1	2	
	Problem Consciousness	1. No awareness and repeat same problem 2. Less awareness and hardly improve the situation 3. Existence of a Plan but slow improvement 4. Good awareness Plan and solve the problem quickly	2	4	

Fig. 2-3 Example of Capacity Assessment Form and its Results

2.2.5 C/P Training in Japan

1) Training on Flood Risk Management Phase-I

C/P training in Japan was conducted from 13 May 2008. Initially the training was planned for 8 persons, but only 5 persons were participated in this training. As part of the training, trainees visited various government and private agencies related flood risk management.

Training Period: 13 May 2008 to 28 May 2008

Trainee: 5 Persons

Visiting Place: Japan Meteorological Agency-Osaka District Meteorological Observatory, Disaster Reduction and Human Renovation Institution, Osaka Prefecture

Sayamaike Museum, Kinki Regional Development Bureau, MLIT, Osaka City, Taitou-ku Tokyo Metropolitan Government, CTI Engineering International Co., Ltd.

After training in Japan, trainees made a presentation during JCC Meeting on 18 June 2008 and prepared Comments and Recommendation for Training.

2) Training on Hydrology Phase-I

Hydrology training was conducted for PMD engineers in order to learn basic hydrology acknowledge for management of FFWS.

Training Period: 20 September 2008 to 1 November 2008

Trainee: 2 Persons

Visiting Place: JICA Tsukuba International Center, Japan Meteorological Agency, CTI Engineering International Co., Ltd. (CTII)

3) Training on Flood Risk Management Phase-II

C/P training in Japan is conducting from 12 May 2009. Trainees are 8 parsons from C/P agencies and they are divided in 3 courses. Trainees are visiting government and private agencies, where related in the project.

Course	Period	Participant	Visiting Place
1. Flood Risk Management-National Level	12 May 2009 - 18 May 2009	1 (FFC)	MLIT, Tokyo Metropolitan Government, Cabinet Office, IDI, CTII
2. Flood Risk Management-Local Government	14 May 2009 - 27 May 2009	3 (FFC, CDGR)	Shinjuku City, MLIT, JRRN, Nerima City, FRICS, Kanagawa Prefecture Government, CTII
3. O/M on FFWS	14 May 2009 - 27 May 2009	4 (PMD, Rescue 1122)	JRC, MLIT

C/P training in Phase-II was re-designed due to the necessity of O/M training in the manufacturer of FFWS for C/P agencies. Since Phase-I, JICA expert had several lectures and on the job training with C/P, C/P starting faced another problem for management of FFWS. Especially about trouble shooting and minor repair works of FFWS. Before starting the project, under the one year defect periods, most of these problems were solved by the local maintenance company.

2.2.6 Workshop on April 07 2009

Workshop was conducted on April 07 2009 in PMD, library of Lai Nullah Building for the capacity development of Counterparts agencies and other related organizations. The purpose of workshop and schedule will be shown in below.

Purpose of Workshop

- Sharing of knowledge on Flood Risk Management among engineers and staff of Local Government (LG) and the related agencies.
- Improvement of Flood Risk Management activities with the engineers, LG and representatives of residents in the target area concerned.

Table 2-11 Schedules for Workshop on April 07 2009

Activity	Time	In-Charge
Registration	09:40 - 10:00 am	
Opening Program Welcome Speech	10:00 - 10:20 am	Project Director PMD-DG
Workshop Overview	10:20 - 10:30 am	JICA Expert Team
Activities Report for **Output 1**; Flood Simulation Model (MIKE11) Reproduction of 2007 and 2008 Flood Operation and Maintenance of Monitoring System	10:30 - 11:00 am	PMD, FFC
Activities Report for **Output 2**; Operation and Maintenance of Warning System	11:00 - 11:20 am	Rescue1122
Tea Break (11:20-11:30)		
Activity Report for **Output 3**; Awareness Activities 2009 (Action Plan and Achievement in progress)	11:30 - 12:00 am	Task Force Team
Activity Report for **Output 4**; Common Communication System for Flood Risk Management Sedimentation (Maintenance Dredging of Lai Nullah)	12:00 - 12:30 pm	JICA Expert Team WASA
Open Forum Commitment / Impression Improvement of activities	12:30 - 13:00 pm	Project Director FFC (Moderator)

Result of workshop on April 07 2009 was organized in report and hand out to all participants of the Workshop and counterparts. Participant of Workshop is shown in Table 2-12.

Table 2-12 Record of Attendance of Workshop at each Concerned Agencies

No	Organization Name	Invitation Workshop	Actual
1	CDGR (Revenue, Fire Fighting, Civil Defence, WASA, TMA, Education, Health) (3 Civil Defence Volunteers)	08	11
2	FFC	03	03
3	PMD	08	08
4	Task Force (2 PMD, 3 CDGR, 2 Rescue1122)	07	07
5	Rescue1122	02	03
6	NDMA	03	01
7	EOJ	01	01
8	JICA	03	01
9	Project Evaluation Team	01	01
10	EAD	01	01
11	JICA Expert Team	03	03
12	CDA	01	-
13	RCB	01	-
14	Union Council and Residents and Mosques	18	-
15	NGO		
16	Other donor		
17	Private company		
18	Media		
19	Principal of school		
20	Mosque		
	Total	60	40

2.2.7 Seminar

Seminar was conducted on November 3 2009 in Islamabad, due to the security reason, venue was changed to Islamabad Club. Therefore, newspaper and media were not able to join the seminar and other related donor and agencies did not attended. Total numbers of participants were nearly 60 persons.

Purpose of Seminar

- Sharing of Achievement and Issue on Flood Risk Management among engineers and staff of Local Government (LG) and the related agencies.
- Sustainable of Flood Risk Management activities with the engineers, LG and representatives of residents in the target area concerned.

Table 2-13 Schedules for Seminar on November 03 2009

No.	Contents / Presentation Title	Name	Position / Office
A. Speeches			
	Opening Speech	Mr. Asjad Imtaiz Ali	Project Director / Member Technical, FFC
	Welcome Speech	Dr. Qammar uz Zaman Choudhary	Director General, PMD
		Mr. OTAKE Tomoharu	Chief Representative, JICA Pakistan Office
B. Presentations			
	Project Overview	Mr. Kaku Shuji	Team Leader, JICA Expert Team
1-1	Activities of MCC of Flood Forecasting and Warning System	Mr. M. Aleem ul Hassan Mr. Imran Aslam Butt	Meteorologist-PMD Assistant Electronic Engineer, PMD
1-2	Hydrological Simulation –MIKE 11	Mr. Qazi Tallat Siddique	Assistant Engineering Advisor (Civil), FFC
2-1	Operation and Maintenance for Warning System	Mr. Ahmed Tahir Chuhan,	Computer Telephone Wireless Operator, Rescue1122
3-1	Task Force for Awareness Regarding Flood Risk Management	Mr. Ali Hussain	Emergency Officer / Leader of Task Force, Rescue1122
4-1	Revision of Flood Relief Plan – 2009, District Rawalpindi	Mr. Sajid Mahmood Minhas	Senior Instructor, Civil Defence, CDGR
4-2	Maintenance Dredging & Existing Issue in Lai Nulah	Lt. Col. ® Isalm-ul-Haq	Managing Director, WASA
5-1	Result of Project Evaluation and Recommendation	Ms. SUEYUSHI Yukiko	Terminal Evaluation, JICA Evaluation Team
C. Open Forum			
	Commitment / Impression	Mr. Kaku Shuji	Team Leader, JICA Expert Team
		Mr. Qazi Tallat Siddiqui	Assistant Engineering Advisor (Civil), FFC
	Closing Remark	Mr. KUMAGAI Hidenori	Leader, JICA Evaluation Team

CHAPTER 3 ACTIVITIES AND PROGRESS OF OUTPUT 1

3.1 Condition and Problems on Hydrology–Start-up Stage

1) Continuity from the Soft-Component under Japan Grant Aid Project

Five (5) persons obtained the certificate of hydrology in Soft-Component under Japan Grant Aid Project. According to the inventory of trainees of PMD for this Project, three (3) of them took part in the said hydrological training and they are said to be able to do flood forecasting with MIKE11 software. Presently, only two (2) of them remained in the project. These two (2) trainees have insufficient hydrological knowledge to evaluate the forecasted results and data although they are able to do some activities for flood forecasting.

There is little continuity from soft-component project because the nominated personnel for the current Project are 22 from PMD, one (1) from FFC and two (2) from Rescue1122. All of them are inexperienced in soft-component, except the three (3) PMD staffs mentioned above.

2) Knowledge on Hydrology

Several meteorologists from PMD are taking part in this training. Although they have some knowledge on hydrology, none of them has knowledge on rainfall analysis for flood and river hydraulics. Also, the new trainees of PMD have no knowledge on hydrology because most of them are electric engineers.

The person who trained in soft-component has only limited knowledge of flood forecasting. For instance, they are not able to analyze hydrological data and modify the forecasting model. On the other hand, the nominated person from FFC is hydrologist, and he seems to have good knowledge of hydrology and floods.

3) Decision-Making on Alert and Evacuation

Based on the present procedure, PMD transmits flood information via FFWS and fax, Rescue1122 operates the warning system and CDGR make decision on the issuance of “Alert” or “Evacuation” warning. Therefore, some hydrological knowledge is necessary for Rescue1122 to give appropriate suggestion on hydrology to CDGR but such an engineer hasn’t been trained yet. Furthermore, issuance of “Evacuation Order” warning might be delayed if CDGR makes decision from only water level at Gawalmandi Bridge, which is an old practice before 2007.

3.2 Training on Hydrology Phase-I

The contents and schedule of the hydrological training was prepared based on the above problems.

3.2.1 Implementation of Lecture and Practice

Implementation schedule from 14 March 2008 to 14 April 2008 is shown in Table 3-1. Program of training in this period was planned as mainly indoor-lecture with the following objectives:

- To transfer the knowledge that they have to obtain before monsoon season, and
- To ensure self-training can be undertaken during the absence of Experts.

Considering the previous lectures and indoor-practice/practice using data collected in self-training have been conducted. In addition, this period was monsoon season thus actual discharge measurement was conducted with supported from JICA Expert Team.

The indoor-lecture and practice were conducted almost every day except Friday and Sunday. Four (4) meetings, 14 indoor-lectures, five (5) practices and four (4) field trainings have been done.

Table 3-1 Training Schedule on Hydrology

Date	Contents	Program	Group
Mar. 14	Explanation of Program on Hydrology	Meeting	B
Mar. 12 - 22	Preparatory work		
Mar. 24	Orientation meeting	Meeting	B
Mar. 25	Hydrological Data	Indoor Lecture	A
Mar. 26	Data Management and Data Analysis	Indoor Lecture	A
Mar. 27	Hydrological Statistics	Indoor Lecture	A
Mar. 29	Outline of MIKE11	Indoor Lecture	A
Mar. 31	Reproduction of 2007 Flood	Practice	A
Apr. 1	Discharge Measurement (Outline)	Indoor Lecture	B
Apr. 2	Discharge Measurement (Float Method)	Indoor Lecture	A
Apr. 3	Discharge Measurement (Field Notebook)	Indoor Lecture	A
Apr. 5	Discharge Measurement (Discharge Calculation)	Practice	A
Apr. 7	Discharge Measurement	Field Traning	A
Apr. 8	Discharge Measurement (Site Inspection)	Field Traning	A
Apr. 9	Flood Forecasting Model of Lai Nullah	Indoor Lecture	B
Apr. 10	Feature of Lai Nullah	Indoor Lecture	B
Apr. 11	Flood Forecasting	Practice	A
Apr. 14	Meeting, Leaving Islamabad	Meeting	A
	Collecting Hydrological Data (Rainfall and Water Level)	Self Training	A
	Preparation of Annual Table and Monthly Table	Self Training	A
	Discharge Measurement	Self Training	A
	MIKE11 Simulation	Self Training	A

Group A : PMD
Group B : PMD + FFC + Rescue1122

Date	Contents	Program	Group
Jun. 23-24	Preparatory work		
Jun. 25	Orientation meeting and Flood Warning Code 2008	Meeting/Lecture	B
Jun. 26	Presentation of Result of Self-training	Indoor Lecture	A
Jun. 28	Practice on Rainfall analysis	Practice	A
Jun. 30	Discharge Measurement in Lai Nullah	Indoor Lecture	A
Jul. 1	Practice on Discharge Measurement at Gawalmandi	Field Traning	A
Jul. 2	Evaluation of data, Data error finding	Indoor Lecture	A
Jul. 3	Runoff model	Indoor Lecture	A
Jul. 5	Discharge measerement in actual flood	Field Traning	A
Jul. 8	H-Q Rating Curve	Indoor Lecture	A
Jul. 9	Runoff calculation, installation of new flood forecasting mode	Practice	A
Jul. 10	Meeting, leaving Islamabad	Meeting	A
	Rainfall Analysis	Self Training	A
	Discharge Measurement	Self Training	A
	MIKE11 Simulation	Self Training	A
	Practice on MIKE11	Self Training	A

Group A : PMD
Group B : PMD + FFC + Rescue1122

3.2.2 Implementation System

Take into consideration of the ability of trainees in self-training activities, the trainees of PMD was divided into four (4) groups as shown in Table 3-2. Four (4) trainees were named as group leader of each group and the counterparts are managing and controlling these groups. As for MIKE11 software, 1 or 2 persons were nominated as MIKE11 user of each group due to the limitation of software key.

Table 3-2 Grouping of Trainees

Mr. Akram Amjun

Mr. Jan Muhammad Khan

Group 1			**Group 2**		
No.	Name	MIKE11	No.	Name	MIKE11
GL	Mr. Shahzad Sultan	x	GL	Mr. Shahid Mahamood	x
1	Mr. Yasir Hefeez Qureshi		1	Mr. Imran Ahmed Sadiqi	
2	Mr. Ali Hussan Abbasi		2	Mr. Farhan Khaliq	
3	Mr. Ghulam Hussain		3	Mr. M. Atif	
4			4		
5			5		

Mr. Zaheer A. Babar

Group 3			**Group 4**		
No.	Name	MIKE11	No.	Name	MIKE11
GL	Mr. Aleem ul Hassam	x	GL	Mr. Imran Aslam	x
1	Mr. Kashif Ali	x	1	Mr. Aamir Shehzad Warsi	
2	Mr. Bukhtair Sethi		2	Mr. Waqar Ali	
3	Mr. Shahid Aziz		3	Mr. M. Rizwan	
4	Mr. Hamid ur Rehman		4	Mr. Zaheer Abbas	
5			5		

* GL: Group Leader
MIKE11: MIKE11 User

3.2.3 Attendance of Training

The attendance of training had individual variation which can be grouped into ‘less than 50%’ and ‘more than 80%’ as shown in Table 3-3. While the Expert is absent, each team leader shall train the person of lower attendance rate by using the text that the hydrological Expert had prepared. However, this self training by team leader was not conducted when the Expert came to Pakistan again in May 2008.

Table 3-3 Attendance Rate

	Name & Designation	Deptt.	3/24	3/25	3/26	3/27	3/29	3/31	4/1	4/2	4/3	4/5	4/7	4/8	4/9	4/10	4/11	4/14	Rate (%)
1	Mr. Akram Anjum, Director	PMD	1													1		1	
2	Mr. Jan Muhammad Khan,	PMD																1	
3	Mr.Zaheer A.Babar, Dy. Director	PMD														1		1	
Group No.1																			
GL	Mr.Shahzad Sultan, Meteorologist	PMD	1	1		1	1	1	1	1	1	1	1	1	1		1	1	88
1	Mr. Yasir Hafeez Qureshi, Sub. Engr.	PMD	1	1	1		1	1											31
2	Mr.Ali Hussain Abbasi, Sub. Engr.	PMD		1		1	1		1						1			1	38
3	Mr.Ghulam Hussain. Sub. Engr.	PMD	1	1	1	1	1											1	38
Group No.2																			
GL	Mr.Shahid Mahmood, CDEO	PMD	1	1	1	1	1		1	1	1			1	1	1	1	1	81
1	Mr. Imran Ahmed Siddiqi, Assistant Meteorologist	PMD	1	1	1	1			1	1					1	1	1	1	63
2	Mr. Farhan Khaliq, Sub. Engr.	PMD	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	100
3	Mr. Muhammad Atif. Sub. Engr.	PMD	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	100
Group No.3																			
GL	Mr. Aleem ul Hassan, Meteorologist	PMD	1	1	1	1			1	1		1	1	1	1	1	1	1	81
1	Mr. Kashif Ali, Sub. Engr.	PMD	1		1	1	1	1	1	1	1	1	1	1	1	1	1	1	94
2	Mr. Bukhtair Sethi, Sub. Engr.	PMD	1					1			1		1	1	1	1	1		50
3	Mr. Shahid Aziz. Assistant Electronic Engineer,	PMD		1	1	1	1		1	1	1		1	1				1	63
4	Mr. Hamid ur Rehman, Sub. Engr.	PMD		1	1	1				1				1					31
Group No.4																			
GL	Mr. Imran Aslam, Electric Engineer	PMD	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	100
1	Mr. Aamir Shehzad Warsi, Sub. Engr.	PMD		1		1		1						1				1	31
2	Mr. Waqar Ali, Sub. Engr.	PMD	1	1	1	1	1		1				1						44
3	Mr. Rizwan Ahmed, Sub. Engr.	PMD		1	1														13
4	Mr. Zaheer Abbas, Sub. Engr.	PMD		1				1	1	1	1		1	1			1	1	56
Other Participant from FFC and Rescue 1122																			
1	Qazi Talalt, Senior Engr. /	FFC	1						1						1	1			100
2	Usma Khalid, CTWO	Rescue 1122							1							1			50
3	Ali Hussain, Emergency Officer	Rescue 1122							1							1			50
4																			
5																			

	Name & Designation	Deptt.	6/25	6/26	6/28	6/30	7/1	7/2	7/3	7/5	7/8	7/9	7/10	Rate (%)
1	Mr. Akram Anjum, Director	PMD											1	
2	Mr. Jan Muhammad Khan,	PMD												
3	Mr. Zaheer A.Babar, Dy. Director	PMD	1	1	1	1		1	1			1	1	73
Group No.1														
GL	Mr. Shahzad Sultan, Meteorologist	PMD	1	1		1	1	1	1	1	1	1	1	91
1	Mr. Yasir Hafeez Qureshi, Sub. Engr.	PMD		1										9
2	Mr. Ali Hussain Abbasi, Sub. Engr.	PMD	1		1	1	1		1				1	55
3	Mr. Ghulam Hussain. Sub. Engr.	PMD	1											9
Group No.2														
GL	Mr. Shahid Mahmood, CDEO	PMD	1	1	1			1	1	1	1	1	1	82
1	Mr. Imran Ahmed Siddiqi, Assistant Meteorologist	PMD	1						1					18
2	Mr. Farhan Khaliq, Sub. Engr.	PMD	1	1	1	1	1	1	1	1	1		1	91
3	Mr. Muhammad Atif. Sub. Engr.	PMD	1	1		1	1	1						45
Group No.3														
GL	Mr. Muhammad Aleem ul Hassan, Meteorologist	PMD	1	1	1	1	1	1	1	1	1	1	1	100
1	Mr. Kashif Ali, Sub. Engr.	PMD	1	1										18
2	Mr. Bukhtair Sethi, Sub. Engr.	PMD		1										9
3	Mr. Shahid Aziz. Assistant Electronic Engineer,	PMD	1	1										18
4	Mr. Hamid ur Rehman, Sub. Engr.	PMD												0
Group No.4														
GL	Mr. Imran Aslam, Electric Engineer	PMD	1	1	1	1	1	1	1	1	1	1		91
1	Mr. Aamir Shehzad Warsi, Sub. Engr.	PMD	1	1	1		1	1	1	1		1	1	82
2	Mr. Waqar Ali, Sub. Engr.	PMD					1		1	1		1		36
3	Mr. Rizwan Ahmed, Sub. Engr.	PMD												0
4	Mr. Zaheer Abbas, Sub. Engr.	PMD												0
Other Participant from FFC and Rescue 1122														
1	Qazi Talalt, Senior Engr. /	FFC												-
2	Usma Khalid, CTWO	Rescue 1122	1											100
3	Ali Hussain, Emergency Officer	Rescue 1122												-
4	Aamir Saeed Khan	Rescue 1122	1											100
5	Musa Zubair Loghi	Rescue 1122	1											100
6	M.Shoaib Ayyaz	Rescue 1122	1											100
7	Azmat Ali	Rescue 1122	1											100

Note: colored person are also the member of Phase-II training (see Table 3-7).

3.2.4 Output Phase-I

1) Existing Conditions of FFWS (Start up Stage)

Based on the result of Table 3-3, JICA Expert conducted a seminar to explain each problem to C/P members. Problem regarding O/M of FFWS equipments will be considered in the training program in June 2008. On the other hand, problems about operation of FFWS system are evaluated and recommended to FFC, PMD, CDGR and Rescue1122 for necessary actions. There are some improvements in O/M works since the above seminar, such as regular cleaning up of rain gauging stations and water level stations, repair of damaged fence at Kattarian water level gauging station and cutting of obstructing tree at Bokra rain gauging station.

2) Identification of PMD Problem and Planning of Training Schedule

The Expert team confirmed with trainee about the guideline and manual related to FFWS and prepared training schedule based on the level of trainees.

3) Analysis of Meteorology/Hydrology Data and Exercise for Flood Simulation Model

a) Analysis of Meteorological and Hydrological Data

The lecture on “Hydrological Data”, “Data Management” and “Hydrological Analysis” were conducted. In self-training, each group collected hydrological data of each station and prepared monthly and annual tables.

b) Exercise of Flood Simulation Model

Practice on flood forecasting and reproduction of past floods were conducted twice. The usage of MIKE11 and the ability to intuitively understand the relation between rainfall and water level are growing through repeating of this work.

c) Identifying Problems of Existing Flood Simulation Model

The trainees selected seven (7) floods of 2007 and re-produced one (1) case under instruction of the Expert. Another six (6) floods were done by themselves as self-training while the Expert was away. As a result, it turned out that present simulation model based on the parameters of large flood in 2001, underestimated the water levels of several minor floods in 2007.

d) Issuance of Warning According to Flood Simulation Model

Hydrology Expert confirmed that trainees who were trained in soft-component are able to execute flood forecasting works by using MIKE11. These trainees are also able to explain the procedure of flood forecasting works to other trainees. The soft-component participants have good understanding on it.

e) Drills on Flood Simulation Model by Trainee

After the activity of b), other MIKE11 users tried to execute the flood forecasting simulation under the guidance of the soft-component participants. They shall learn the necessary skills during in the future self-training.

4) Training for PMD Personnel (continuation)

a) Guidance for Runoff Mechanism

Lecture on runoff mechanism has been done once but the mechanism can only be understood trough actual exercise. Therefore, the exercise will be executed by Lai Nullah model in the Phase-II.

b) Guidance for Characteristics of Runoff Model

Exercise with simple MIKE11 model has been carried out by trainees. In addition, they are continuously simulations by self-training in order to improve their understanding on the change of runoff corresponding by the change of parameters.

c) Drills on Discharge Measurement

Hydrology Expert had done indoor-lecture seven (7) times the practice once, field training twice and actual measurement works once. As for the actual measurement, JICA Expert Team accompanied with trainees and confirmed that they could conduct it by themselves if they had the parson who is designated as group leader.

d) Rainfall Analysis and Detection of Error

Exercise on rainfall analysis was conducted once to improve the understanding of lectures. Full understanding is anticipated after self-training on the analysis with actual rainfall data.

The rainfall data observed under the FFWS has to be checked due to defective observation. The hydrological Expert conducted the evaluation on data accuracy and found some observation errors.

5) Practice of Flood Simulation Model (continuation)

Practice on flood simulation models was not able to be carried out during this period. However, the Expert had confirmed that the trainees could conduct flood forecasting works in accordance with the procedure manual.

3.2.5 Aggradation of Riverbed and its Effects on Flood Warning Code

1) Identified Issue during the Activities

The water level at Gawalmandi Bridge reached Alert Level in the early morning on 5 April 2008 though it was dry season. At that time, the amount of basin mean rainfall was 31.5 mm and the total rainfall was 54.2 mm. The maximum 180 minutes rainfall was 25.7 mm and it didn't reach even pre-alert level of 50 mm/180 minutes. The incident indicated that alert warning may happen frequently at coming monsoon season of 2008.

Aggradation of riverbed is caused by the construction of infrastructures in Islamabad and river improvement works, as well as riverbank erosion along the upstream of Lai Nullah.

If the desilting works is not conducted, the Flood Warning Code should be reviewed and modified immediately in order to avoid frequent issuance of alert warning.

2) Action Taken for the Problem

The hydrology Expert was dispatched to deal with the abovementioned problem on 12 May 2008. Based on the following study, the flood warning code was revised.

a) Estimation of the Degree of Riverbed Aggradation

From field survey and through comparison of pictures of Lai Nullah, the hydrology Expert estimates that aggradation is about 1 m for the stretch between Kattarian Bridge and Chaklala Bridge. The flood simulation model was then being modified accordingly. Through MIKE11 simulations, it was confirmed that the estimate of river elevation is roughly correct.

b) Reliability of Rainfall Data

The rainfall data observed and stored in FFWS was analyzed and the reliability was evaluated. It was found that the following data are not reliable:

- Data of Golra rainfall gauging station on June 2007
- Data of Bakra rainfall gauging station on 1 July 2007 - 15 January 2008

c) Revision of Flood Warning Code

The flood warning code was revised based on the results of MIKE11 simulations using observed data in 2007. The revised code is shown in Table 3-4.

Table 3-4 Revised Flood Warning Code Phase-I

Code		Flood Warning Code					
		Pre-Alert		Alert		Evacuation	
		Katt	Gawal	Katt	Gawal	Katt	Gawal
2007 code	W.L.	-	-	496.5	489.8	499.6	493.6
	Rain	50mm/180min.		or 50mm/60min. or 130mm/180min.		or W.L. Alert and Rain Alert	
2008 code	W.L.	496.5	489.8	498.4	491.7	499.6	493.6
	Rain	50mm/180min.		or 30mm/60min. or 70mm/180min.		or W.L. Pre-Alert and Rain Alert	

d) Flood Warning Code 2008

The abovementioned revised code was explained and discussed in the following meetings and then approved as the Flood Warning Code 2008.

Table 3-5 Meeting on Flood Warning Code Phase-I

Date	Contents
June 18	Report in Monthly C/P Meeting
June 20	Explanation and Discussion with stakeholders concerning flood
June 23	Explanation and Discussion in Pre-flood Arrangement 2008 Meeting
June 26	Explanation to the staff of PMD and Rescue1122 in Hydrology Lecture
June 30	Explanation to Rescue1122 in O&M Lecture
July 2	Distribution to DCO and Revenue of CDGR as O&M Manual
July 8	Confirmation in Monthly C/P Meeting

3.3 Modified Training on Hydrology Phase-II

3.3.1 Improving Parameters of the Flood Simulation Model

In response to the activity result of Phase-I, it was evaluated that the trainees needed to be trained more especially about MIKE11 skills by direct instruction under the JICA Expert team. Following activities are additionally carried out in order to understanding of data analysis that JICA Expert conducted in 2008 and to learn MIKE11 skills.

1) Calibration of the Flood Simulation Model
2) Modification and Improvement of Model, Practice on Runoff Calculation and Modeling Practice (Additional Item, MIKE11)
3) Practice on Flood Forecasting with Improved Model (Additional Item, MIKE11)
4) Checking Rainfall Data and Detection of Data Error (Additional Item)

Activity 1) is originally scheduled and the JICA Expert gives technical guidance concerning the verification and the improvement of flood forecasting model based on the reproduction result of floods in 2007 and 2008.

Activity 2) should have been carried out as a self-training and JICA Expert has already given a lecture about this topics. However, the understanding is not enough due to lack of actual works. Therefore, the degree of understanding have to strengthened through an actual practice under guidance of JICA Expert in Phase-II.

Some part of Activity 3) haven't been finished in Phase-I. In Phase-II, JICA Expert complements the unfinished part and teaches the operation for MIKE11 in additionally.

As for the Activity 4), the trainees is going to evaluate the actual data by using flood warning code 2008 that was modified by JICA Expert.

3.3.2 Improvement of Flood Simulation Model

Although the lecture for flood forecasting is delivered in advance, the main activities will be carried out in next stage from the middle of May to the end of June, 2009.

3.4 Hydrological Training Phase-II

The contents of hydrological training were scheduled with considering the additional activity described in section 3.3.1.

3.4.1 Implementation of Lectures and Practices

The lectures and the practices were carried out from January 14 to March 6, 2009 as shown in Table 3-6. Main activity was concentrated to the practical work due to the results of Phase-I.

The indoor-lecture and practice were conducted almost every day except Friday and Sunday. Particularly regarding MIKE11, the JICA Expert conducted the operation guidance of MIKE11 in order to share the time table because only 2 computers were available in PMD. Two (2) meetings, eight (8) indoor-lectures, eleven (11) MIKE11 practices, seven (7) indoor-practices, one (1) field training and five (5) evaluations concerning hydrology, flood forecasting and MIKE11 skills have been implemented in this training. (Evaluation activities were colored in the Table 3-6).

Table 3-6 Training Schedule on Hydrology

Date	Contents	Program	Group
Jan. 14	Orientation	Meeting	A
Jan. 15	Confirmation of Self-Training Result	Practice	A
Jan. 19	Practice on Runoff Model	Practice	A
Jan. 20	Sensitivity Analysis on each Runoff Parameter	Practice	A
Jan. 21	Explanation on Runoff Parameter	Lecture	A
Jan. 22	Presentation on Hydrology Training in Japan	Lecture	A
Jan. 24	Reproduction of 2008 Floods	Practice	A
Jan. 26	Explanation of Reproduction Result by PMD	Lecture	B
Jan. 27	MIKE11(Network Editor + Cross-section Editor)	MIKE11	A
Jan. 28	MIKE11(Runoff Editor + Boundary Editor + Simulation)	MIKE11	A
Jan. 29	Examination on Hydrology	Evaluation	A
Jan. 31	MIKE11(Explanation on Modelling)	Lecture	A
Feb. 2	MIKE11(Modelling/Evaluation)	Evaluation	A
Feb. 3	MIKE11(Modelling/Evaluation)	Evaluation	A
Feb. 4	MIKE11(Modelling/Evaluation)	Evaluation	A
Feb. 7	Presentation on the Modelling and Discussion on Difficulties of Modelling	Discussion	A
Feb. 9	Cross-sectional Survey (Kattarian Bridge & Gawalmandi Bridge)	Field Training	A
Feb. 10	Making river cross section	Practice	A
Feb. 11	MIKE11(Model Modification/Runoff)	MIKE11	A
Feb. 12	MIKE11(Model Calibration on Target Flood)	MIKE11	A
Feb. 14	MIKE11(Model Calibration on Target Flood)	MIKE11	A
Feb. 16	MIKE11(Application of calibration result to 2007 & 2008 floods)	MIKE11	A
Feb. 17	MIKE11(Application of calibration result to 2007 & 2008 floods)	MIKE11	A
Feb. 18	Presentation of Calibration Result and Discussion on Difficulties of Calibration	Discussion	A
Feb. 19	Explanation on How to check rainfall data/Rainfall analysis	Lecture	A
Feb. 21	Rainfall Analysis and Data Checking (Correlation Analysis)	Practice	A
Feb. 23	Rainfall Analysis and Data Checking (Double-Mass Curve Analysis)	Practice	A
Feb. 24	Presentation on the Result of Data Checking	Lecture	A
Feb. 25	Explanation on change of river-bed	Lecture	A
Feb. 26	MIKE11(Model Modification/Cross-section)	MIKE11	A
Feb. 28	Explanation on Flood Forecasting and Lead Time	Lecture	B
Mar. 2	Lead Time (Required Time for PMD/Rescue1122 and Residents)	Discussion	B
Mar. 3	MIKE11 (Flood Forecasting/Explanation of Procedure)	MIKE11	A
Mar. 4	MIKE11 (Flood Forecasting/Practice)	MIKE11	A
Mar. 5	MIKE11 (Flood Forecasting/Evaluation)	Evaluation	A
Mar. 6	Meeting, Leaving	Meeting	A

3.4.2 Implementation System

Nine (9) trainees were selected aiming at the efficiency improvement of lectures and practices in Phase-II as listed in Table 3-7. However, the trainee of PMD became seven (7) substantially because one person hardly attended and another dropped in the middle of training.

Practice for MIKE11 and others for trainees were applied time sharing method during the working hour because only two computers were available for training.

Table 3-7 Trainees of PMD

1.	Mr.Zaheer A.Babar
2.	Mr.Shahzad Sultan
3.	Mr. M. Aleem ul Hassan
4.	Mr. Imran Aslam
5.	Mr. Aamir Shahzad Warsi
6.	Mr. Farhan Khaliq
7.	Mr. Kashif Ali
8.	Mr. Waqar Ali
9.	Mr. Shahid Mahmood

3.4.3 Attendance of Training

Attendance of training is shown in Table 3-8. Total attendance rate of PMD is around 70% but it is high with about 90% except two people who has an extremely low attendance rate. And three lectures and discussions were carried out together with FFC and Rescue1122.

Presentation and Practice of MIKE 11

Examination and Discussion of Lead Time

Fig. 3-1 Photo for Hydrology Training

Table 3-8 Attendance Rate

	Name & Designation	Deptt.	1/14	1/15	1/17	1/20	1/21	1/22	1/24	1/26	1/27	1/28	1/29	1/31	2/2	2/3	2/4	2/7	2/9	2/10
1	Mr. Akram Anjum, Director	PMD																		
2	Mr. Jan Muhammad Khan, Director	PMD																		
3	Mr. Zaheer A.Babar, Dy. Director	PMD	1	1	1	1	1	1	1	1	1	1	1		1	1	1	1	1	1
4	Mr. Shahzad Sultan, Meteorologist	PMD	1		1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
5	Mr. Aleem ul Hassan, Meteorologist	PMD	1	1	1	1	1	1	1	1						1	1	1	1	1
6	Mr. Imran Aslam, AssistantElectric Engineer	PMD	1	1	1	1	1	1	1	1	1	1	1		1	1	1	1	1	1
7	Mr. Aamir Shahzad Warsi, Professional Assistant	PMD	1	1	1	1	1	1	1		1	1	1	1	1	1	1	1	1	
8	Mr. Farhan Khaliq, Sub. Engr.	PMD	1	1	1	1	1	1	1	1	1	1	1	1		1	1	1	1	1
9	Mr. Kashif Ali, Sub. Engr.	PMD	1	1	1	1	1	1	1	1	1	1	1							
10	Mr. Waqar Ali, Sub. Engr.	PMD		1		1														
11	Mr. Shahid Mahmood, CDEO	PMD	1	1	1					1	1	1	1	1	1	1	1	1	1	
12	Mr. Usman Khalid, CTWO	Rescue1122								1										
13	Mr. Hasnain Mehmood, CTWO	Rescue1122								1										
14	Mr. Aamir Saeed Khan, CTWO	Rescue1122								1										
15	Mr. M.Shoaib Ayyaz	Rescue1122																		
16	Mr. Riaz Ahmed	Rescue1122																		
17	Mr.Qazi Tallat M. Siddiqui, AEA	FFC														1			1	

	Name & Designation	Deptt.	2/11	2/12	2/14	2/16	2/17	2/18	2/19	2/21	2/23	2/24	2/25	2/26	2/28	3/2	3/3	3/4	3/5	3/6	Rate (%)
1	Mr. Akram Anjum, Director	PMD																			
2	Mr. Jan Muhammad Khan, Director	PMD																			
3	Mr. Zaheer A.Babar, Dy. Director	PMD	1	1	1	1	1	1	1	1	1	1	1		1	1	1	1	1		97
4	Mr. Shahzad Sultan, Meteorologist	PMD	1	1	1	1		1	1	1	1	1				1		1	1	1	83
5	Mr. Aleem ul Hassan, Meteorologist	PMD	1	1	1	1	1	1	1	1		1	1			1	1	1	1		81
6	Mr. Imran Aslam, AssistantElectric Engineer	PMD	1	1	1	1	1	1	1	1	1	1	1		1	1	1	1	1		97
7	Mr. Aamir Shahzad Warsi, Professional Assistant	PMD	1	1	1	1	1	1	1	1		1	1		1	1	1	1	1		92
8	Mr. Farhan Khaliq, Sub. Engr.	PMD	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	97
9	Mr. Kashif Ali, Sub. Engr.	PMD																			31
10	Mr. Waqar Ali, Sub. Engr.	PMD																			6
11	Mr. Shahid Mahmood, CDEO	PMD	1	1		1	1	1	1			1	1			1	1	1	1		78
12	Mr. Usman Khalid, CTWO	Rescue1122													1	1					100
13	Mr. Hasnain Mehmood, CTWO	Rescue1122													1						67
14	Mr. Aamir Saeed Khan, CTWO	Rescue1122													1	1					100
15	Mr. M.Shoaib Ayyaz	Rescue1122													1						33
16	Mr. Riaz Ahmed	Rescue1122													1						33
17	Mr.Qazi Tallat M. Siddiqui, AEA	FFC					1					1	1		1	1			1		67

3.4.4 Output Phase-II

The lectures and the practices were carried out from January to March 2009. Main activity was concentrated to the practical work due to the results of Phase-I. And the trainees set flood warning code under instruction of hydrology expert in June 2009.

The indoor-lecture and practice were conducted almost every day except Friday and Sunday. Particularly regarding MIKE11, the JICA Expert conducted the operation guidance of MIKE11 in order to share the time table because only 2 computers were available in PMD. All of seven (7) trainees practiced MIKE11 almost every day though four (4) trainees were nominated as MIKE11 user.

Four (4) meetings, eleven (11) indoor-lectures, thirteen (13) MIKE11 practices, eleven (11) indoor-practices, one (1) field training and five (5) evaluations concerning hydrology, flood forecasting and MIKE11 skills have been implemented in this training.

The practical work is executed step-by-step under the JICA expert's guidance, the achievement level is monitored and evaluated with each activities. Therefore, if the trainee was absent they had to conduct and recover it on the other day. The items to be conducted and to be finished are listed in Table 3-10 and 3-11. Green mark means C/P have already done as end of August 2009.

1) Improving Parameters of the Flood Simulation Model

The output of each activity is described below.

a) Calibration of the Flood Simulation Model

Explanation of each parameter is lectured and the sensitive analysis that confirmed how the runoff changed after changing of each parameter was carried out. Trainee explained the result of the sensitive analysis and then the feature and the standard value of the parameters were understood by themselves.

Moreover, the actual work for model calibration was conducted four (4) times and the trainees had understood the objective and procedure of calibration. With discussion about the difficulty of calibration and the trainee could understand more deeply.

b) Modification and Improvement of Model, Practice on Runoff Calculation and Modeling Practice

This time, JICA Expert spent a long time for this activity. Importance of model modification and procedure of model modification to deal with the aggradation of river bed were understood through this activity. And the procedure of modeling, difficulties of modeling and the limitation of modeling were also learned through not only lecture but also developing simulation model step-by-step. At first, four (4) trainees were nominated as a MIKE11 user but all trainees operated MIKE11 exercise almost every day. Moreover, river cross-sectional survey was carried out by the trainees under the guidance of JICA Expert in order to utilized for model modification

c) Practice on Flood Forecasting with Improved Model

Each trainee did the calibration, and the model that the highest reproducibility among them was adopted as a forecasting model in 2009. And the practice on flood forecasting was executed using this model. The procedure of flood forecasting was understood through this activity. The hydrological sense like the relationship among water level, rainfall and rising speed of water level was grow up by repeating this activity. And the calculation speed can be faster than before.

d) Checking Rainfall Data and Detection of Data Error

JICA Expert had analyzed rainfall data to deal with the aggradation of riverbed and had found data error at that time. In this training, the trainee understood the method of checking the rainfall data and detecting of data error by the actually conducted data checking activity. Then, the JICA Expert taught the trainee how to consider the result of data checking. The trainees have to consider the results by using on the basis of their analysis and explain the data reliability.

2) Discharge Measurement by C/P

The real discharge measurement in Lai Nullah by C/P was not able to conduct in 2009, due to the weather condition.

3) Evaluation of Validity of Flood Warning Code by the Flood Simulation Model

a) Flood Forecasting

Selection of the flood forecasting model and the procedure of flood forecasting were lectured by JICA Expert. The procedure of flood forecasting by MIKE11 model was explained in accordance with procedural manual prepared by JICA Expert.

b) Required Data for Flood Forecasting and Lead Time

Under ordinary flood forecasting, the starting time should be decided after examination of lead time. Therefore, JICA Expert gathered the related agency such as FFC, PMD and Rescue1122 and discussed the lead time in the lecture. During the discussion, the time required for data transmission, for issuance of warning and required time for the residents to evacuate safely were examined. As a result, the trainee of each agency could image their actual activity and the required time, in order to understand that which part of factor should be improved.

c) Setting of Flood Warning Code

Hydrology expert set flood warning code considering with short-term rainfall and prepared procedural manual for setting flood warning code as a lecture material. Trainees carried out setting water level code, setting rainfall code using MIKE11 simulation result and estimation of possible evacuation time by themselves through two weeks closely-packed practice.

d) Analysis of Short-term Rainfall for Flood Warning Code

FFWS can obtain rainfall data in 10 minutes intervals. Therefore more accurate rainfall code can be set taking 30 minutes, 60 minutes and 180 minutes rainfall into consideration. In fact, code 2007 and 2008 was set based on hourly and 3 hourly data.

Table 3-9 Condition of Achievement (Phase-II-1)

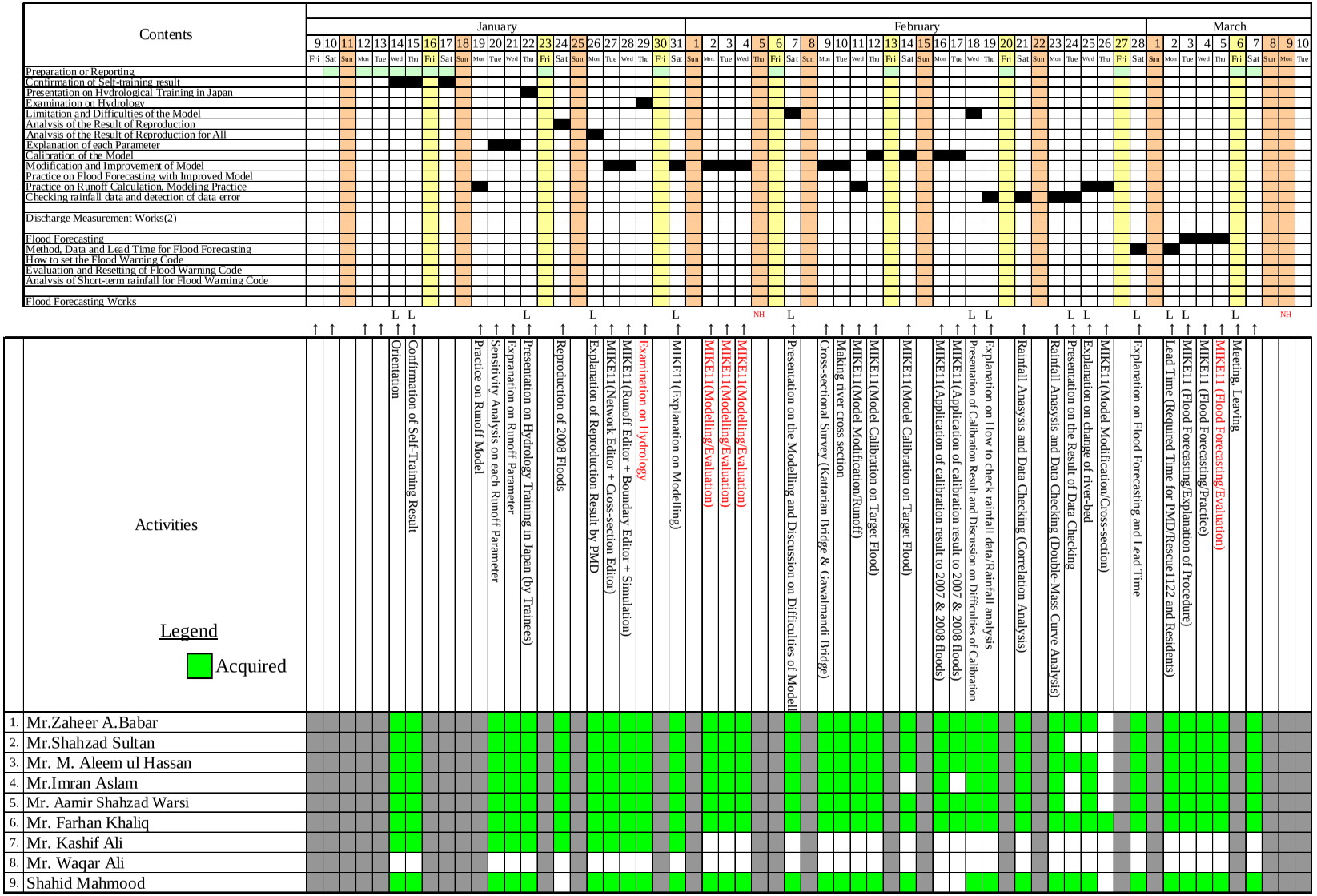
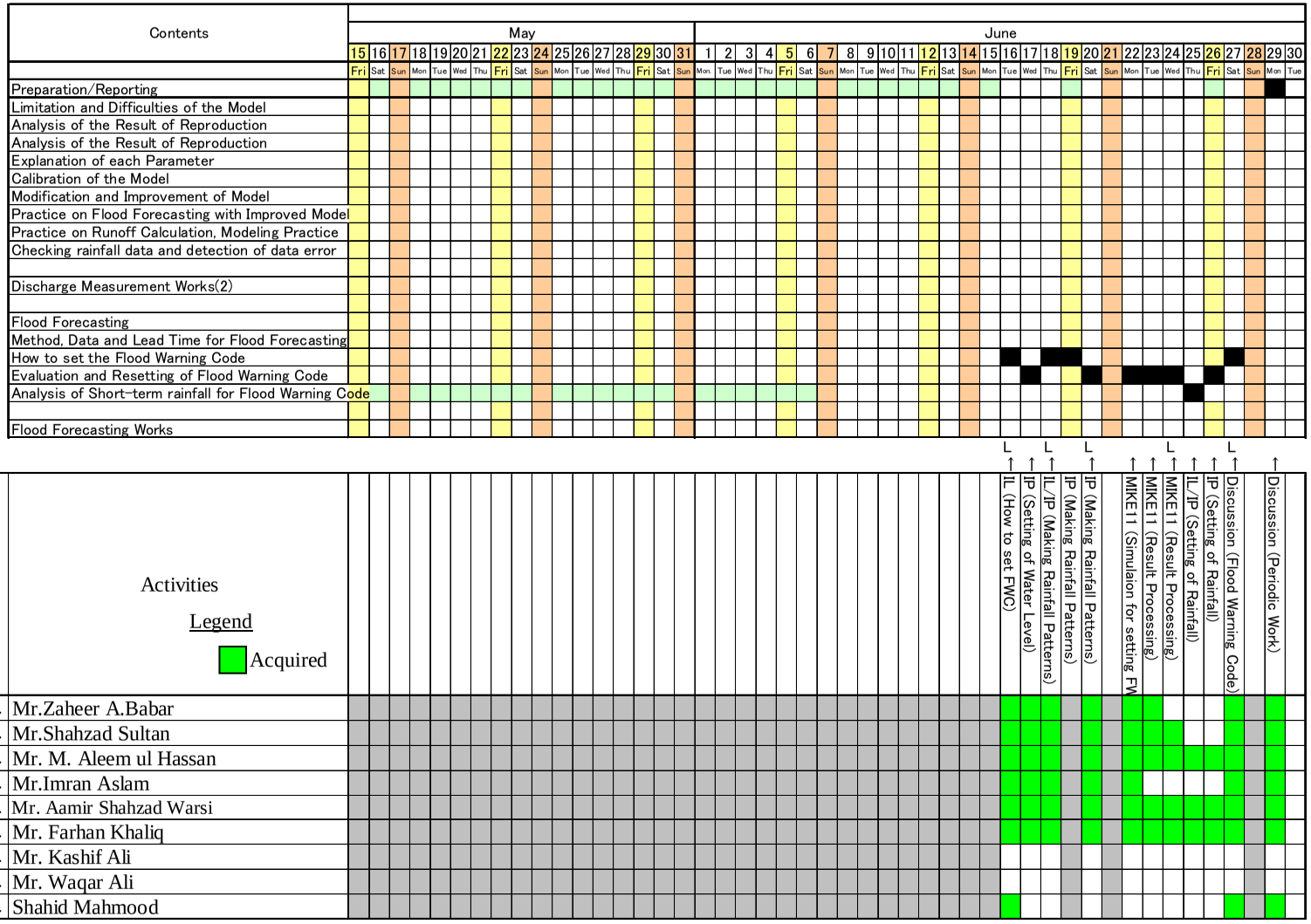


Table 3-10 Condition of Achievement (Phase-II-2)



CHAPTER 4 ACTIVITIES AND PROGRESS OF OUTPUT 2

4.1 Issue and Countermeasure during Warranty Period (2007.4～2008.3)

To grasp current operation and maintenance condition of the existing flood forecasting and warning system, interview survey for C/P and local inspector was conducted by JICA Expert. As a result, several problems on the operation and maintenance of the equipment were identified.

Japan Radio Co., Ltd., equipment supplier of Grand Aid Project, ensures the following countermeasures and the recurrence prevention plan for the trouble which occurred during the one year warranty period.

Table 4-1 Countermeasures by Equipment Supplier

Agency	Condition of Failure	Countermeasure by Equipment Supplier (Japan Radio Co., Ltd.)
WASA	The client PC was infected with virus due to careless connection with external memory by the operator, the monitor system of WASA was not working.	Countermeasure: ・The computer virus has been eliminated by anti-virus software. Recurrence preventive measures: ・Setting has been made to disable the usage of USB and CD drive on that PC. ・Password setting has also been made to limit the usage of the said PC.
WASA	A part of wireless LAN equipment was burnt, which believed to be caused by thunderbolt.	Countermeasures: ・A part of wireless LAN equipment has been exchanged with new one. Recurrence preventive measure: ・Wiring route has been changed by including earth cable as lightning arrester.
Warning Post (WP2, WP3)	Due to unpaid electricity bills by TMA, electricity supply was cut off and the equipment was not working.	Countermeasure: ・TMA has paid the electricity bills. Recurrence preventive measure: ・Avoid late payment of electricity bills. ・To check regularly including non-rainy season.
Warning Post (WP6)	A part of siren control board burnt by thunderbolt and resulted in non-functional of siren operation.	Countermeasure: ・The burnt siren control board has been replaced by new one and the capacity of the protection device was increased. Recurrence preventive measure: ・Isolation transformer has been added to protect siren control board from electrical surge.
All Warning Post	Electrical surge is easy to cause to the electric power line and damage is expected.	Recurrence preventive measure: ・Earth line of the electricity power box has been taken out.

4.2 Training for Operation and Maintenance on FFWS

4.2.1 Training Contents in Phase-I

1) Training of System Maintenance

For the operation of equipment, training for detailed operating method and maintenance of equipment has already been provided by the supplier during equipment installation. As for O/M, trainings were provided during the period of soft component in the Grand Aid project. In this project, O/M training was intensively concentrated an operator, who did not attend the former training, of Rescue1122 in DPCC. Training lectures were focused on actual operation and equipment checking method.

As for the flood forecast system of PMD, training subjects have been provided in line with the levels of understanding and ability of the staffs concerned.

Table 4-2 Training Subject

Agent	Training Subject	Numbers
PMD, Rescue1122	・ Explanation of training schedule ・ Understanding of present condition ・ Important points of operation and maintenance	4
PMD, Rescue1122 FFC	・ Visits to all gauging stations, warning posts and repeater stations ・ Training on operation and maintenance method for O/M personnel of PMD, Rescue1122 and FFC.	1
Rescue1122	・ On the job training on the correction of incorrect times between the overall system clock and the clocks of warning control equipments by reinstallation of software. ・ Practice on actual activation of siren and voice broadcasting for evacuation ・ OJT on the operation of warning control equipment and exchange of lightning protection arrester	3
PMD, Rescue1122	・ Training on maintenance record (daily, monthly and 6-monthly inspection reports)	2
PMD	・ Training on the restarting of wireless LAN repeater at RAMC in the event of system hang caused by heavy rain.	1
PMD, Rescue1122	・ Practice on the usage of types of equipments.	3

2) Revision of System Management and Operation Manual

The System Management and Operation Manual prepared during Soft Component project has been revised to cope with the present condition of warning control operation and it is named as 'System Operation and Maintenance Management Manual 2008 version'. This manual completed at the end of June and a briefing was held for all personnel concerned. The revised manual was distributed during the Monthly C/P Meeting on 8 July 2008. During this year's rainy season, warning operation was conducted based on this manual. If necessary, it will be revised again for the coming year's rainy season.

4.2.2 Training Contents in Phase-II

It guided more detailed maintenance management study and training using the measuring instruments which was introduced from the Grant-Aid implementing of periodical maintenance of the system. The periodical maintenance practice goes in the purpose to fix the technology which was acquired in study and training of Japan. In addition to train an important items actually for system operation and maintenance. As for the flood forecast system of PMD, it considered the level of the intelligibility and the ability of the maintenance management member, it gave a subject and it forwarded the independent execution of the maintenance. As the result of the training, O/M staff understands role and work recognition to the maintenance work. Therefore, the operation of FFWS along the maintenance management manual became possible. Table 4.3 shows the Phase-II study and training contents

Table 4-3 Phase-II Training Subject

Date	Training Subject	Agency
May 30	Urgent repair for warning post Urgent repair for WP-2 and WP-10 has been conducted in cooperation with PMD and Rescue 1122 jointly.	PMD, Rescue 1122
June 1	1. Explanation of the schedule and hearing for present condition 2. Point of operation and maintenance management	PMD, Rescue 1122
June 2-9	Periodical maintenance OJT Visit all gauging station repeater station and train operation and maintenance method by O/M personnel from PMD	PMD

June 4	Flood information communication drill between PMD and Rescue 1122	PMD, Rescue 1122
June 10-13	Periodical maintenance OJT Visit warning post and train operation and maintenance method by O/M personnel from Rescue 1122	Rescue 1122
June 13	1. Issuing Evacuation siren blow for Evacuation drill. 2. Periodical maintenance OJT for Warning control supervisory station for Rescue 1122	Rescue 1122
June 14	Periodical maintenance training for PMD	PMD
June 15-18	Periodical maintenance OJT Visit warning post and train operation and maintenance method by O/M personnel from Rescue 1122	Rescue 1122
June 19	Final presentation for the operation and maintenance work	PMD
June 24	Final presentation for the operation and maintenance work	Rescue 1122

4.3 Operation and Maintenance of FFWS

4.3.1 General Operation of FFWS

1) Rainfall and Water Level Gauging Telemetry Subsystem

In Phase-I, data collection on radio telemetry has been carried out. For the operation condition check on the telemetry system, the data obtaining rate is a very important element. The radio telemetry system automatically measures rainfall and water level data at an interval of 1 hour. For the period of about 10 months from 1 April 2007 to 31 January 2008, a total of 305 days of data have been obtained, which is equivalent to the rate of 99.68 %, exceeded the anticipated rate of 99.5%. Hence, it can be concluded that the telemetry subsystem is not affected by transmission interference and urban noise.

In Phase-II, data collection by radio telemeter is operating certainly, but in this period, the problem occurred at two stations and repairing work was made by PMD which took long time. Fortunately, there is no any hindrance for flood forecasting operation because it has happened in dry season. However, the annual data obtaining rate declined substantially.

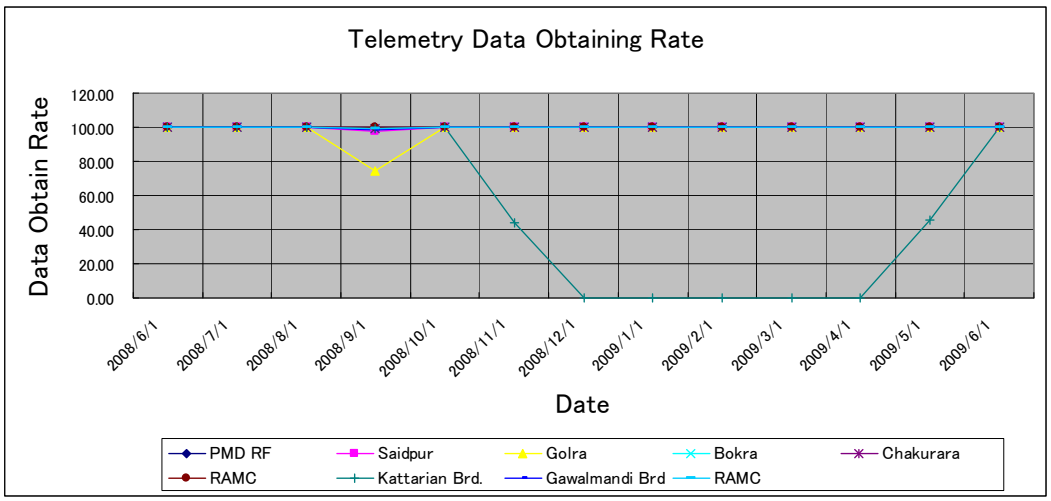


Fig. 4-1 Telemeter Data Obtaining Rate 2008-2009

2) Flood Forecasting Data Processing Subsystem

In Phase-I, FFWS server, WEB server, the display control PC and the plasma display board are working well. The safekeeping of collected telemetry data and data backup by FFWS

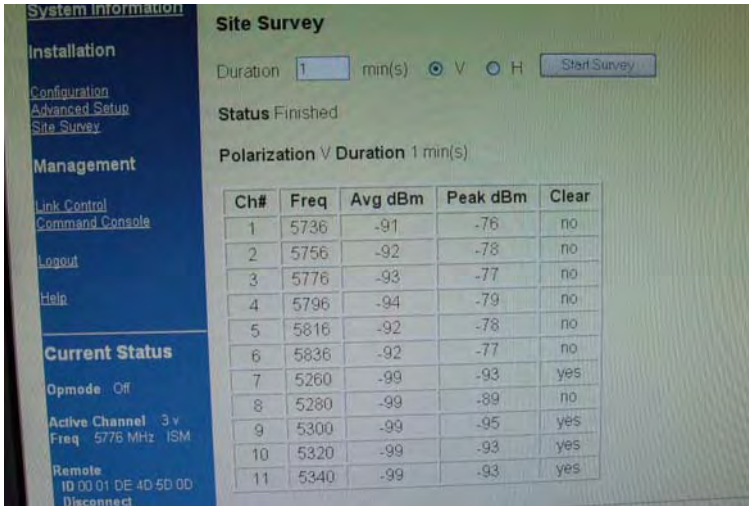
server are functioning as normal. On a whole, there is no major problem concerning the system operation, including the knowledge and ability of operators from PMD. In 2007, the operators from PMD managed to transmit a total of 17 times of flood forecasting information to TMA flood prevention center.

In Phase-II also, FFWS server, WEB server, the display control PC and the plasma display board are working well. The backup of the telemetry collected data as well as the data backup of the FFWS server are executed at present. In case of system operation, there seems not to be a problem specifically including the knowledge and the ability of the operator of PMD. PMD sent 15 times of flood information to TMA flood prevention center through FAX machine in the flood season of 2008 which was less than 2007.

3) Flood Data Transmission Subsystem

In Phase-I, the basic operation of the data transmission subsystem has been functioning as normal. TMA Flood Prevention Center and WASA monitoring station are able to monitor the flood data via WEB server of PMD with high speed connections. Also, except FFC monitoring station, usage of IP phone is possible. For the case of FFC, as they have just moved to a new office, some of the communication equipments are not yet to be properly set up. As a result, the flood data transmissions system is still not functioning. Nevertheless, FFC is now procuring an antenna and establishing a wireless LAN line between FFC-RAMC repeaters. As such, the monitoring network is expected to be completed in near future.

In Phase-II, the basic operation of the data transmission subsystem has been normal as well as the data transmit to TMA Flood Warning Center form the WEB server of PMD. However, data communication network by wireless LAN from PMD to TMA become unstable sometimes which caused by means of disturbance from other wireless LAN users on the same channel of 5.8GHz band. To solve the problem, application has been submitted to the Frequency Administrative Bureau in the PTA (the Pakistani telecommunication Authority) to request the channel at the 5.3 GHz band. According to the PTA, this channel was grand to the other agency already. Therefore, some solution shall be fund within the 5.8GHz band. Fig. 4-2 shows operation status of the channel in the TMA warning control center and the channel as for Ch1 to CH6, shows an overcrowded condition by operating a lot of users. FFC has been started installation of the Monitoring System in New Office from the end of November 2009.



Ch#	Freq	Avg dBm	Peak dBm	Clear
1	5736	-91	-76	no
2	5756	-92	-78	no
3	5776	-93	-77	no
4	5796	-94	-79	no
5	5816	-92	-78	no
6	5836	-92	-77	no
7	5260	-99	-93	yes
8	5280	-99	-89	no
9	5300	-99	-95	yes
10	5320	-99	-93	yes
11	5340	-99	-93	yes

Fig. 4-2 Result of Site Survey of Wireless LAN Channel at TMA

On the other hand, PMD upload a part of the data of Lai Nullah FFWS data by the home page of the PMD, therefore, public user became accessible to monitoring the FFWS information.

4) Flood Warning Subsystem

In Phase-I, the operation condition of warning post was not so satisfactory (see Table 4-4). Three (3) warning posts were malfunctioning before the system inspection. Two (2) out of three (3) warning posts were recovered after resetting of the system. Unfortunately, power supply at warning post WP-4 has been suspended for a long time, which resulted in over-discharged of batteries and all equipments are not functioning. Therefore, it is necessary to investigate the situation and restore the power supply as soon as possible. Also, during the system check, it was found that 'abnormal' sign was appearing from time to time.

Table 4-4 O&M Conditions of the FFWS (Phase-I)

Item		Equipment	Station	Equipment operation condition and Trouble	Pending for O/M management
1	1	Telemetry monitoring equipment	PMD Flood Forecasting & Warning Management Center	· Normal operation. The telemeter data acquisition percentage from 1 April 2007 to 31 January 2008 was 99.86 % exceeded the design target value. · One of the display control PCs was infected by virus due to uncontrolled internet access. As a result, the flood warning display board was not functioning. Virus removal and reinstallation of software are necessary.	· The telemeter data acquisition percentage from 1 April 2007 to 31 January 2008 was 99.86 %, which is above the design target value.
	2	Information processing equipment	PMD Flood Forecasting & Warning Management Center	· Normal operation.	· The USB and CD drivers for the PC's are unusable by management intentionally.
	3	Data transmission equipment	PMD Flood Forecasting & Warning Management Center	· Normal operation.	· There are some network interferences between PMD and FFC, hence network could not be established.
2	1	Telemetry rainfall observation equipment	PMD Islamabad	· Normal condition. Sometime, low voltage indication is detected. Setting of 5V seems to be critical. Resetting-up has been done.	· Resetting-up has been done and it is back to normal.
	2		Saidpur	· Normal operation	· Nil
	3		Gorla	· Data reading is not functioning. It is necessary to exchange a test card. ·	· Very dusty, cleaning required.
	4		Bokra	· Normal operation	· Lightning arrester was bended and one element of antenna was fallen. PMD staff has repaired the antenna concerned. · Very dusty, cleaning required.
	5		Chakrara	· Normal operation	· Nil
	6		RAMC	· Normal operation	· The equipment room needs to be tidied up.
3	1	Telemetry water level gauging equipment	Kattarian Bridge	· Normal operation	· Very dusty, cleaning required.
	2		Gawalmandi Bridge	· Normal operation	· Removal of sludge around the well curb is necessary. · Very dusty, cleaning required.
4	1	Telemetry/wireless LAN repeater equipment	RAMC	· Data transmission was hanging during heavy rainfall. This problem can be solved by resetting the system.	· The equipment room needs to be tidied up.
5	1	Flood monitoring equipment	FFC	· The equipment works during normal condition, but wireless LAN network is not working due to network interference.	· The equipment and materials have been moved in the new FFC office. · The installation of wireless LAN antenna is to be completed soon.
	2	Flood monitoring equipment	WASA	· Normal condition	· The engine generator is run out of gasoline. · Replenishment of gasoline must be done before rainy season.

6	1	Flood warning control & supervisory equipment	TMA Disaster Prevention Control Center	The system is functioning as normal except some minor problems as follows: ・ A client PC did not operate well due to virus infection. System recovery was done. However, the monitor display unit was out of order recently, which need to be replaced. ・ The clocks of record control and printer were incorrect. Adjustment completed. ・ The display unit of warning control PC became dim and hampered works. The display unit has been replaced with the spare unit kept by Rescue1122.	・ There is no space to keep spare parts. A storage shelf is necessary. ・ USB and CD driver are unusable by management intentionally. It is necessary to instruct the maintenance company CTI, to recovery USB and CD/DVD driver to original condition.
7	1	Warning equipment WP-1	TMA Building	・ Normal operation	・ Nil
	2	Warning equipment WP-2	Arian Mohallah	・ Normal operation	・ Very dusty, cleaning required. ・ Garbage removal is necessary.
	3	Warning equipment WP-3	Moti Mehal	・ Due to lightening hit, power supply to NFB was cut off. Restoration of power supply done.	・ Fallen leaves within the premise should be cleared. ・ It is dusty in the building. Cleaning required.
	4	Warning equipment WP-4	Ratta Amral Bridge	・ Power supply has been suspended for too long time, which resulted in over-discharged of batteries and all equipments are not functioning.	・ It was due to unpaid electricity bills. Immediate action to restore the electricity supply is necessary. ・ Bird nest was seen in the siren. Removal required. ・ Garbage within the premised should be cleared. ・ Cleaning of dust in the building is necessary.
	5	Warning equipment WP-5	Gaji Mandi Bridge	・ Due to lightening hit, power supply to NFB was cut off. Restoration of power supply done.	・ Cleaning of dust in the building is necessary.
	6	Warning equipment WP-6	Pir Wadhai Bridge	・ Functioning as normal except occasional malfunctioning during system check. Reconsideration of checking sequence is necessary.	・ Weeding and cleaning of dust are necessary.
	7	Warning equipment WP-7	Pir Wadhai Fire Station	・ Functioning as normal except occasional malfunctioning during system check. Reconsideration of checking sequence is necessary. ・ Warning light is not functioning. The bulb could be broken.	・ Cleaning of dust in the building is necessary.
	8	Warning equipment WP-8	Khayaban Park	・ Normal operation	・ Glass brick was broken. Immediate repair required. ・ A dead body of cat was observed in the premise. Immediate removal required. ・ Cleaning of dust and garbage is also necessary.
	9	Warning equipment WP-9	Gawalmandi	・ Normal operation	・ The kite hangs on antenna should be removed. ・ Cleaning of dust is required.
	10	Warning equipment WP-10	Dhok Chraghdin	・ Normal operation	・ Cleaning of dust is required.

In Phase-II, the operation conditions of warning post were as same problem status as telemetry subsystem. Two (2) warning posts have malfunctioned or uncontrolled before inspection of the system. All warning posts are normal operation after repair. However, commercial power supply cable at three warning post installed very low position that is danger to cut off by residence. It is necessary to re-install for high position by the power supply company.

Table 4-5 O&M Conditions of the FFWS (Phase-II)

Item		Kind	Station	Equipment operation condition and Trouble	Countermeasures
1	1	Telemetry control & supervisory Equipment	PMD Flood Forecasting & Warning Management Center	Normal operation. The telemeter data acquisition percentage from April 2008 to May 2009 is declined substantially due to long period data lacking of Gorla rain gauge and Kattarian water level station. Total average become 94.49%.	1. It took long time for restoring of Gorla rain gauge and Kattarian water level station repair. 2. Cable repair for Kattarian water level station has been made by PMD and function of data transmission is normal.
	2	Information Processing Equipment	PMD Flood Forecasting & Warning Management Center	Flood warning display board to be connected to display control PC became abnormal due to contamination of Virus on the PC	Re-installation of Window OS and FFWS application software will conduct by PMD personnel who learned how to re-install software during Tokyo training.
	3	Data transmission Equipment	PMD Flood Forecasting & Warning Management Center	Normal operation in equipment. But transmission disconnected some time due to interference and heavy rainfall.	Some interference on the wireless LAN network between PMD and TMA network and receiving power became low in short time then network could not established some time. It is necessary to sift CH 7-Ch11.
2	1	Telemetry Rain fall Observation Equipment	PMD Islamabad	Normal condition. Sometime, low voltage indication is detected.	Power interruption gives low voltage information which is one of normal operation.
	2		Sidpure	Normal operation	none
	3		Gorla	The observational data became not able to be collected.	1. It got to exchange a test card and to be good. 2. Dust in the station housing is terrible. Need to be clean.
	4		Bokra	Normal operation	Dust in the station housing is terrible. Need to be clean.
	5		Chakrara	Normal operation	None
	6		RAMC	Normal operation	None
3	1	Telemetry water level gauging equipment	Kattarian Bridge	Normal operation. Antenna and earth cable has been cut and stolen and telemetry data could not obtained for long time.	1.PMD staff conducted cable joint repair and it is be come normal. 2.Graffiti by spray paint on the front door. Need to be clean.
	2		Gawal Mandei Bridge	Normal operation	Need to be clean.
4	1	Telemetry/Wireless LAN Repeater equipment	RAMC	1. Telemetry transmission power became 6W. 2. Data transmission was hanging during heavy rainfall but a line is restored in resetting to the normality.	1.Re-ajustment of output power to 10W is made during periodical maintenance OJT.
5	1	Flood Monitoring Equipment	FFC	The all equipment removed from old building.	Local agent is doing the re-installation work of wireless LAN unit at new FFC building.
	2	Flood Monitoring Equipment	WASA	UPS for client PC is out of order.	1. Replaced with local made UPS and client PC works normal condition. 2. Wireless LAN unit has out of order. Check and replace for spare unit is necessary.
6	1	Flood Warning Control & Supervisory Equipment	TMA Disaster Prevention Control Center	The system is working normally. 1. Serial printer for warning control record was miss setting.	1. Printer was reset. 2. A cabinet to accommodate spare unit and parts is carrying in the warning control room by Rescue 1122.
7	1	Warning Equipment WP-1	TMA Building	Normal operation	none
	2	Warning Equipment WP-2	Arian Mohallah	Speaker-2 abnormal was indicated when check from warning control station.	1. Joint repair team of PMD and Rescue 1122 made repairing work for Speaker cable joint. Speaker cable was cut by kite strings. It become normal condition after repair. 2.Cleaning need that dust in the building is terrible The removal of the garbage in the site
	3	Warning Equipment WP-3	Moti Mehal	Normal operation, Many weeds overgrowth in station site.	1. Need to cut the weed. 2. Need to clean of dust in the building.
	4	Warning Equipment WP-4	Ratta Amral Bridge	Normal operation.	1. There is a lot of garbage in the building fence. Need cleaning. Dust in the building. Need cleaning.

	5	Warning Equipment WP-5	Gaji Mandi Bridge	The main NFB tripped often and it cased over discharging of battery Reset of NFB and it became normal.	1. If power failure continued more than 1 day, visit the station and reset NFB. 2. Fence was collapse by adjoin debris. CDGR will make repair work. 3. The clean of dust in the building
	6	Warning Equipment WP-6	Pir Wadhai Bridge	Normal operation, Many weeds overgrowth in station site.	1. Need to cut weed. 2. The clean of dust in the building.
	7	Warning Equipment WP-7	Pir Wadhai Fire Station	Normal operation	The clean of dust in the building
	8	Warning Equipment WP-8	Khayaban Park	Normal operation 1. Block glass on road side broken again by throwing the stones. 2. Graffiti by spray paint on the front door.	1. The damaging on the glass block in the building will repair by CDGR. 2 Need to be clean. 3.Need cleaning of dust in the building.
	9	Warning Equipment WP-9	Gawal Mandi	Normal operation	The clean of dust in the building
	10	Warning Equipment WP-10	Dhok Chraghdin	Normal operation 1. Uncontrolled from warning center	1.Joint repair team by PMD and Rescue1122 found transmitter defects and replace spare unit 2.The clean of dust in the building

Below pictures shows station condition before maintenance guidance.

Inside of Warning Post 8

Outside of Warning Post 8

4.3.2 FFWS Operation Condition

PMD is in-charge of flood forecasting. During rainy seasons, 24-hour work is required but non-rainy season the operation is limited from 8:00 am to 8:00 pm.

Rescue1122 is responsible for the operation and maintenance of DPCC. One operator is working from 8:00 am to 8:00 pm during non-rainy season, and during monsoon season, the center is on 24-hour operation under three shifts.

1) Flood Warning Records in 2007

During the period from April 2007 to January 2008, a total of 19 times of flood alerts were detected from 11 incidents of rainfall. From these, PMD has issued 17 flood warnings via fax. Issuances of flood clear warning were not done for some flood alert detections, because of the readings were only slightly exceeded the detection level.

Table 4-6 Flood Alerts in 2007

	Pre-alert	Flood Warning	Evacuation	All clear
Automatic flood alert detection by FFWS	4	19	0	-
Flood information fax transmission from PMD	4	16	1	4
Flood warning dissemination by DPCC	-	7 (voice broadcasting only, no siren)	-	7 (broadcasting)

Remaining of the two incidents of flood warning, DPCC issued flood warning only by voice announcements. During this one year period, no operation of sirens has ever been done. Flood information from PMD has transmitted successfully and the operators of TMA have confirmed their receipt of information, but no siren was being operated. Although eventually no flood was occurred, the reason for not operating the sirens after receiving flood warning is questionable. Unfortunately, flood warning operation during warranty period was responsible by the staffs of Fire Department, while Rescue1122 was only assisting the operation of the DPCC, hence Rescue1122 did not having any record regarding the reason of non-operation of sirens.

2) Flood Warning Records in 2008

During the period from April 2008 to January 2009, a total of 6 times of flood alerts were detected. PMD transmitted all the fax of Alert to DPCC automatically. It seems that the awareness of operator in PMD has been improved because the operator can operate following the manual.

Table 4-7 Flood Alerts in 2008

	Pre-alert	Flood Warning	Evacuation	All clear
Automatic flood alert detection by FFWS	8	6	1	8
Flood information fax transmission from PMD	7	6	1	8
Flood warning dissemination by DPCC	-	3 (voice broadcasting only, no siren blow) 2 (voice broadcasting and siren blow)	1 (voice broadcasting and siren blow)	6 (voice broadcasting)

In DPCC, the number of flood warning with blowing siren was two times out of six times of Alert, and operation was not comply with the manual. Since the operator is hesitating to push a sound the siren, in order to conduct actually operation, the training in Phase-II is teaching operators not to hesitate to sound the siren by practice.

3) Flood Warning Records in 2009

The weather in Rawalpindi during the monsoon season in 2009 was abnormal weather with a little rain. The flood warning by FFWS was only happened one time for Pre-Alert on July 28 2009, the result of the guidance this year was not able to be verified, and it will be carried out by C/P in next year.

4.3.3 FFWS Maintenance Management

During the warranty period of the equipments, whenever malfunctioning of equipment occurs, in Phase-I, the person-in-charge of flood forecast system (PMD) and flood warning system (Rescue 1122) shall, via 'Trouble Report', requests CTI (local equipment maintenance company) to make the necessary repair. After completion of the repair works, a 'Trouble and Repair Report' form shall be filled out. However, investigation shows that PMD has filled out the 'Trouble Report' form but has never filled the 'Trouble and Repair Report' form. As a result, maintenance records are not complete. During this one year period, PMD and Rescue1122 did not carry out any maintenance work. In additional, there was an incident that a computer at WASA was infected by virus due to unknown reason. The person-in-charge of PMD and Rescue1122 were also trained on the daily equipment check, cleaning works and so on under the concept of OJT with JICA Expert.

In Phase-II, the site inspection for all gauging station and warning post had been conducted by JICA Expert together with PMD and Rescue1122 maintenance personnel. As the conclusion, in 1 year from April, 2008 to May, 2009, daily maintenance by the PMD and Rescue 1122 is not implemented expect PMD Flood Forecasting Center, TMA DPCC, the manned rainfall observation station and the station where have some troubles. The "Trouble report" was recorded and filed. However, maintenance history for each station's equipment could not search because of unfilled of the "trouble and repair report". The site inspection in June 2009, telemetry observation station and warning posts were polluted with dust and the garbage. It is difficult to observe the trace which did maintenance regularly. Guidance for cleaning in the facilities and equipment by OJT was conducted once again.

CDGR responded to the request of Rescue1122 for the maintenance for the building and the fence, in the future and restoration will be able to carry out by CDGR. JICA expert guided with rescue 1122 in the repair works of two warning posts which were defects on equipment.

The repair of warning speaker at the Warning post WP-2 has been done by the cooperation with Rescue1122 and PMD. The repairing work photograph is shown in Fig. 4-3.

Fig. 4-3 Repairing Work of Speaker Cable at Warning Post WP-2

4.3.4 Status of Maintenance of FFWS

In Phase-I, the installation of system was completed in March 2007. Upon expiry of warranty period expired at the end of March 2008. The system has completely transferred to the Pakistan Government. During warranty period, whenever there were any problems, users only need to contact the supplier to undertaken any necessary repairs. As a result, after expiry of warranty, the maintenance staffs of PMD and Rescue1122 were still lack of awareness and initiative for self maintenance. During the investigation in January 2008, telemetry stations and warning posts were full of dust and garbage, but the situation has significantly improved during the present inspection. The photos below show the comparison of conditions in January 2008(before) and June 2008(after).

Rainfall Gauging Station (before)

Rainfall Gauging Station (after)

Warning Post (before)

Warning Post (after)

It is believed that this is partly contributed by the improved consciousness of maintenance staffs and the results of participation of management staffs of PMD and Rescue1122 in the training program in Japan.

In Phase-II, PMD takes charge of the flood forecasting, operators are working 24-hours with 3 shifts during monsoon season and the one or two operator from 8 o'clock to 20 o'clock during a non-monsoon season. The Rescue 1122 is conducted O/M work for TMA DPCC. One operator is working from 8 o'clock to 20 o'clock in non-flood season and seven operators are watching 24 hours by 3 shifts in monsoon season.

1) Modification of the System Management and Operation Manual

Management and Operation Manual of FFWS was established on Soft Component during the Grand Aid Project. It has been revising with present condition and environment of operation. For example, in June 2008, the JICA Expert Team has prepared the System Management and Operation Manual 2008, and subsequently distributed and explained to all the parties concerned. After the 5th July flood, the Expert Team conducted a post-flood investigation by undertaking interviews with the parties concerned. From the investigation, it was found that there were differs in understandings by PMD and Rescue1122 on the Lai Nullah Flood Situation Report. In order to solve this problem, immediate actions have been taken to coordinate with PMD and Rescue1122 to standardize their understanding. The latest revised standard is [The System Operation and Maintenance Management Manual 2009 version]. This manual was completed on the end of June and explained to all concerned personnel.

2) Existing Condition of FFWS-PMD

Kattarian water level gauge station was broken since November 2008 and it was repaired by PMD engineers on April 2009. The reasons caused the delay of repair work have to be examined by all concerned agencies and Expert.

3) Progress of Repair FFWS Equipments

After the monsoon season of September 2008 and absent of JICA Expert in Pakistan, there were some trouble on maintenance of FFWS equipment. At the survey on the beginning of Phase-II, there were three issues about maintenance of FFWS, which is list in Table 4-8;

- Kattarian Water Level Gauging Station (KWLGS) had theft of cable since November 2008. Telemetry of data transmission was not able to operate.
- All three (3) Monitors of DPCC in TMA was broken since last year.
- Warning Post (WP) No.10 (from last year) and No.2 (from Jan 2009) had a problem to control by DPCC.

Table 4-8 List of Trouble Equipment

Issue	Response by Counterpart Agencies	Subject for the Challenge of Repair	Remark (result at end of April 2009)
KWLGS (theft of cable)	PMD issued a letter to CDGR and FFC	• Budget for repair • Security of the site • Responsible agency • Ownership • Awareness for residence	• Issue was left behind three months and fence of KWLGS was also destroyed gradually. • Repair work was started April and it was repaired by PMD. • Fence is going to repair in near future.
Monitors in FWCC	Rescue1122 announced in JCC Meeting on Jan 2009	• Budget for repair • Ownership	• Rescue1122 repaired by own budget.
WP10 & WP2	WP10 was broken from last year by operator but trouble report was not submitted by Rescue1122 and WP2 also same situation.	• Budget for repair • Ownership • Routine works for O&M • Technical support for O&M	• Introduce a new technical support company • Examine by own resources • Can not identify problem.

In order to solve these problems, a new local technical support company was introduced by the Grand- Aid Contractor (end of Jan 2009) though FFC. However, warp up several weeks of talks with little progress on repair works and there is a difficulty of agreement with technical support company and counterpart agencies. WASA had reported UPS in monitoring system was broken on April 2009 and asking PMD for cause investigation. Based on the result of investigation, WASA was announced to repair the UPS at Monthly C/P Meeting on April 23 2009.

Warning Post No.2 and No.10 are broken down since last year. The reason caused faulty might be the isolation transformer burnt and deep observation by the duty person, problem cannot be resolved without technical expert. Regarding this problem, trainee from Rescue1122 will discuss with expert during the training in Japan. After return from Japan, Rescue1122 repaired the broken parts with a help of PMD and JICA Expert.

4.3.5 Organization set up for Operation and Maintenance on FFWS

In Phase-I, there is not change in the organization set up of O/M in PMD. However, it must be noted that three of the staffs who underwent training during the Grand Aid Project have left due to personal reasons. Subsequently, six new staffs assigned to the flood forecasting operation, and trainings were given by the experienced staffs. Therefore, there is not much problem for technical level of staffs.

There is no change of organization set up for flood monitoring system in FFC. For the case of WASA, all the members are newly-appointed. The organization took charge of the flood warning and evacuation warning has officially transferred from TMA to Rescue1122. Previously, O/M personnel of Rescue1122 were temporary appointment by the office. At the beginning of the Phase-I, they are official assigned. Out of the four Rescue1122's personnel who attended the training under the Grand Aid Project, two are remained in the operation. The seven newly appointed staffs are necessary to be training for the operation. It is understood that the three experienced staffs shall act as trainers to provide training for the new staffs. If necessary, training for these staffs should be considered to provide under this Project.

In Phase-II, there is no change of the O/M organization in the PMD which takes charge of the flood forecast operation. FFWS in PMD has been operated by 6 O/M staffs. There will be no technical problem for operation. One the other hand, 9 persons are appointed as O/M staff at Rescue 1122. Three (3) of nine (9) are new. They have to trained O/M technique from Rescue 1122 staff who had trained in advance.

CHAPTER 5 ACTIVITIES AND PROGRESS OF OUTPUT 3

5.1 Social Survey

Social Survey was conducted by local consultant under the supervision of JICA Expert in Phase I. Questionnaire was made by JICA Expert and evaluated by C/P members. Questionnaire was translated to Urdu and pre-survey was carried out for 30 households in pilot area. Evaluations of the questionnaire entries and survey method were discussed among JICA Expert, C/Ps and local consultant. After modification of the questionnaire, survey teams commenced the social survey at the target areas. Eight (8) survey teams were established in order to catch-up the delay of works caused by the National Election on 18 February 2008. The outline of social survey is shown in Table 5-1.

Table 5-1 Outline of Social Survey

Items	Contents	Remarks
Work period and Schedule	Interview Period: March 21 to April 5, 2008 Three months (including preparation and reporting)	
Survey Items	• General information of respondent • Communication system (source) in community • Flood damage • Action of people during flood • Consciousness of people concerning flood and flood disaster prevention • Response of people regarding government actions on flood disaster prevention • Flood evacuation center • Existence of community groups and community leaders • Consciousness of people and behavior characteristics for gender • Disposal of household garbage and collection system • Joint activities for Flood Risk Management	• Questionnaires were translated to Urdu for local community.
Survey object Area and Approach	Objective area: Target area Number of Sample: 1,530 persons Approach: Interview Survey by local consultant, 2 persons (male and female) and one person from government officer in total of 3 persons in one team. Create 8 teams for 8 zones	

The results of Social Survey were introduced in Awareness Program in Phase-I to share the resident awareness between the governmental agencies and the residence.

5.2 Drawing up Hazard Map

5.2.1 Collection of the Data for Hazard Maps and Evacuation Plan

Data collection regarding hazard maps and evacuation plan was conducted by local consultant in the whole target area in Phase-I. The collected data are as follows:

Map Information

- Boundary of Union Council (UC)
- Evacuation Center
- School (government and private schools having area greater than 5,000 m^2)
- Play grounds and parks (having area greater than 5,000 m^2)
- Marriage Halls (having area greater than 5,000 m^2)

- Mosques and Churches
- Fire Stations
- Police Stations
- Hospitals
- Industrial Establishments
- Roads (major roads and important secondary streets)
- Bridges (specifications)
- Pedestrian crossing bridges
- Underpasses
- Obstacles of traffic

Information

- Maps related to the zonal boundaries of UCs
- UC level population statistics
- Details of Government offices in the zones
- Historical data or information regarding flood related damages and deaths
- Contact information of community leaders (MPAs, UC Nazims, TMO etc.)
- Registered NGOs with details of work done and their contact information
- Details of volunteers registered with Civil Defense

Secondary Information

The followings information obtained through processing of field survey data and other information mentioned above.

- To identified additional (reserved) evacuation centers
- To identified evacuation routes on zonal maps
- To identified areas of risk or danger
- Places of public assistance/relief (hospitals, NGOs etc)

Evacuation Center

There are five evacuation centers determined in the existing plan. In order to ensure each zone has at least one evacuation center, additional three centers were proposed for the zones without evacuation center. Thus, there a total of eight evacuation centers indicated in the Flood Relief Plan 2008. In addition this, another three temporary evacuation centers were proposed for areas where evacuation centers are lacking due to uneven distribution of evacuation centers.

The followings is the list of Evacuation Centers in Phase-I:

- Govt. College for Woman, Dhok Naju
- Govt. Boys High School. Babu Lal Hussain Road
- Govt. Boys High School, Daryyabad Rawalpindi
- Govt. Islamia High School, Liaqt Chowk Rawalpindi
- F.G. High School, Marir Hassan Rawalpindi
- Govt. Girls High School, Safdarabad Pirwadhai Rawalpindi
- Govt. Girls High School, Bagh Sardaran Rawalpindi
- Govt. Boys High School Dhol Khabba Rawalpindi

Temporary Evacuation Center:

- Asghar Mall College
- Govt. Waqar ul Nissa College
- Waqar ul Nissa Girls Higher Secondary School

5.2.2 Drawing up of Draft Hazard Maps

In this project, two types of hazard map, i.e. (a) Hazard Map for target area, and (b) Hazard Map for each objective area, were developed based on the above collected data.

In order to take into consideration of the opinions of C/P, comments on Hazard Map were collected from the awareness program held on May 8 2008 until the No.7 Monthly C/P Meeting on 3 September 2008.

The information described in the hazard map includes the estimated inundation area, evacuation centers (existing and temporary) and its photos, evacuation routes, contacts for weather information, contacts in emergency, description of inundation depth, siren pattern, objectives and description of hazard map etc. The checklist of emergency goods and photos of previous flood disaster are also shown. The photos of previous damage are described in the map in order to remind the residents about the previous 2001 Flood.

5.2.3 Improvement of Hazard Map

In Phase-II, the Hazard Maps were improved on subsequent sections. The final version of Hazard Maps are bound a report with the separate volume. Hazard Map will be properly revised by Task Force in the future.

The hazard map was made combining with each part by using software, Adobe Illustrator and Microsoft Power Point, and it allowed for easy correction and update of data. The addition of evacuation center and dangerous area etc. can be easily corrected if operator has an ability level with PC in the daily work.

When the probable flood area is reviewed, a detailed study for flood simulation is necessary. However there is a portable way for Task Force to improve hazard map, which is the flood hazard map based on the actual inundated area can be drawn by based on the actual inundated area. Expert provided a big satellite map in the Task Force office for this purpose and accumulating data is the essence of the best hazard map.

1) Update the Base Map

The new satellite image was shot in March 2008. The base map has been mainly improved about the following two points.

The first improved point is update of map information. The Kattarian Bridge and I.J Principal Road were not appeared in the old base map but in the new base map. The downstream section of Gawalmandi Bridge was improved and the channel was shortcut but it has not been reflected in the old base map. The new image shows the improved channel as existing condition (see Fig. 5-1).

The second point is an enhancement of the image quality. The resolution of new image is 0.6m x 0.6m, on the other hand the old one was 1.0m x 1.0m. As shown in the following photos in Fig. 5-1, new map can clearly see the buildings and the cars compared with the base map.

However, it might be difficult for the local resident to understand the position of the road and the building, etc. in the satellite image and when a detailed map (such as road map etc.) is developed in the future, the base map is recommended to be replaced it.

2) Revision of Urdu Description

The accuracy of the description in Urdu has been pointed out and the descriptions in Urdu were corrected by Task Force member as the part of Task Force activities.

3) Software Conversion

Flood hazard maps have been made by GIS software so far because the evacuation information such as the location of evacuation center, school, parks, government office etc. which were taken using GPS in the Phase-I of the study in 2008, and the estimated flooding area, main road network and river network were drawn by GIS software in the Master Plan study in 2003. Because the arrangement of the basic data had ended, it was judged that the GIS data should be converted to the file format of Adobe Illustrator or Microsoft Power Point for easily use.

The Illustrator is the drawing software, which is going to be provided to the counterpart from JICA.

4) Remaining Issues

The evacuation distance from the vicinity of UC-36 to the evacuation center (Govt. Girls Higher Secondary School No.1, Bagh Sardarah) is around 2 km, which is still too far to evacuate on foot.

Three evacuation centers (Govt. Girls High School, F.G Boys High School, M.C. Boys Central Model High School) are located in the estimated flood area.

It is necessary to solve these problems.

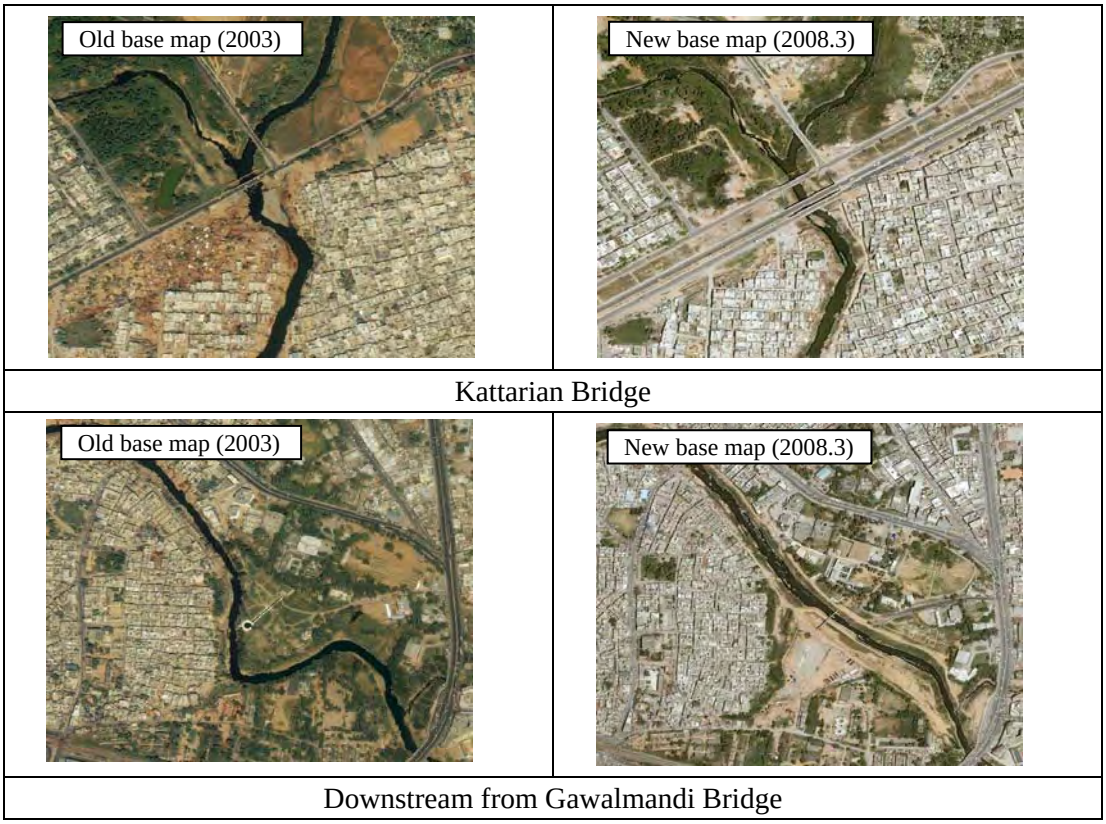


Fig. 5-1 Improvement of Base Map

5.3 Selection of Pilot Area

Based on the number of evacuation center, evacuation distance and discussion with CDGR-DCO, Civil Defense and Revenue, target area was divided into eight (8) zones. At the same time, zone 3 was selected as the pilot area for the Project. The rationales of Pilot Area selection is shown in Table 5-2.

Table 5-2 Rationales of Pilot Area Selection

Items	Contents	Remarks
Reference resources	• 100-year and 25-year flood areas identified during the development study project. • Vulnerable areas specified in the existing flood relief plan and the report of WASA • Discussion with C/P (CDGR-DCO)	
Criteria of Selecting	• Frequently flooded areas • Understanding and cooperative structure of the area (NGO and volunteer)	• 25-year flood area is targeted.

5.4 Implementation of Awareness Activities

Awareness activities in Phase-I were conducted by JICA Expert and Awareness activities in Phase-II were conducted by C/P agencies with the assistance of JICA Expert.

5.4.1 Awareness Activities in Phase-I

During the pre-discussion with C/P members about preparation of awareness program and evacuation drill, there was a request from C/P and supporting staffs that awareness program and evacuation drill are very important for community, therefore, it is necessary for them to understand in advance. In this project awareness program is planned for five (5) times. Expert Team conduct awareness program for local government officers one time and remained four times for community. In order to conduct the program and drill in the community smoothly, meetings with Union Councils (UCs) and C/Ps were held in advance of each program.

1) Awareness Program

Prior to the actual awareness program, a trial program was conducted for C/P beforehand. The participated C/Ps were CDGR (Revenue, Civil Defense, F&P), Rescue1122 and CDA. Awareness programs for the residents in pilot area were conducted four (4) times. In total, five (5) times of awareness programs were conducted. The number of participant is shown in the following table. The fourth program was requested from DO of Civil Defense for the staff and volunteers of Civil Defense. The program for UC-42 was held because UC Nazim strongly requested because the area has flood damages frequently though the area is not located within the pilot area.

Table 5-3 Implementation of Awareness Program

	Target area	Date	Participant				
			Male	Female	Government	Press	Total
1	C/P	5/8			16		16
2	UC-46	6/20	32	31	29	21	113
3	UC-36	7/4	112	5	17		134
4	Civil Defense	7/18	5		98*	6	109
5	UC-42	7/25	17	13	10		40

*: 65 Volunteers are included

The contents of awareness programs are almost common, which generally as follows:

i) Registration of Participants (15 min. before the program)
ii) Welcome Speech (5 min.)
iii) Speech by UC Nazim (5 min.)
iv) Why flood is coming? (20 min.)
v) What can we prepare for flood? (20 min.)
vi) What is Hazard Map? (20 min.)
vii) Video of UC-46 Evacuation Drill on June 20, 2008 (5 min.)
viii) Closing Speech

For UC-46, evacuation drill was conducted following the awareness program. The video of that evacuation drill was shown in awareness programs at other UCs.

In the program for UC-46, all of the presentations were done by JICA Experts. Subsequently of UC-46, C/Ps made some presentations in order to carry out part of awareness program.

Why flood is coming?	PMD:	Mr. Shahzad Sultan, Meteorologist, Mr. Shahid Mehmood, Meteorologist
What is Hazard Map?	Rescue1122:	Mr. Ahmed Chohan, CWTO

C/Ps showed strong interest in the above awareness programs and they had participated positively. As the contents of the presentations closed to their specialized field, they are good at explanation and attracting residents' attentions

2) Evacuation Drill

Evacuation drill was conducted following the awareness program in UC-46 on June 20 2008. At the beginning of the drill, Rescue1122 explained the siren patterns for alert and evacuation and the procedure of evacuation drill. Then evacuation to the evacuation center commenced after hearing the evacuation sirens. Evacuation center was 'Islamia College No.4' at Liaquat Road, which is located near the venue of awareness program. Participants gathered at the evacuation center and had a questionnaire survey for the awareness on disaster prevention.

Various flood preparedness matters and procedure for evacuation drill were described in "Guideline for the Disaster Awareness Program Activities (Draft)".

C/P coordinated with police for traffic control during the drill, as a result the participants were able to move to the evacuation center smoothly. Thus, evacuation drill was completed in safety and without any trouble.

3) Map Exercise

Map exercise for resident in the pilot area was conducted twice as follows.

Table 5-4 Implementation of Map Exercise

	Target area	Date	Participant				
			Male	Female	Government	Press	Total
1	UC-46	6/30	16		12		28
2	UC-36	7/11	29	5	3		37

In the map exercise for resident, firstly the participants were instructed to draw the main roads, rivers and drainages, bridges, schools, parks, facilities for disaster prevention, evacuation centers etc. on the map in order to familiarize themselves with the characteristics of the town they are living. Secondly, evacuation routes from their houses to evacuation center were drawn on the map, and they must keep away from flooding area and dangerous area. After that, the reasons for selection the evacuation route and important points during evacuation were discussed in each group. Then each group leaders presented the results of discussion to all participants. The majority of participants selected the evacuation route based on the following conditions that are avoiding flood area and dangerous area and the distance to evacuation center should be as short as possible. So, participant (resident) seems to have reasonable knowledge for proper evacuation activities.

4) Poster and Billboard of Hazard Map

10 billboards (outdoor, A0 size) and 50 posters (indoor, A1 size) were made and installed at prominent locations of schools, hospitals, mosques, parks at easily seen by the local residents. The posters were also displayed in the offices of C/P. The following map shows

the location of billboards and posters. *i* indicates the location of Billboard (outdoor), *i* indicates the location of poster (indoor).

Unfortunately, 2 out of 10 billboards were badly damaged within 1 month after they were installed. It is necessary to establish maintenance arrangements in CDGR for damaged billboard.

Billboard (Outdoor)

Poster (Indoor)

Fig. 5-2 Location Map of Poster and Billboard Installation

5) Leaflet of Hazard Map

A4 size leaflet of hazard map was made by JICA Expert Team to facilitate local residence in order to understanding of hazard map in usual days. Leaflet was written in Urdu in order to ensure understanding for residents. 1,000 leaflets were made and distributed to UC offices (UC-36, 39, 40, 41 and 46) in the Pilot Area and Civil Defense.

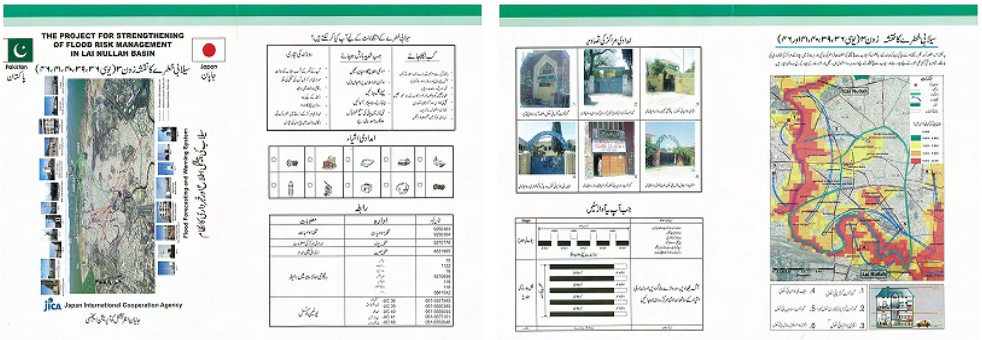


Fig. 5-3 Leaflet of Hazard Map

6) Monitoring on Flood Disaster Prevention Action

Monitoring on flood disaster prevention action of residents in pilot area was conducted on 5th July 2008 when the annual maximum flood happened, and monitoring on the level of understanding of flood disaster prevention action in the Pilot Area was conducted on 2nd September 2008 when the rainy season was almost finished.

This Monitoring survey was conducted along with the monitoring of the Evacuation Drill by local consultant under supervision of JICA Expert.

Table 5-5 Outline of Monitoring Survey

Item	Contents	Remarks
Work period, number of times and person	• Evacuation drills 5 times, at flood event in monsoon: approx. 3 times • One group is two person (Expert team and C/P)	
Study approach	(1) Video shooting from the beginning of evacuation to evacuation center (2) Recording of problems, photo shoot of obstacles (3) Recording of time required for evacuation, and number of people (4) Recording of actions and supports by related organizations (5) Questionnaire survey to participants of evacuation drills (6) Monitoring the flood disaster prevention action taking by inhabitant and related organizations in monsoon	• Recording the actions of inhabitant along the evacuation route during the evacuation drills. These results will be reflected to Phase-II. • Extraction of problems • The differences of the action between drills and flood times are clarified
Objective area	Pilot area, Area where evacuation drills was conducted	

a) Flood Monitoring on July 5

As for the flood on July 5, enough investigation was not able to be done due to the lack of preparation, and a supplementary hearing survey was executed later.

- Evacuation order was issued
- Monitoring teams were dispatched to the evacuation centers in the pilot area and standby there.
- Medical goods were prepared and doctor was standby at the evacuation center.
- Residents did not evacuate to the evacuation center at all. Therefore, monitoring on resident was not able to be done.
- Residents understood the meaning of siren and evacuated from their houses to higher ground or taller buildings or relative house but did not go to evacuation centers.
- In spite of siren sounding for evacuation, a lot of residents gathered at the riverside to see the river condition.

b) Monitoring on 2 - 4 September 2008 after Monsoon Season

Questionnaire survey was conducted to evaluate whether the resident's awareness improved through the awareness activity such as awareness program, evacuation drill, map exercise, billboard and poster with cooperation from C/Ps in the pilot area.

Table 5-6 Results of Questionnaire Survey

No.	Question	Yes	No
Q 1	Have you seen the Poster of “Flood Hazard Map”	42	4
Q 2	If “Yes” in “Q1”. then: your comment		
	1. Easy to understand	39	7
	2. Need to more improve	15	31

Q 3	Have you joint or see any other flood awareness activity (please check it)		
	1. Awareness program	4	
	2. Map Exercise	5	
	3. Bill Boards	4	
	4. Pamphlets/Leaflet	7	
	Others (No/ not joined the activity/ not familiar)	26	
Q 4	Are you familiar with the Awareness Programs on Flood Disaster?		10
	Others		
	1. Through Pamphlets/Maps/Billboards	16	
	2. Through Media/ Newspaper	10	
	3. Through Awareness Programs	6	
	4. Through Peoples/Friends	4	
Q 5	Have you joint any other Flood Awareness Activity or Real Evacuation Activity?		46
Q 6	Are these activities in "Q3". Enough for Flood Awareness?	14	28
	Others		
	1. I don't Know	2	
	2. There should be more	1	
	3. It should have some extra work	1	
Q 7	Is any problem for install and maintain the Poster/Billboard in your place?	17	29
Q 8	Have you noticed any change in the level of awareness of people in your area after these activities?	39	7
Q 9	Have you notice any change in response during flood activities from Government department/ CD/Revenue/Rescue1122 etc. after this awareness program?	28	16
	Others		
	1. Should be regular & continued	1	
	2. I think the media can pay a active role	1	

Note: Number of community member interviewed = 46 (Male 38, Female 8)

From the results of questionnaire, it was found that nine of the respondents were participated in the awareness program and map exercise. More than 90% of respondents answered that they have seen the hazard map and the contents of hazard map are understandable. However, they are not so satisfied with the awareness activities so far, and felt that improvement is necessary.

With respect to flood awareness, 80% of the respondents feel that the level of awareness has improved through the awareness activities and the display of hazard map poster. Also, more than half of the respondents feel that the activities of disaster-related agencies have improved.

Since occurrence of flood was very few this year, and those floods were concentrated in the first half of rainy season, actual activities on evacuation of resident and awareness survey were not able to be executed effectively. According to the results of questionnaire, though residents understand the proper evacuation activities, monitoring should be done in the next rainy season whether resident can do an appropriate action during actual flood. Moreover, it is necessary to examine how to evaluate when there is no flood.

5.4.2 Awareness Activities in Phase-II

1) Establishment of Task Force

a) Purpose

It is very necessary for the local residents and government officials concerned to be aware of the importance of Flood Risk Management for the Lai Nullah Basin in order to mitigate flood damage. For the government officials to fulfill their role in flood risk management, educational activities focusing on flood disaster awareness are required. These disaster awareness activities include the disaster awareness program, the evacuation drill, the map exercises, and the printing of information materials for

distribution to the participants of the orientation program, evacuation drills and map exercises.

Disaster awareness activities have been conducted at Rawalpindi City in Phase-I of the Project. The main activities performed in cooperation with the counterpart personnel of the JICA Expert Team were conducted in the Pilot Area; namely, Zone 3 (UC-36, 39, 40, 41 and 46). The same awareness activities are to be executed throughout the whole target area of Rawalpindi City in Phase-II.

Based on the original scope of work, Phase-II is to be executed mainly by the counterpart agencies themselves. To maintain the sustainability of disaster awareness activities in Phase-II and in the future, a task force is proposed to carry out this mission.

b) Member of Task Force

The agencies responsible for Flood Risk Management consist of the following:

- Management Office - CDGR-DCO (focal person is EDO (Revenue))
- Advisor - FFC
- Observer -WASA, RCB, CDA

The organizational composition of the Task Force could be the following agencies:

- CDGR - Revenue
- CDGR - Coordination
- CDGR - Civil Defense
- CDGR – Social Welfare
- Rescue1122 - Rawalpindi
- PMD - FFWS (Flood Forecasting and Warning System) Master Control Center
- TMA – TMO

c) Activities and Action Plan of Task Force

i) Activities

To execute the disaster awareness program activities efficiently, the task force should be organized. The task force could be composed of the CDGR (Revenue, Civil Defense), Rescue 1122 and PMD, and shall have the following duties and responsibilities:

- To conduct disaster awareness activities for residents and government offices;
- To provide necessary information on flood risks awareness to entities concerned;
- To record all disaster awareness program activities conducted together with the results and comments;
- To improve the Hazard Map; and
- To submit to the management body the work records and the recommendations for future activities.

ii) Action Plan

Action plan was discussed from the end of February to the beginning of March 2009 among Task Force members and Expert Team. In the action plan, it aimed at the following points.

- Awareness program and map exercise should be done at least in each zone, 8 zones by the beginning of Monsoon Season

- Evacuation drill should be done at least 2 or 3 times in the target area by the beginning of Monsoon Season
- Update Hazard Map, Install Billboard, Poster and distribute Leaflet

And it was included the monitoring of the action of the related agencies and evacuees in the monsoon season to measure the achievement of the awareness activities.

Workshop and Seminar are planned at the beginning and the end of the activity.

Table 5-7 Overall Action Plan for Task Force

Activities	Target Zone	2009 March	April	May	June	July	Aug.	Sep	Oct	Nov	Target Group	Remark
Awareness Orientation	3										CD-volunteers	
	1,6,7										School *+Mosque	
	2,8										School	
	4,5										School+Mosque+Mohalla	
Map Exercise	3										CD-volunteers	
	1,6,7										School *+Mosque	
	2,8										School	
	4,5										School+Mosque+Mohalla	
Evacuation Drill	4,5											
Pamphlet & Leaflet												Prepare before end April
Board	4,5											
Hazard Map												Prepare in beginning of April
Others												
Monitoring & Evaluation	4,5											
Workshop											C/P, JCC, FRC	April 7 2009
Seminar											C/P, JCC, NGO, Residence, FRC	1st week of November

Role of Task Force

Member will meet once a week. (every Tuesday in the office)
Based on the action plan, awareness activities shall be carried out.
Confirm the awareness activities and prepare the necessary documentations.
Photocopy the materials and arrange the letters for the activities.

Signatures of Task Force member

Approved by

Note: *; Schools are designated as Evacuation Center
Summer vacation of school will be started at the beginning of June.

In the discussion, it was decided that Awareness programs in each zone should be conducted at the schools designated for evacuation center in each zone. And it was considered that the program in the area where the flood damage was large will be conducted along with Evacuation drill right before the rainy season.

Map exercise was planned to implement with the Awareness orientation every time. Leaflet distribution and Installation of Poster and Billboard will be done during April to May. Meanwhile, these activities need to take budgetary measures.

The following table shows the detailed action plan until the monsoon season in 2009.

Table 5-8 Action Plan for Awareness Program before Monsoon Season

	March	April	May	June
Target Area and Participant	*Target Area* Zone-3 *Participants* Volunteers of Civil Defense	*Target Area* Zone-1, 6 & 7 *Participants* Students and Teachers 1. Govt: College for Women, Dohk Najju (Z-1) 2. Govt: Girls High School Safdarabad, Pirwadahi (Z-6) 3. Govt: Girls High School, Bagh Sardarn (Z-7)	*Target Area* Zone-2 & 8 *Participants* Students and Teachers 1. Govt: Boys High School, Babu Lal Hussain (Z-2) 2. Govt High School, Dohke Kabba (Z-8)	*Target Area* Zone-4 & 5 *Participants* 1. Mohalla 2. UC 3. Mosques 4. C.D Volunteers

		For Reserve 1. Govt: Waqar-un-Nisa College for Women (Z-4) 2.F.G. Boysd High School Daryabad (Z-5)	*For Reserve* 1.Govt: Waqar-un-Nisa College for Women (Z-4) 2. F.G. Boysd High School Daryabad (Z-5)	
Awareness Orientation	✓	✓	✓	✓
Map Exercise	✓	✓	✓	✓
Evacuation Drill				✓ (twice)
Awareness Material		Leaflet	Poster, Billboard	

Note: These Schools are designated as Evacuation Center.

Summer vacation of school will be started at the beginning of June.

d) Training for Task Force

After the task force is established, several lectures and discussion have been conducted by JICA Expert Team. Moreover, the meeting for the arrangement of the program was properly held when it was necessary.

Short term expert conducted lectures twice and attended the Awareness Program for Civil Defense Volunteers in Zone 3 during his stay. The first lecture was conducted about the title of "Disaster Prevention and Disaster Awareness Activities in Japan" on March 24 and the second lecture was about the title of "Hazard Map in Japan and Discussion about Future Challenge" and the evaluation of the awareness program on March 25 was conducted on March 27 2009.

Table 5-9 Training and Meeting Records

No	Date	No. of Participants	Location	Remarks
1	Feb 19 2009	10	PMD, Islamabad	
2	Feb 24 2009	9	PMD, Islamabad	
3	Mar 03 2009	7	Rescue1122, Rawalpindi	90 Minutes
4	Mar 11 2009	7	PMD, Islamabad	105 Minutes
5	Mar 24 2009	10	PMD, Islamabad	Training by Short Term Expert
6	Mar 27 2009	9	PMD, Islamabad	Training by Short Term Expert
7	Apr 14 2009	6	Rescue 1122, Rawalpindi	105 Minutes
8	May 29 2009	6	Rescue1122, Rawalpindi	60 Minutes
9	Jun 02 2009	7	DDO (C)-CDGR, Rawalpindi	
10	Jun 05 2009	5	Rescue 1122, Rawalpindi	
11	Jul 01 2009	6	Rescue1122, Rawalpindi	
12	Jul 06 2009	11	Rescue1122, Rawalpindi	
13	Jul 22 2009	8	Civil Defense Office, Rawalpindi	165 minutes
14	July 30 2009	8	Rescue1122, Rawalpindi	
15	Oct. 24 2009	9	Rescue1122	Remaining Issues
16	Nov. 7 2009	10	Rescue1122	Use of the budget

As a part of training, the presentation titled as "Effort on Flood Risk Management" including the following contents was made by each Task Force member.

- Damage of 2001 flood
- Flood Forecasting and Warning System
- Concerning Agencies for Flood Risk Management
- Resident's Awareness on Flood Risk Management
- Task Force Activities
- Situation of Lai Nullah (Solid Waste Dumping, Aggradation of river bed)

These contents were composed again, and the presentation was made. The following photos show the training scenes.

Fig. 5-4 Training of Task Force

2) Summary of Task Force Activity

After the kick-off meeting and lecture from short-term JICA Expert, member of Task Force start conducting awareness program within the target area. In the beginning, Task Force is decided to target school student and teacher. Record of awareness activities is summarized in Table 5-10.

Table 5-10 Summaries of Task Force Activities

No	Date	Type of Activity	Participants		Location	Target Group	Remarks
			Residents	Members			
1	Mar 06 2009	A.P	15	4	Rescue 1122, Rawalpindi	Teachers from Rawalpindi	75 Minutes
2	Mar 25 2009	A.P & M.E	44	10	Civil Defense, Rawalpindi	Civil Defense Volunteers	120 Minutes
3	Apr 15 2009	A.P	50	7	Govt. girls High School Bagh sardaran	Teachers and Students	180 Minutes
4	Apr 18 2009	A.P	345	7	Govt. Girls High School Safdarabad	Teachers and Students	150 Minutes
5	Apr 25 2009	A.P	35	5	Rawalpindi Chamber of Commerce and Industries	Member of RCCI relating to businesses	180 Minutes
6	Apr 28 2009	A.P	75	4	F.G Boys School Daryabad	Teachers and Students	90 Minutes
7	May 08 2009	A.P	125	4	Govt. Girls High School, Milat Colony	Teacher and Students	60 Minutes
8	May 21 2009	A.P	60	4	Govt. Boys High School Said Puri Gate	Teacher and Students	90 Minutes
9	May 30 2009	A.P	161	7	Govt. College for Women, Khayaban-e-Sir Syed	Teachers and Students	60 Minutes
10	Jun 13 2009	A.P & E.D	50	9	Govt. Waqar un Nisa College	Civil Defense Volunteer & Residents	180 Minutes
11	Jul 14 2009	A.P	250	7	Markazi Jamia Masjid,Gawalmandi	Mosque Community	45 Minutes
12	Jul 20 2009	A.P	100	4	Akbari Masjid, Mohin Pura	Mosque Community	45 Minutes
13	Aug 01 2009	A.P	26	7	Redo Medical Complex- 1 (NGO), Rawalpindi	Participants from Different NGOs	80 Minutes

Members= Task Force Member & JICA Experts
A.P = Awareness Program
M.E = Map Exercise
E.D = Evacuation Drill

3) Concerning Issues for Activities of Task Force

The progress of budget of the task force was late and it was the main reason for restrict the activities of Task Force. After several meeting with DCO and EDO(F&P), the budget for Task Force was able to be released. The printing of 8,000 hazard map leaflets and the base maps for map exercise began by using the budget on November 13, 2009.

Therefore, releasing budget allows task force to use own budget by their decision with approval of DCO. It means greatly advanced for the task force activity in the future as a precedent. The right is a copy of the check for the advance payment of the printing which was paid on November 13 2009.

The activity of Task Force has been reported and monitored at monthly C/P meeting, and henceforth, it is proposed monitoring by the new steering committee in the future. The steering committee will be conducted regularly and seasonally after the project ends.

4) Poster and Billboard of Hazard Map

Some posters and billboards installed in Phase-I have been damaged in one year after the installation. Since Task Force could not activate their budget for a long period, JICA Expert Team repaired and reinforced the 5 partially damaged billboards out of them in Phase-II. Remaining damaged billboards and Posters will be fixed by Task Force after the budget activated.

July 2008

June 2009

August 2009

Fig. 5-5 Billboard Situation installed at Nazim Office of UC-36

Table 5-11 Current Situation of Billboard (Outdoor)

	Name Of Place	Address	Type/Size	Situation
Installation Sites Requested by UC-36 Nazim				
1	Rattat Amral Bridge	UC-36, Mohin Pura	Urdu/A-0	●
2	Govt. Girls Degree College	Mohin Pura	Urdu/A-0	△
3	M.P Primary School	New Schene Mohin Pura	Urdu/A-0	●
4	Govt. Dispensary(in Lawn)	New Schene Mohin Pura	Urdu/A-0	●
5	UC-36 Office	MohimPura	Urdu/A-0	△
Installation Sites Requested by UC-46 Nazim				
1	Liaqat Bagh main Gate	Murre Road, Near TMA Office	Urdu/A-0	●
2	Laoqat bagh Press Club	Murree Road, Near TMA Office	Urdu/A-0	△
3	Gowal Mandi Bridge	UC-46	Urdu/A-0	●
4	Children Park	Community Chowk	Urdu/A-0	△
5	CIA Office	Raja Bazar	Urdu/A-0	△

Table 5-12 Current Situation of Poster (Indoor)

	Name of Place	Address	Type/Size	Situation
Installation Sites Requested by UC-36 Nazim				
A1	Tawakly Masjid	Mohala Arjun Nager Mohin Pura	Urdu/A-0	●
A2	Masjid-e-Sadiqia	Mohin Pura Near UC-36	Urdu/A-1	●
A3	Sunrise grammar School (private)	Street No.26,Mohin Pura	English/A-1	○
A4	Noshahi Masjid	Mohin Pura	Urdu/A-1	●
A5	Masjid-e-Kubra	Street No.22,Mohin Pura	Urdu/A-1	○
A6	Waite Lifiting Club (Private)	Near Nullah Lai,Mohin Pura	English/A-1	○
A7	Zia_Ul-Islamia International School For Girl	New Scheem Mohin Pura	English/A-1	○
A8	Jamia Masjid Akbari	New Scheem Mohin Pura	Urdu/A-1	○
A9	Govt.Degree Collage For Women	New Scheem Mohin Pura	English/A-1	○
A10	Tehsil Office	Raja Bazar	Urdu/A-0	○
Installation Sites Requested by UC-46 Nazim				
B1	TMA	Liqat Bagh Laiqat Road	Urdu/A-1	○
B2	Jamia Masjid Hanfia	Bohar Bazar Chowk Nia Mohalla	Urdu/A-1	○
B3	Moti Masjid	Laiqat Road Near Small Bridge Raja Bazar	Urdu/A-1	○
B4	Govt.Islamia High School # 04	Laiqat Road Near Laiqat Bagh	English/A-1	○
B5	Govt Haigh School And DAV Collage	DAV Collage Road	English/A-1	○
B6	Govt.Mission Higher Secondery School	Iqbal Road Near Raja Bazar	English/A-1	○
B7	Govt.M.C Girls High School	Nia Mohala Iqbal Road	English/A-1	○
B8	UC-46	Laiqat Road Laiqat Bagh	Urdu/A-1	○
UC-36,46,39,40,41				
C1	Govt.Muslim Girls High School	Murree Road Near E.D.O	Urdu/A-0	○
C2	Govt.Girls Higher Scondery School	Murree Road Near E.D.O	Urdu/A-1	○
C3	Govt.Alpha Christian High School	Gordan Collage Road Near Savour Foods	Urdu/A-1	○
C4	Govt.Faiz-Ul-Islam High School	Trunk Bazar Iqbal Road oppt.Moti Bazar	Urdu/A-1	●
C5	Govt.Muslim High School # 02	SaidPuri Gate Jaima Masjid Road Near UC-41	English/A-1	○
C6	Govt.Gordan Collage	Laiqat Road Oppt.TMA	English/A-1	●
C7	Govt.National Collage Of Art	Laiqat Road Laiqat Bagh	Urdu/A-1	○
C8	E.D.O	Murree Road	Urdu/A-1	○
C9	D.H.Q Hospital	Main Raja Bazar	Urdu/A-1	○
C10	Jamia Masjid Abdullah	City Sadar Road Near Jinah Bridge	Urdu/A-1	○
C11	Jamia Masjid Ghosia	Mohalla Arjun Nager Mohin Pura	Urdu/A-1	○
C12	Qadimi Masjid	Mohalla Arjun Nager Mohin Pura	Urdu/A-1	○
C13	Usmania Masjid	Mohala Usman Pura Imperil Market	Urdu/A-1	●
C14	Noor Masjid	DAV Collage Road	Urdu/A-1	●
C15	Darul Islamia Ehle Hadis	New Scheme Near Govt. Degree Collage For Women Mohin Pura	Urdu/A-1	●
C16	Bilal Masjid	Mohin Pura	Urdu/A-1	○
C17	Tehsil Office Mosque	Kashmiri Road Raja Bazar	Urdu/A-1	○
C18	Jamia Masjid Sheshy Wali	SaidPuri Gate Jaima Masjid Road	Urdu/A-1	○
C19	Masjid Qazi ShahaBudeen	Main Bohar Bazar	Urdu/A-1	●
C20	Jamia Masjid	Jamia Masjid Road	Urdu/A-1	○
C21	Purana Qila Masjid	Purana Qila Bazar	Urdu/A-1	●
C22	Jamia Masjid Nomina	Gordan Collage Road Near Savour Foods	Urdu/A-1	○
C23	Jamia Masjid Hanfia	Mohalla Noshai Mohin Pura	Urdu/A-1	○
C24	Moti Bazar Masjid	Moti Bazar (sabzi Mandi)	Urdu/A-1	○
C25	Faiz Masjid	Bara Bazar Chowk Iqbal	Urdu/A-1	○
C26	Taleem-ul-Quran	Dingi Khuee Chowk Purana Qila	Urdu/A-1	○
C27	Masjid Mian Alam Khail	Bohar Bazar	Urdu/A-1	●
C28	UC-39	Waris Khan Back Side Of Police Station Waris Khan	Urdu/A-1	○
C29	UC-40	Bohar Bazar Near Lal Hawali	Urdu/A-1	○
C30	UC-41	ShahChin Charagh Saidpuri Gate Bani Chowk	Urdu/A-1	○
C31	RDA	Laiqat Bagh Murree Road	Urdu/A-1	○
C32	Sport Complex	Laiqat Bagh Murree Road	Urdu/A-1	○

Note: ○ no damaged, △ partially damaged, ● totally damaged

5) Leaflet of Hazard Map

Leaflet and Pamphlet were revised by Task Force according to the improvement of Hazard Map in Phase-II and the design was also renewed. Hazard Maps in the leaflet were reflected the addition of evacuation center and the revise of siren pattern.

The printing of the leaflet of all zones began in November 2009 because of the issues for Task Force budget were solved.

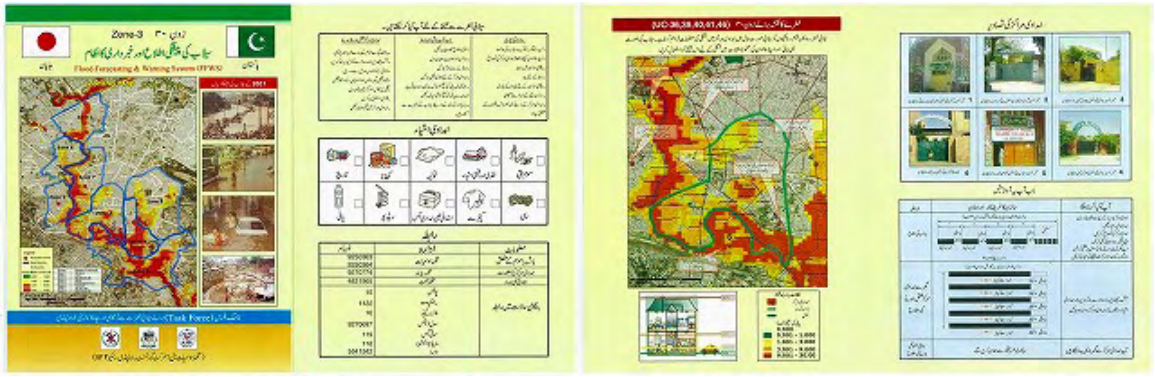


Fig. 5-6 Renewed Leaflet of Hazard Map in Urdu

CHAPTER 6 ACTIVITIES AND PROGRESS OF OUTPUT 4

6.1 Comprehension of Flood Relief Plan

Flood Relief Plan has been updated every year since 2004 and the latest was published on May 2007. In the 2007 edition, there were some confusion between old system and the new system introduced by the Grant Aid Project in 2007. Also, it was lacking a statement of the roles of Rescue1122 that newly established in 2006. The modification of Flood Relief Plan 2007 was focused on the following three points:

- Command structure
- Communication system between concerned agencies
- Roles of Rescue1122

Based on the Flood Relief Plan 2007, JICA Expert was conducted interview survey with the related agencies, such as Revenue (CDGR), Rescue1122, Fire Fighting (CDGR, former TMA) and Civil Defense. This interview survey was not only for confirmation of the flood relief plan for JICA Expert Team, but also contributed to understand the problems of the existing plan for the related agencies.

1) Interview Results of Revenue (CDGR)

The following subjects were confirmed during the discussion.

- Revenue has a primary role in Flood Relief Plan, especially establishment and operation of relief camps.
- The related agencies will be cooperated each other during emergency situation.
- All order for emergency activities are issued by CDGR-DCO.
- Agencies had a role of evacuation guidance/assistance are Police, Fire Fighting and Civil Defense.

2) Interview Results of Civil Defense (CDGR)

Civil Defense is constituted by official staffs and volunteers. Volunteer leaders are allocated in each area. Request has been made to list down the volunteer leaders of each in the FRP, unfortunately it has not been submitted to the JICA Expert before the deadline of modification.

3) Interview Results of Rescue1122

The roles of Rescue1122 are:

- To issue warning using the system of FFWS and fire vehicles for the low-lying area
- To issue warning (under the responsibility of DEO-Rescue1122) according to the instruction of CDGR-DCO
- Rescue1122 do not conduct evacuation assistance in order to standby for emergency situation.
- The activities of the TMA Rescue Squads (uncertain for real activities) are transferred to the CDGR, however, the activities regarding lifesaving have been hand over to Rescue1122. The remaining activities such as clean of river debris are carried out by CDGR.
- It is necessary to prepare the action plan for dispatch officer during the emergency situation.

Since Rescue1122 does not play the main roles in evacuation assistance, TMA and Civil Defense will take the major roles of evacuation assistance continuously. It is necessary to monitor their activities because their performance for the activities is still unclear.

4) Interview Results of TMA

It was understand, by the interview with TMA, most of the roles in TMA had been transferred to CDGR since 2006. However, these changes were not yet reflected the FRP and it created some confusion to the operation and management personnel. For example, "Flood Rescue Squads" that mentioned in the FRP is insubstantial and inactive. Based on the above findings, JICA Expert arranged the followings:

- Activities regarding lifesaving will be carried out by Rescue1122.
- Remaining activities such as clearance debris is taken over by the Municipal Services (Spatial Planning, Sanitation and Solid Waste Management) of TMA.

TMA will continue to manage Flood Relief Center in emergency, but only able to operate as a liaison office due to the shortage of manpower.

6.2 Revision of Flood Relief Plan

6.2.1 Revision in Phase-I

In the revision in Phase-I, the command structure, communication system and the roles of Rescue1122 were improved, warning siren patterns were added and Flood Relief Plan 2008 was completed.

1) Roles of Rescue1122

The role of Rescue 1122 that is the new agency and the command channel, the commands should be basically issued by DCO, were specified in Flood Relief Plan 2008.

It was proposed that the activities regarding lifesaving should be taken over by Rescue1122 since Rescue Squads no longer exists in TMA, and the activities not related to lifesaving such as debris clearance should be taken over by the Municipal Services (Spatial Planning, Sanitation and Solid Waste Management) from TMA.

2) Command Structure and Roles of Related Agencies

The command structure and roles of related agencies was descried in Flood Relief Plan 2008. Up to 2007, FRP did not have any explanation in figure hence it was very difficult to understand the content. Thus, the JICA Expert proposed to add the main FRP contents in figure to ensure easy understanding of the command structure and the roles of related agencies.

3) Siren Pattern

The siren patterns were newly described in Flood Relief Plan 2008 to ensure all related agencies and resident can recognize the two kinds of siren for warnings.

4) Member of Flood Relief Committee

Rescue1122 was not included as the member of FRC until 2007. The responsibility of the operation of warning post was handed over from TMA to Rescue1122 in 2006. Presently, Rescue1122 has a significant role in FFWS. Therefore, Rescue1122 had joined as a member of FRC in Flood Relief Plan 2008.

6.2.2 Revision in Phase-II

1) Addition of Flood Warning Code 2009

The action should be taken by each warning level based on Flood Warning Code 2009 and the role of representatives of each organization related to disaster prevention was described. However, a detailed system of each organization could not be mentioned, but an instruction of the system-making and formulation of the action plan in each organization was described.

2) Addition of Description of Awareness Activity

The establishment of Task Force and their organization, purpose and role were described with the importance of the awareness activity and as the core of the implementation system.

3) Addition of Hazard Map

Purpose of Flood Hazard Map and explanation of description information were described. It explains the importance of the update of information, and the hazard map of the entire object area and Zone4 is described. It is described that all zone's data can be downloaded from the site of FFC. However, PMD website instead of FFC is described as temporary steps because it has not been established yet at that time.

4) Addition of Evacuation Center

Govt. Waqar ul Nissa College for Women was added as proposed Evacuation Center. This school has been recommended by JICA Expert as Evacuation Center. Now, total number of Evacuation Center The number of Evacuation Center came in nine places now.

5) Command Structure and Roles of Related Agencies

Based of DCO instruction, DO (Fire Fighting) was appointed a person in charge, the representatives were elected from each organization related to disaster prevention and Central Flood Control Centre was set up in the fire station. The contact to a related organization will be done by this organization based on a direct instruction from DCO.

The re-arrangement of the communication system according to the installation of Central Flood Control Centre was reflected and the clarifications of those who issue the instruction officially according to the importance of the instruction etc. have been improved.

In the command structure, as a destination of fax from PMD, DO (Revenue) was deleted and DO (Fire Fighting), which is person in charge of Central Flood Control Centre, and Civil Defense, which plays main roles of the disaster-prevention activity in CDGR, were added.

The figures and the contents of FRP will be revised from time to time in future, with consideration of opinions from counterpart.

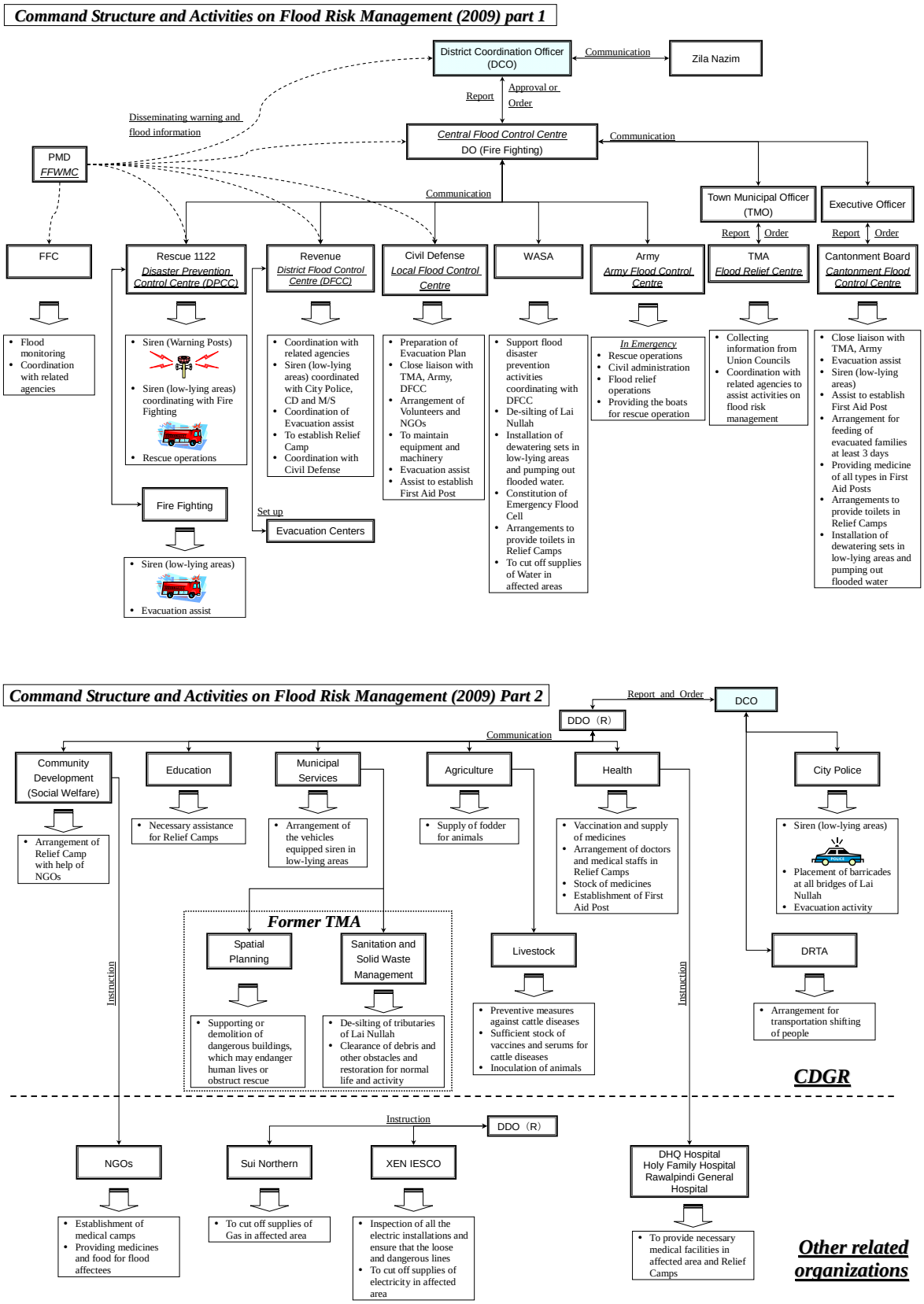


Fig. 6-1 Command Structure and Roles of Related Agencies

6) Siren Pattern

The repetition frequency of flood warning siren was changed to sound longer, 12 times, because the former siren was 5 times and it was short, and it had the possibility of failing to be heard.

Flood Alert Warning

The flood alert warning shall be issued by operating the siren in 12 repetitions of sounding for 10 sec. and a pause for 5 sec.

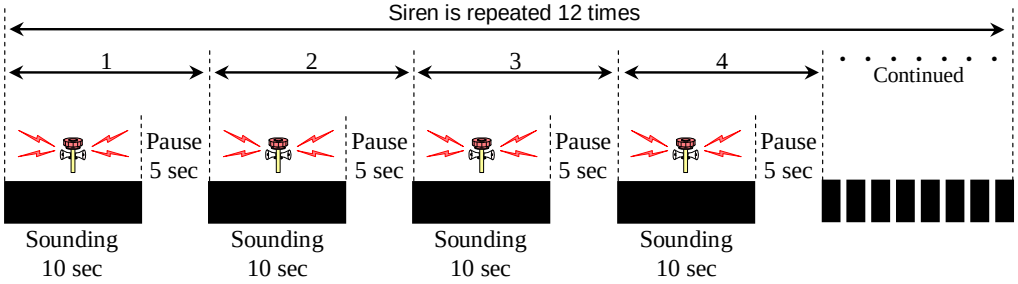


Fig. 6-2 Siren Pattern of Flood Alert Warning

Flood Evacuation Warning

The flood evacuation warning is same as before and shall be issued by operating the siren in 5 repetitions of sounding for 50 sec. and a pause for 10 sec.

Fig. 6-3 Siren Pattern of Flood Evacuation Warning

6.3 Flood Relief Committee

In Phase-I, Flood Relief Committee (FRC) Meeting was held on 23 June 2008. The revised Flood Relief Plan 2008 was introduced and JICA Expert explained the general outline of the modification portions and the points of revision of Flood Relief Plan, and aimed to familiarize the plan to C/P participating.

In Phase-II, Pre-Flood Arrangements Meeting was held on 4 June 2009, and the roles and responsibilities of related agencies were confirmed. In this meeting, especially, dredging of Lai Nullah by WASA was remarkable.

6.4 Map Exercise for C/P

1) CDGR

Map exercise for CDGR (Revenue, Civil Defense), Rescue1122 and CDA was conducted on 8 May 2008 as a part of awareness program. Though there were some aspects where participants were confused during the first experience of map exercise, generally they have quite good understanding of the exercise. However, it was found that they did not know the roles of agencies and communication flow. Also, there were comments that the map was too small. From this map exercise, it was confirmed that improvement of the training scenario and procedure is necessary.

2) Rescue 1122

Map exercise for Rescue1122 was conducted on 26 June 26 2008. It was aimed to improve the understanding of C/P staffs on the objectives of the map exercise and to familiarize themselves with the procedure and how to facilitate it. The map exercise was carried out as per the actual exercise for community. The staff actually carried out the map exercise to know the procedure. The staff seemed to basically understand the procedure and process. Moreover, in order to improve the color of marker, making order and questionnaire for participant, which will be contribute to understand for the residence about Map Exercise.

6.5 Guidance for Awareness Activity and Hazard Map

1) Guidance for Awareness Activities

Based on the achievement in Phase-I, guidance for Awareness Program, Evacuation Drill, Map Exercise and Awareness Materials (Billboard and Poster, Leaflet) was prepared. In executing each activity, the advance preparations, preparations on the day of event, and the practical considerations were described. As the program and checklist used in the actual activities are described in the guidance, the guidance is deemed easy to understand for participants.

The Guidance was revised based on Task Force activities after the 2009 flood season.

2) Guidance for Hazard Map

This guidance is basically produced by extracting from “Flood Hazard Map Manual for Technology Transfer” published by Ministry of Land, Infrastructure and Transport, Japan and Infrastructure Development Institute, Japan in March 2003. Some description were revised and added in order to suit the Lai Nullah, Pakistan situation, and unnecessary descriptions at present stage were skipped.

6.6 Equipment Provision to Civil Defense

JICA Expert Team has prepared the equipment (hand siren and hand megaphone) for enhancement of flood risk management. Civil Defense was selected appropriate organization for equipment provision which was based on the roles of evacuation guidance and assistance in the Flood Relief Plan 2008.

In order to enhance and to evaluate the effectiveness usage of equipment, Civil Defense was asked to prepare the plan for evacuation activities. There are 10 patrol teams that consisted of civil defense staffs and volunteers were organized, and the team will execute evacuation guidance and assisting by use of the equipment at their assigned area when the evacuation order issued.

The activity was initially planned at the pilot area but it was changed to Zone 4 in line with the request of Civil Defense. Based on the agreement between Civil Defense and JICA Expert, Civil Defense manages the equipment properly and JICA Expert will check the condition before next flood season.

JICA Expert confirmed that Civil Defense has managed the equipment on 22 July 2009. However, one megaphone was missing in Civil Defense.

6.7 Monitoring on Actions taken by C/P during Floods

Monitoring on Flood Disaster Prevention Action of C/P during this monsoon season was conducted by questionnaire and interview survey in twice.

The largest flood in this monsoon season happened on 5 July 2008 and evacuation order was issued by CDGR-DCO. However, the formation of monitoring had not been prepared yet at this time, and then interview survey was conducted on subsequent day.

The follows was the record of 2008.

- Only one Evacuation Center, Govt. Islamia High School No.4, out of 8 evacuation centers was established.
- Medical goods were prepared and doctor was standby at the evacuation center.
- No resident evacuated to evacuation centers. (other places were same situation)

Alert was issued at 20:50 21 August 2008. Though it did not reach evacuation level, activities of C/P at Alert level was monitored because it had entered the last stage of rainy season at the month. After this alert, flood did not happened.

Fortunately, monsoon season in 2009 did not received heavy rain in the Target Area, as the result of weather record, there was only one time reach to the “pre-alert” level. Monitoring works during the actual flood event was not able to conduct.

1) PMD

- When the Alert was issued, the Director was not in office.
- The persons in charge of monitoring were Mr. Shahid and Mr. Imran. They judged that warning must be issued.
- According to Mr. Imran, although there was a minor problem with the system, in less than 5 minutes, he managed to communicate with all related agencies (CDGR, Civil Defense, Rescue1122 etc.) to issue warning.
- According to Mr.Shahid, he was also on duty on the same day. He said that equipment was working properly. Communication with all related agencies took 5 minutes though it usually takes around 20 minutes.

2) DCO (CDGR)

Interview with DCO was not able to be done because of schedule constraint. The survey team tried to contact to Ms. Noreen Bashir (EDO of Finance & Planning), and Habib Ullah (Senior Administrative Officer, SAO) instead of DCO but no answer was obtained.

3) EDO (Revenue, CDGR)

After Alert was issued, Mr. Asif Qureshi (EDO, Revenue) was in contact with all related agencies via his cell phone.

No resident evacuated to the evacuation centers. According to the post-survey at the site, although no resident evacuated to the evacuation center, the resident evacuated to the relatives house and friends which is located on the hilly area or the upstairs based on their

own judgments. It seems that the awareness activity contributed some effectiveness to the residence. When the resident heard the siren and the evacuation action was taken promptly.

4) Civil Defense

According to Mr. Farooq Ahmed (Chief Instructor), Civil Defense did not receive any information and did not have any activities on 21 August 21 2008.

5) Rescue1122

According to Dr. Tanveer Akhter (DEO), he informed DPCC about Alert by telephone and fax at 20:50 21 August 21 2008.

6) DPCC

- The staff in charge of operation on the day responded to the question
- The equipment was not working properly for 4 days. They have complained to PMD to solve the problem.
- Usually it takes about 20 minutes to receive information.
- DPCC received fax of Alert at 21:00 21 August 2008. They operated according to the manual.

7) FFC

According to Mr. Ahmed Kamal (Chief Engineer), he is always available via his cell phone. He was in touch with Civil Defense and Fire Fighting to check the level of flood.

Monitoring at evacuation center was not conducted because evacuation order was not issued. However, from the questionnaire, some inconsistent points were identified:

- According to PMD, they have informed all the related agencies but Civil Defense claimed that they did not receive any information.
- PMD and DEO of Rescue1122 informed DPCC at 20:50 but according to DPCC, they only received it at 21:00.

Concerning the second point above, DPCC might have given inaccurate answer as the interview. Because of the interview was not conducted immediately after the event. However, with respect to the first point, if it is true then the problem is very serious. It is necessary to identify the cause, and to improve the communications system. Usually fax sending from PMD is time consuming, which might need improvement for the staff of PMD. Otherwise, the reason is simple, which is due to the busy fax line. The related agencies should consider have additional fax line for emergency use.

6.7.1 Evacuation Center

During the monsoon season in 2009, JICA Expert also conducted site survey of all evacuation center about following conception.

1. Basic Information about size of evacuation center
2. Building Condition
3. Available Capacity in Emergency Usage
4. Communication System
5. Available Service/Facilities

6. Support Organization

Result of evaluation for above was summarized in Table 6-1 and Fig. 6-4.

Table 6-1 Evaluation of Existing Evacuation Center in Rawalpindi

Sr. No	Name	Structural Condition	Accommodation Capacity	Communication System	Emergency Facilities	Emergency Management	Rating	Remarks
		a	*b*	*c*	*d*	*e*	*f*	
1	Govt. College, Women, Dhoke Najju	1.0	0.0	0.0	**-1.0**	0.0	0.0	Flood water enters into the building
2	M.C. Boys High School, Babu Lal Hussain	0.0	0.0	0.0	**0.0**	1.0	0.2	Old block needs urgent attention
3	F.G. Girls High School, Daryaband	1.0	1.0	0.0	1.0	1.0	0.8	Old block needs urgent attention
4	Govt. Islamia High School, 4, Liaqat Chowk	**1.0**	**2.0**	**0.0**	**2.0**	**1.0**	**1.2**	Flood water enters into the building
5	F.G. High School, Mareer Hassan	1.0	**-2.0**	0.0	**-2.0**	0.0	**-0.6**	Officially no letter, to the Principal for it's use as an evacuation center
6	Govt. Girls High School, Safdarabad Pirwadhai	**-2.0**	**-2.0**	0.0	**-1.0**	0.0	-1.0	Should be replaced with boy's school because of it's deteriorated condition
7	Govt. Girls High School, Bagh Sardaran	1.0	2.0	0.0	**-1.0**	1.0	0.6	
8	Govt. Boys High School, Dhoke Khabba	-1.0	**-2.0**	0.0	**-2.0**	1.0	0.8	Water from adjacent nullah enters into the building in rainy season
9	Waqar-un-Nissa, Girls High School	1.0	2.0	1.0	-2.0	0.0	0.4	Lot of space, could be a potential evacuation center
10	Govt. Waqar-un-Nissa College for Girls	1.0	1.0	0.0	-2.0	0.0	0.0	Cultural & religious constraints, old block needs attention, less free space
11	Govt. Asghar Mall College for Men	1.0	2.0	0.0	-2.0	0.0	0.2	Lot of space, could be a potential evacuation center

Fig. 6-4 Photo of Damaged Structure in Govt. Girls High School

As see the survey results, CDGR should pay more attention about evacuation center. Evacuation center is not only for flood but also for other disaster. Therefore, basic facilities and communication method should be provided in the Evacuation Center.

6.7.2 Improvement for Flood Risk Management by Counterpart

From the occurrence of flood on 5 July this year, various problems concerning the flows of communication and issuance of flood warning were identified and they are summarized in Table 6-2.

Table 6-2 Problems and Points for Improvement during Actual Flood

C/P Agencies	Problems	Improvements
FFWMC PMD	• Delay in sending flood warning due to fax transmission problems. • Incorrect fax number. • DPCC did not fully understand the contents of Lai Nullah Flood Situation Report. • It was not able to ascertain whether the flood warning had reached all the parties concerned.	• Ensure availability of fax facilities for all parties concerned. • Reconfirmation of fax numbers of all parties concerned. • Improvement of the contents of Lai Nullah Flood Situation Report to ensure clear directives (refer to item d) below).
DPCC Rescue1122	• Fax machine was concurrently served for telephone use. • Delay in receiving the fax of Lai Nullah Flood Situation Report due to frequent use of the fax machine to receive external enquiry calls. • There were mistakes in operating flood alert sirens (person-in-charge escaped from holding responsibility) • Unfamiliar with the operation of flood alert sirens as it was the time to operate.	• Application has been made for a specific fax line without sharing with telephone usage. • Enquiry calls should be directed to Rescue1122 Office rather than the Operation Room. • Further explanation of amended Lai Nullah Flood Situation Report.
CDGR	• Despite that CDGR-DCO is responsible to issue Evacuation Order, he was not able to monitor the FFWS. • He did not acknowledge receipt of Lai Nullah Flood Situation Report.	• Ensure DCO can have close monitoring on the FFWS operated by PMD (see item b) below).
Other organizations	• The monitoring facilities at FFC are not functioning. • It was either because the flood alert system is not convincible or due to lack of understanding, some organizations were still judging the needs for evacuation based on the old system.	• Immediate resumption monitoring system at FFC is necessary. • Elevating the understanding of FFWS by providing a manual to all parties concerned.

1) Project Website on the PMD Official Homepage

Since May 2008, the information of the current Project is published online via the PMD Official Homepage. The contents include scope of work, methodology and schedule of the current Project.

2) Semi-real-time Upload of Rainfall and Water Level Data on PMD Homepage

In order to enable the CDGR-DCO to monitor the FFWS, it was proposed that real-time rainfall and water level data collected by PMD via the FFWS be uploaded to the PMD Official Homepage automatically at an interval of 10 minutes. As such, the DCO would be able to monitor the situation of anticipated flood via internet. On the Phase-II, upload system was upgrade by the PMD engineer and it is contributing the disclosure of flood information in Lai Nullah since May 2009.

3) Advance Announcement of Heavy Rain Forecast in Lai Nullah Basin (Lai Nullah Watch)

During the Monthly C/P Meeting No.6 on 8 July 2008, the concerns on short notice of flood prediction were raised. It was thus agreed that when heavy rain with flood risk is forecasted, PMD shall announce the said weather forecast, Lai Nullah Watch, to all parties concerned so as to ensure prompt flood preparation.

4) District Disaster Management Plan 2009 Rawalpindi

District disaster management plan 2009 was the first time prepared in CDGR, the editor of this manual is one of the trainee in Japan on May 2009. This manual is not only for flood but also for other natural and human disaster. With use the same time of FRP in monsoon season, risk management for disaster in CDGR will be improved. In addition, WASA also prepared "Flood Mitigation Plan 2009" for Lai Nullah this year. Making these manuals is very important for the first step of disaster risk management however operation of these manuals is more principal aim.

5) Disaster Management Exhibition & Conference 2008 & 2009

Based on the date of the massive earthquake in Pakistan on 8 October 2005, in 2007, the Government of Pakistan declared 8th October as the Day for Disaster Reduction in Pakistan. In this day various activities related to disaster awareness such as conference and an exhibition were held. For 2008, it was decided that similar disaster awareness conference and exhibition to be held on 8-9 October 2008. Although the said activities were not taken into consideration during the formulation of the current Project plan, the JICA Expert Team has decided to involve in the exhibition through joint-participation with the C/Ps. For this purpose, hazard maps, pamphlet, etc. prepared under Output 3 shall be exhibited and awareness activities (seminars, evacuation drill and map exercises) organized in June and July this year shall be shown via videos. All the relevant C/Ps have agreed to station at the exhibition booth to provide necessary explanations to the visitors.

Unfortunately, after the incidence of suicide bombing at a hotel in Islamabad on 20 September 2008, the said exhibition has been postponed due to safety reason. Eventually, the conference was held on 8 October 2008 in line with the original schedule but exhibition has been postponed to 3-4 November 2008. In addition the exhibition was postponed one more time by organizer on 28 October 2008. The new schedule is planed on 16 to 17 December 2008.

DEMC 2009 will be held on October 8-10 2009 in convention center Islamabad. This year contents of the exhibition and magnitude of conference is upgrade by the organizer.

6.7.3 Role and Activities of Volunteer in Civil Defense

The Civil Defense Volunteer Organization are playing important role to assist evacuation activities during the emergency events. In the Phase-II, Experts like to find the way to coordinate with this organization. The awareness of flood risk management for the member of volunteer and community leaders were conducted by the Task Force.

6.7.4 Web Site

As a result of the discussion on the monthly C/P meeting about the way to open the flood risk management information to the public, new website is developed and it is scheduled to collect the opinions from the resident under the management of Task Force.

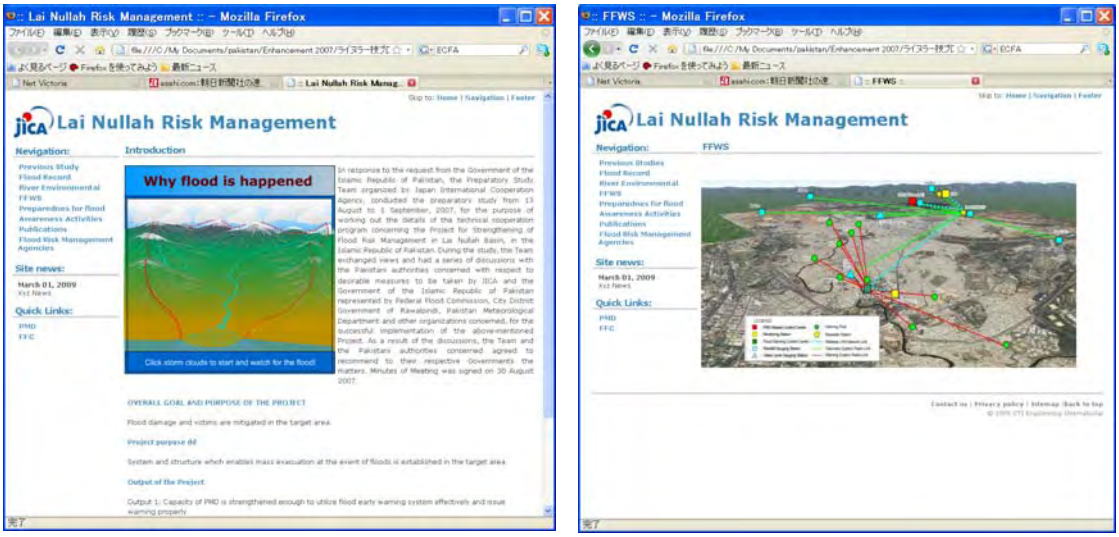


Fig. 6-5 Website

6.7.5 Communication Drill in CDGR

Based on the FRP 2009, DCO ordered to conduct a communication drill within concerned agencies in CDGR on July 8 2009. The result of communication drill was recorded and reported to DCO. This is the first time of the communication drill in CDGR and it discovered many problems which shall be improved in CDGR.

CHAPTER 7 EVALUATION

Before the completion of the Phase-I, JICA Expert Team shall collaborate with C/P to evaluate the outputs of technical transfer, achievements and performance of each activity with the use PCM method.

7.1 Evaluation of Capacity Development on Overall Project Phase-I

Capacity development (C/D) has been adopted in this Project. The process of evaluation method is based on three levels, which are individuals, organizations and institutions. Evaluation indicators are based on the agreement of both parties (C/P and JICA Expert). Surveys were conducted twice i.e. during the beginning of the Project and at the end of Phase-I. The question and result of capacity assessment are shown in Table 7-1 below. The number of respondents from C/P is seventeen, which including seven supporting staffs. There was no answer from WASA, TMA, CDA and CDGR-CD.

Table 7-1 Evaluation Index (FFC & PMD)

Capacity	Item
{Individual} Knowledge, ability, skill and intention about individual improvement	I-1 Understanding of FFWS
	I-2 Consolidation of observation data
	I-3 MIKE11
	I-4 Runoff mechanism
	I-5 Skill to improve flood simulation model
	I-6 Skill to improve flood warning code
	I-7 Discharge Measurement and H-Q Curve
	I-8 O&M Works
{Organization} Organization Structures, Roles, Management, Leadership and Problem Consciousness	O-1 Mission of FFWMC
	O-2 Coordination with other agencies
	O-3 Influences and Leadership of the FFWS
	O-4 Collaboration Level among the Related Organization
	O-5 Manpower for FFWS activity (forecasting and observation)
	O-6 Equipment for FFWS activity (forecasting and observation)
	O-7 Problem Consciousness
{Social} Social Involvements	S-1 Disclosure of Information
	S-2 Public Contribution
	S-3 Community Flood Risk Management

The evaluation indexes in Table 7-1 are divided into four categories as summarized in the table below and Fig. 7-1.

Question	I-1	I-2	I-3	I-4	I-5	I-6	I-7	I-8	O-1	O-2	O-3	O-4	O-5	O-6	O-7	S-1	S-2	S-3
Before	61%	53%	56%	53%	53%	44%	54%	45%	31%	66%	58%	51%	56%	50%	69%	25%	25%	28%
Target	94%	92%	97%	94%	89%	94%	92%	83%	72%	83%	92%	100%	97%	76%	97%	72%	89%	72%
Achievemer	83%	68%	68%	75%	64%	56%	67%	56%	47%	69%	69%	67%	64%	58%	75%	56%	42%	47%

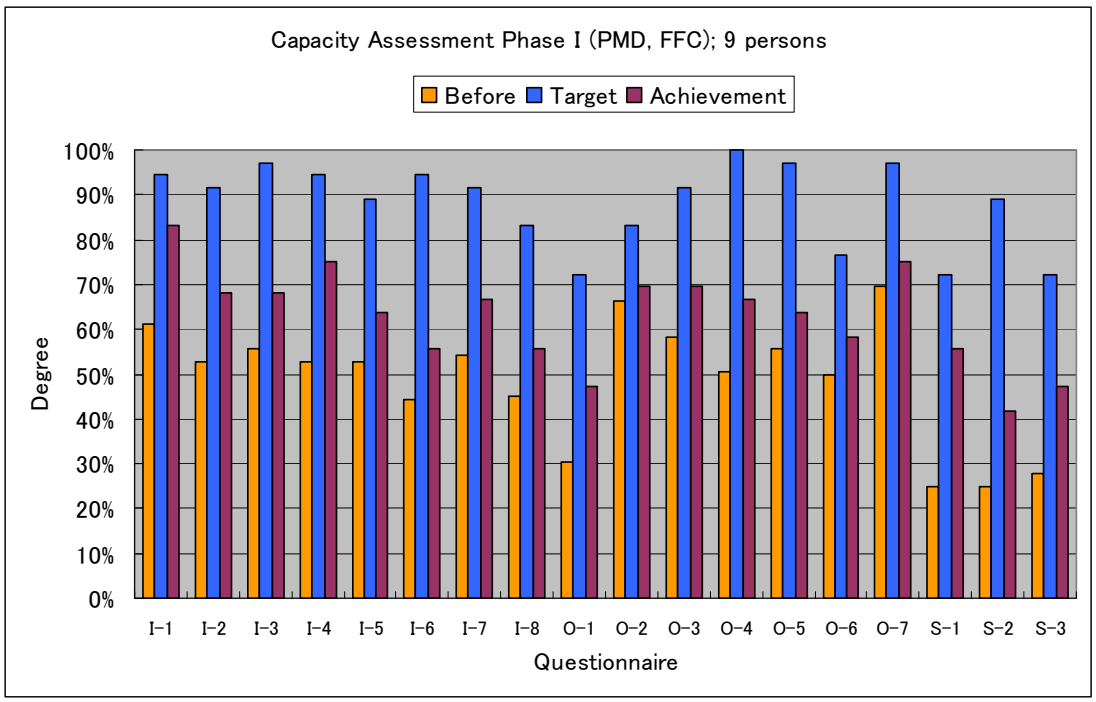


Fig. 7-1 Target and Achievement of Output (PMD, FFC)

From the evaluations undertaken for C/P staffs of PMD and FFC, the following conclusions were made:

- Understanding of FFWS has been improved.
- In view of the simple data management works, high C/D targets were set for the C/Ps, but unexpectedly that achievements were quite low due to low efficiency of C/P staffs on the tedious data management works.
- Low understanding of hydrological aspect is partly due to the changing of original staffs participated in the Soft Component phase of the Project that resulted in missing of basic hydrological knowledge.
- It is difficult for other staff to accomplish the duty as a representation when the person in charge is an absence because each one's responsibility and duty in their organization are fixed
- Through the participations of flood awareness activities, Monthly C/P Meetings, and information sharing among the C/Ps, the awareness of all C/P members on the importance of flood risk management has been significantly elevated.

Table 7-2 Evaluation Index (CDGR & Rescue1122)

Capacity	Item
{Individual} Knowledge, ability, skill and intention about individual improvement	I-1 Understanding of FFWS
	I-2 Understanding of Flood Relief Plan (FRP)
	I-3 Flood Characteristic of Lai Nullah
	I-4 Warning Code
	I-5 Hazard Map
	I-6 Community-based Flood Risk Management (FRM)*
	I-7 Management of Relief Center
	I-8 O&M Work FRM*
{Organization} Organization Structures, Roles, Management, Leadership and Problem Consciousness (CDGR/Rescue1122)	O-1 Mission of Flood Relief Plan (FRP)
	O-2 Coordination with other agencies
	O-3 Influences and Leadership of the FRP/ Influences and Leadership of the FFWS
	O-4 Collaboration Level among the Related Organization (in ordinary time)
	O-5 Manpower for FRP activity/ Manpower for FFWS activity
	O-6 Equipment for FRP activity/ Equipment for FFWS activity
	O-7 Problem Consciousness
{Social} Social Involvements	S-1 Disclosure of Information
	S-2 Public Contribution
	S-3 Community Flood Risk Management

Note: * FRM is including ordinary and floods activities

Question	I-1	I-2	I-3	I-4	I-5	I-6	I-7	I-8	O-1	O-2	O-3	O-4	O-5	O-6	O-7	S-1	S-2	S-3
Before	67%	63%	79%	83%	54%	54%	63%	54%	54%	46%	54%	50%	71%	29%	58%	50%	29%	29%
Target	96%	100%	100%	100%	100%	96%	100%	96%	100%	83%	83%	75%	100%	63%	100%	75%	79%	83%
Achievement	95%	95%	95%	75%	90%	100%	70%	80%	95%	75%	85%	75%	85%	75%	85%	65%	75%	75%

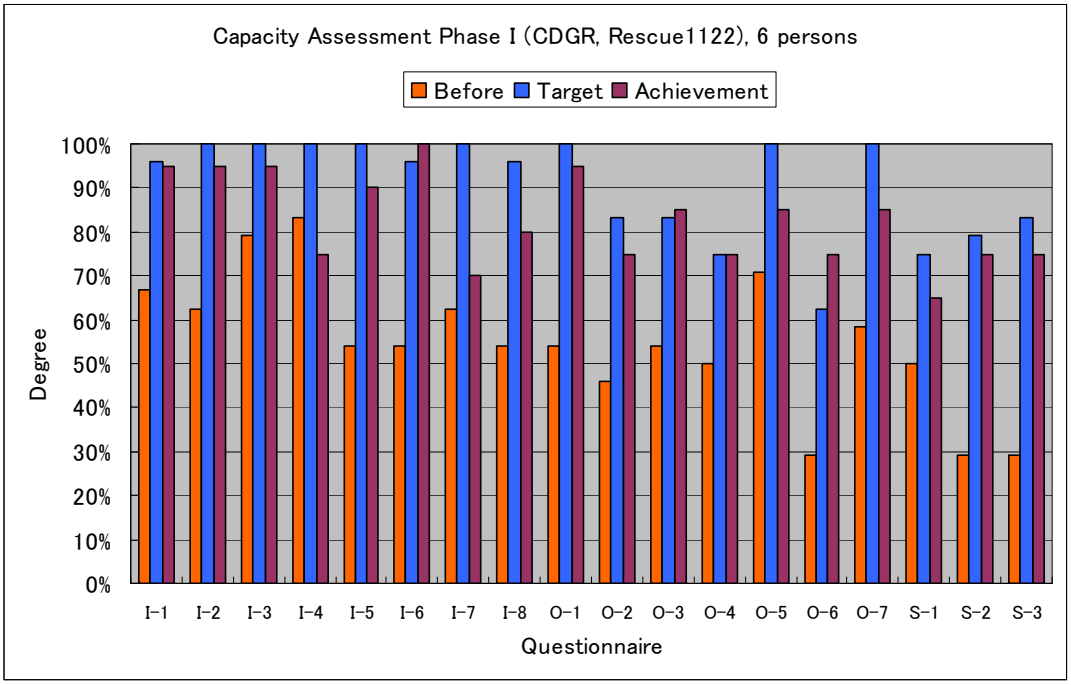


Fig. 7-2 Target and Achievement of Output (CDGR, Rescue1122)

The main findings of evaluations on the C/P staffs of CDGR and Rescue1122 are listed as follows:

- Understanding of FFWS has been significantly elevated.
- Understanding on the amendments made on the flood warning code is still lacking.

- Satisfactory understanding of the hazard map.
- After completion of Phase-I of this Project, most of the C/Ps participated in this Project have shown certain extents of improvement in the knowledge on FFWS.
- The achievements of some aspects dropped because of underestimation of the complexity of works by some C/P members during the baseline evaluation in the beginning of the Project.
- Through repeating organization of awareness activities, active participations from the general public and C/Ps were seen.
- As only those C/P members who actively participating in the Project activities responded to the evaluation questionnaires, negative responses were not reflected in the questionnaires, as a result, the overall results of the evaluation seem to be good but it may not reflect the actual situation.
- Interests were shown on current Project activities such as discharge measurements and awareness programs.
- Although there may be some problems in term of work sharing among the C/P members, generally all the members are supportive in this Project.
- There are requests from the C/P members for additional trainings on hydrology and system operation and maintenance.
- Training on knowledge and operation of system instruments is also necessary.

7.2 Issue and Resolution of Each Output Phase-I

7.2.1 Common Activities

Table 7-3 Issue and Resolution in Common Activities Phase-I

Issue	Resolution	Remark
Move and change of C/P personnel	Reconfirm the project purpose to C/P agencies though the JCC Meeting.	
Secure the budget for next years activities	Explain to new CDGR-DCO and ask for understanding the purpose of the Project.	Next year's activities may be changed by the result of this year's findings.
Non-attendance and non-involvement of C/Ps	Close coordination with C/P agencies though FFC	Only limited C/Ps are joined the activities.
Sustainability of Awareness Program	Establishment a Task Force from C/P for the implementation of awareness activities in Phase-II and future.	Need approval by CDGR-DCO
Modification of PDM	To distinguish hydro works and operation and maintenance work.	PDM will be modified in January 2009 at Phase-II
Training of basic acknowledgement for system equipments	Because of the management office of FFWS changed in Jan 2008, operators are not familiar with equipments and lack of acknowledge.	It is expensive to send instructor of equipment from Japan. To check the possibility of training in Japan

7.2.2 Activities for Each Output

Table 7-4 Issue and Resolution in Each Output Phase-I

Issue	Resolution	Remark
Output 1 • System instability • Need training for O&M of FFWS equipments • Low level of understanding about Hydrology. • MIKE11 • Low achievement of self-training • Necessity to deal with riverbed rise • Necessity to monitor all FFWS activities and need full time assignment in order to maintain the system	• To improve FFWS network security. • To adjust training program with PMD and Rescue1122 • Additional training • To study how to deal with riverbed rise • Rechecking an effectiveness of self training	• To check the possibility of training O&M in Japan • Pre-meeting with PMD-DG
Output 2 • Necessity to establish a Task Force • Safety of evacuation drill • Monitoring of site during the flood event	• Need approval by CDGR-DCO • Close coordination with concerned agencies • Safety first for monitoring works	• Meeting with CDGR-DCO • Coordinate with local UC councilors • Re-evaluate scope of monitoring activities
Output 3 • Communication structure between concerned agencies • Necessity to improve the awareness of new warning code	• Understanding Flood Relief Plan 2008 • Establish website for this Project • Modification of warning code should be completed before middle of June, if necessary.	• Follow-up dredging work for river channel • Coordinate with PMD to establish website • Modification works shall be within time limit.

7.3 Issue and Resolution for Each Output Phase-II

7.3.1 Common Activities

Issues and resolution for common activities will be listed in below.

Table 7-5 Issue and Resolution in Common Activities Phase-II

Issue	Resolution	Remark
Move and change of C/P personal	Reconfirm the project purpose to C/P agencies though the JCC meeting. Need create new transfer system for all C/P.	This is a serious concerned in sustainability of the project.
Secure the budget for post project.	Explain to CDGR-DCO and C/P agencies for understanding the purpose of the Project and provide annual budget for the regular activities	Ownership and Incentive
Nonattendance and noninvolvement of C/P	Close coordination with C/P agencies though the FFC Encourage of counterpart by media	

7.3.2 Activities for Each Output Phase-II

Table 7-6 Issue and Resolution in Each Output Phase-II

Issues	Resolution	Remark
Output 1 • Secure the manpower and equipment for discharge measurements during the monsoon season. • Modified new warning code and inform to concerned agencies	• Confirm the operation structure during the monsoon season. • Monitoring the technical improvement. • Monitoring an effectiveness of training	
Output 2 • Maintenance of FFWS • Monitoring operation works during the flood event	• Have a good communication with concerned agencies • Post survey of operation during the flood event.	• Repair of two warning posts. • Flood often occur on the early morning
Output 3 • Safety of evacuation drill by Task Force • Monitoring works at the site during the flood event	• Close coordination with concerned agencies • Support the Task Force activities. • Safety first for monitoring works	• Coordinate with police and other agencies. • Feedback of awareness activities.
Output 4 • Communication structure between concerned agencies • Modified Flood Relief Plan 2009, including hazard map and task force. • Create common information system for residence.	• Reconfirmed organization for monsoon season. • Understanding Flood Relief Plan 2009 • Establish the Web site for this project	• Follow-up dredging work for river channel • Coordinate with FFC/PMD to establish Web Site

7.4 Evaluation of Each Output Phase-II

Evaluation of the Project will be carried out by JICA Expert and methods of evaluation will be based on each activities and Indicators.

Result of evaluation is shown in Table 7-7.

Table 7-7 Achievement and Remaining Activities of the Project

Objectively Verifiable Indicators	**{Mean of Verification} Achievement**	**Task should be continued after the completion of Project**
Output 1: Capacity of PMD is strengthened enough to utilize flood forecasting system effectively and issue warning properly to concerned agencies		
1a. Upgrading more than 3 staff into a teaching level in PMD who understand of runoff mechanism	{Result of the examination by Expert} • Conducted examination. Out of 7 member, 5 persons achievement the teaching level	1. Need self training 2. Improve quality of the work
1b. Exercise of flood simulation model at least once a week as based on the training schedule	{Final Report of the Project} • Exercise was conducted	1. Need self training to find relationship between rainfall and water level. 2. Improve quality of the work and teach to young engineer.
1c. Upgrading more than 3 staff into a teaching level in PMD who can utilize of flood simulation model	{Result of the examination by Expert} • Conducted examination and 7 persons passed the examination. • 3 persons reach to teaching level.	1. Need self training to improve operation speed.
1d. Revised criteria for the flood warning code	{Progress Report of the Project} • Modified Warning Code 2008 and 2009 which were approved by C/P committee and DCO • 5persons could set Flood Warning Code by themselves	1. Need self training 2. Teach to young engineers

1e. Conduct of operation and maintenance of the system based on the O/M Manual properly	{Final Report of the Project} • Some problem was solved but new thinks coming out. • Counterpart training in Japan	1. Security from computer virus 2. Improve quality of the work 3. Security of WLGS 4. Communication Drill with other agencies
Output 2: Capacity of CDGR (Rescue1122) is strengthened enough to utilize flood early warning system effectively and issue warning properly to residence		
2a. Review criteria flood warning code	{Final Report of the Project} • Lecture for PMD and Rescue1122 of the modified warning code	None
2b. Conduct of operation and maintenance of the system based on the O/M Manual properly	{Final Report of the Project} • Based on the actual activities record of 2008, OM Manual 2008 was modified. • OM Manual 2009 was lectured to concerned personnel.	1. Need self training 2. Improve quality of the work
2c. Conduct of operational drill for warning system at least once for each duty group	{Final Report of the Project} • Conducted three time at this moment	None
Output 3: Capacity of local authorities is developed enough to promote people's awareness and preparedness for the floods.		
3a. Hazard maps prepared	{Progress Report of the Project} • Revised the basic map of Hazard Map • Additional number of Evacuation Center	None
3b. Guideline for Disaster Awareness Activities prepared	{Guidelines for Disaster Awareness Activities} • Prepared a guideline for disaster awareness activities	None
3c. Training and workshops on how to facilitate awareness activities for counterpart	{Progress Report of the Project} • Establish Task Force for awareness activities • Conduct training and workshop for counterpart	None
3d. Conduct awareness activity at least once in each zone	{Final Report of the Project} • 20 times awareness program • 4 time map exercise • 2 time evacuation drill • Total number of about 2,000 persons had awareness program.	None
Output 4: Capacity of related organizations is strengthened enough to mitigate the damage of flood		
4a. Revised flood relief plan for each year	{Revised Flood Relief Plan} • Role of Rescue1122, Command structure and Siren pattern were added in Phase-I • Flood Warning Code 2009, Description of Awareness Activity and Hazard Map, etc. were added in Phase-II • Flood Relief Plan 2009 was approved by DCO-CDGR on June 27 2009	None

4b. Method for information sharing	{Progress Report of the Project} • Regular monthly and JCC meeting with concerned agencies • "Lai Nullah Watch" by PMD to send advance (1day before or more) information of weather forecasting to concerned agencies. • Open project web site for public by PMD, FFC • Necessity of desilting work in Lai Nullah was discussed / recommended in CP meeting and DCO decided to ask Lahor Government to provide specially fund for WASA. The progress of work was presented during the monthly CP meeting (desilting works was not taking since 2004 ADB project) and the sharing of cross section data of Lai Nullah after the desilting was promised between WASA and PMD in the desiliting meeting. • District Disaster Management Plan 2009 Rawalpindi by CDGR-DDMA **(first time)** and distributed to concerned agencies. • WASA draw up "Flood Mitigation Plan 2009" and distributed to concerned agencies. **(first time)**	1. Improve quality of the work 2. Maintenance of web site. 3. Desilting works shall be continued after the monsoon season..

7.4.1 Explanation of Evaluation of Output 1

1) General Evaluation

Questionnaire survey about hydrology was carried out at the beginning of the project. JICA expert team conducted same questionnaire survey for the evaluation of their acknowledgement on hydrology. Both self-evaluation and expert evaluation have been improved so much as attached in Appendix 7-1.

2) Examination on Hydrology

Examination on hydrology were executed to confirm the essential knowledge among the contents lectured in Phase-I. The thought process and the answer were graded and the averaged score was 85 points. After the scoring, the JICA expert pointed out only wrong answer and the trainee answered until they got correct answer. The examination paper and the score are attached in Appendix 7-2. Three (3) trainees who scored higher than 90 points (80 points for five (5) trainees) are evaluated as a teaching level on hydrology.

3) Evaluation of MIKE11 Skills for Modeling

MIKE11 skills have been learned step-by-step since middle of January 2009. Then, the subject of a simple river model was given and the skill of modeling was checked by the check sheet shown in Appendix 7-3 in order to confirm the familiarization of MIKE11.

All of seven (7) trainees have reached at the level that they can develop a model in MIKE11 though their understanding degree and operation speed are difference among individuals. Their level is improving because the practice on MIKE11 has been continued after this skill checking.

All of seven (7) trainees have reached teaching level. Especially, one of them has started MIKE11 training to sub-engineers who newly joined this Lai Nullah Project in 2009.

4) Evaluation of Flood Forecasting Works with MIKE11 Simulation

An urgent and accurate processing is required for flood forecasting works. Therefore, their skill of MIKE11 for flood forecasting was confirmed by checking sheet attached in Appendix 7-4.

Two trainees were evaluated that they could conduct flood forecasting works as of now. The others have the skills but their speed of operation was not enough for flood forecasting. This can be improved enough by self-training and practice by themselves.

5) Flood Warning Code

Trainees set flood warning code by themselves in accordance with the procedure prepared by the hydrology expert. Moreover, three (3) trainees explained setting concept, set warning code and possible time for evacuation according to his code, and all of trainees discussed which the best code is. Setting concept was able to be unified between the hydrology expert and trainees through this explanation and discussion and the hydrology expert confirmed that they could set flood warning code by themselves as well. Following table shows Flood Warning Code 2009.

Table 7-8 Flood Warning Code

Code		Flood Warning Code					
		Pre-Alert		Alert		Evacuation	
		Katt	Gawal	Katt	Gawal	Katt	Gawal
2007 code	W.L.	-	-	496.5	489.8	499.6	493.6
	Rain	50mm/180min.		50mm/60min. or 130mm/180min.		-	
	Comb.	-	-	-	-	or W.L. Alert and Rain Alert	
2008 code	W.L.	496.5	489.8	498.4	491.7	499.6	493.6
	Rain	50mm/180min.		30mm/60min. or 70mm/180min.		-	
	Comb.	-	-	-	-	or W.L. Pre-Alert and Rain Alert	
2009 code	W.L.	497.0	490.0	498.3	491.8	499.6	493.6
	Rain	50mm/180min.		35mm/60min. or 85mm/180min.		-	
	Comb.	-	-	-	-	or W.L. Pre-Alert and Rain Alert	

7.4.2 Future Task on Hydrology Output 1

Improvement of flood forecasting model, modification of the model corresponding to river-bed fluctuation and changing of land-use are required as well as setting flood warning code every year. Trainees have already understood each activity but they haven't understood the series of required activities on hydrology for flood forecasting and warning.

Therefore, required periodic activities were discussed with all of trainees and they decided schedule as shown in Table 7-9. At least these activities should be conducted every year.

As for the long-term task, the flood warning code should be set based on plenty of observed data. Current flood warning code was set from observed data and supplementary simulated data and the procedural manual was prepared for the said way. Therefore, it seems that they haven't

understood how to set the code based on only observed data although the hydrology expert explained about it. Technical assistance about it will be required after more than 5 years.

Table 7-9 Periodic Activities for Flood Forecasting and Warning (Hydrology)

Month	Activities	
January	Data Arrangement/Analysis (Rainfall)	
February	Data Arrangement/Analysis (Water Level)	
March	Cross-section Survey	Awareness Program
April	Model Calibration and Modification	Awareness Program
May	Revising of Flood Warning Code Preparation of Discharge Measurement	Awareness Program
June	Finalizing of Flood Warning Code	Awareness Program
July	Discharge Measurement	
August	Discharge Measurement	
September	Discharge Measurement	
October	Analysis of Flood Data in 10 minutes	
November	Revision of H-Q Rating Curve	
December		

7.4.3 Explanation of Evaluation of Output 2

1) Unsolved Problems and Countermeasure for System Operation in PMD

At present, the flood forecasting and warning system is in the operation condition. In the 2009 monsoon season the forecasting and warning can be operated. However, it has the wireless problem in the whole system.

The wireless LAN network connection becomes unstable by increasing the number of the other user on this wireless LAN network. In order to improve the existing conditions, it is necessary to apply a new channel from the frequency management officials but possibility to get a permit is unknown. On the other hand, wireless LAN network can be enforcement by using high gain antenna methods.

It will be possible to improve network reliability by exchanging a high gain parabolic antenna from the SMS building, which is not to be using at present, to the PMD and TMA. Moreover, the interference can be reduced in changing the polarity of the electric wave transmission from vertical to horizontal polarization.

2) Problem and Measurement for flood Operation in Rescue 1122

The evacuation drill which was done on June 13th, it was a suitable training to blow a siren alert and evacuation. In order to execute this kind of operation without the mistake, it is necessary to repeat the training to blow a siren actually. Therefore, an evacuation drill should be implemented every year and the operator must be given a lot of opportunity to blow a siren. In addition, definite command route shall be established in order to reduce the stresses for the operator during actual flood event.

3) Problems and countermeasure for System maintenance

During the two years, JICA Expert was trained six (6) O/M personnel. In addition, two (2) PMD O/M personnel received the study and training for more detailed operation and maintenance at the factory of the supplier during the training in Japan. Therefore, the ability of the maintenance management improved for every aspect. At present, it was not only the equipment and materials of the telemetry subsystem taking charge of PMD but also it

became possible to repair the warning subsystem of the Rescue1122. Expert can to the conclusion, PMD has capacity to maintenance all the FFWS system which including the warning system of CDGR. Therefore, PMD shall be carry out of role of the technical support of Rescue 1122 and WASA.

For maintenance personnel of Rescue 1122, the Project was trained 8 maintenance personnel. In addition to that two (2) Rescue 1122 O/M personnel also received the study and training for more detailed operation and the maintenance at the factory of the supplier during the training in Japan. As for the operation of the warning subsystem, the technology transfer has been completed. Although, they understood sufficiently for daily maintenance work, but it does not means executing the works in faithfully. It is difficult to say that the knowledge which is enough for all O/M persons. It may need more advanced technique to repair the trouble of equipment. To take this opportunity, it is necessary to conduct a follow-up by the equipment supplier, who can conduct system maintenance management including the repair and guiding more detailed trouble shooting in the future. It will help the system become more sustainable condition. A local maintenance company which was identified by the system supplier designated after free guarantee period completion but the technological capability by this company is still indefinite. The local maintenance company is expected that it become an appropriate technical skill about the trouble which can not be processed by PMD and Rescue 1122.

On the other hand, the agreement of responsibilities of maintenance work for FFWS between the concerned agencies was prepared and approved by the all C/P and operating office. It is shown in Table 7-10.

Table 7-10 Responsibility of Maintenance Work

Office/System	Normal Operation	Trouble shooting	Repair	Replace
PMD ▪Flood Forecasting System ▪Data Communication system	▪Regular operation and checking ▪Record on the work	▪ Identified cause of trouble and examine the countermeasure for recover the system and equipment	▪ If possible for repair by PMD Repair it and recheck the system and leave it in Record. ▪If can not repair by PMD Contract to supply company	▪Contact to Supply Company ▪Inspect the repair works
Rescue 1122 ▪Warning system ▪Communication system	▪ Regular operation and checking ▪ Record on the work	▪ Check the trouble shooting point and identified the problem. ▪ Report to PMD for examines the causes and recommendation for the repair work. ▪ Report to CDGR about trouble shooting	**Structure/Facilities/Security Problem** ▪Coordinate with CDGR for repair **System Problems** ▪If possible for repair by PMD Technical support by PMD, actual repair cost will be paid by CDGR under the inspection of Rescue 1122. ▪If can not repair by PMD Contact to supply company by Rescue 1122.Arrange and purchase the necessary supply and contact PMD for further guidance.	▪ Contact to supply company with concurred by PMD. ▪ Inspect the repair works. ▪ Submit Repair Report to CDGR and PMD
CDGR	▪ Prepare for Annual Budget	▪Received Trouble Report from Rescue 1122 and confirm for repair procedure.	▪Repair the Structure/ Facilities/ Security problem with inspection by Rescue 1122. ▪Prepare the Budget for repair the system.	▪ Received Repair report from Rescue 1122

7.4.4 Explanation of Evaluation of Output 3

Based on the results of social survey and prepared the hazard maps under this Project, several community-based activities were carried out in cooperated with C/P agencies since May 2008. The activities include awareness programs, map exercises and evacuation drill. Total of seven activities were carried out so far, and the results and findings of these activities are presented in

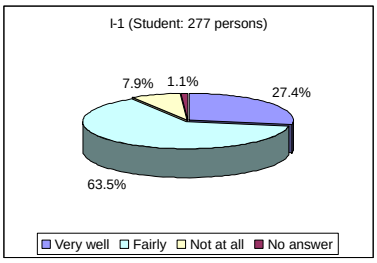
‘The Monitoring on Flood Disaster Prevention Activities’ report prepared by the local consultant. On the other hand, from the questionnaire survey after each activity, it was found that most of the participants have improved their understanding on hazard map and siren pattern after participating in the activities. And, besides the above report, all awareness activities were taped in video and those videos shall be used in the future awareness activities in Phase-II of the Project.

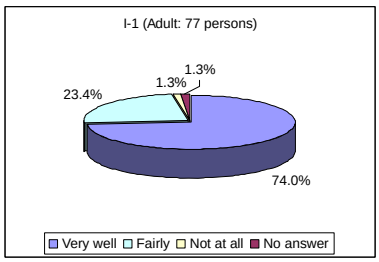
In the Phase-II, awareness activities were carried out by the Task Force team which was newly established on February 2009. Member of Task Force worked hard in order to meet their action plan (see Chapter 5). However the budget for awareness activities for Task Force was not released to them from CDGR. Therefore activities of Task Force were limited and frustrated.

Task Force conducted the feedback questionnaire to the school and government office that already had lecture of the flood awareness in this year. Survey of the feedback questionnaire was conducted from September to October, 2009 and the answers were obtained from 354 people. The results of questionnaire are shown in below.

Q: Do you know the flood mechanism of Lai Nullah?

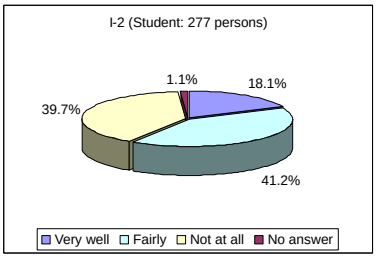
Ans.:

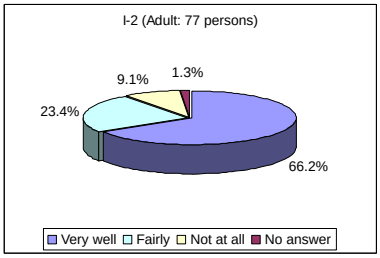




Q: Do you know how to use Flood Hazard Map at the flood incident for your protection from flood?

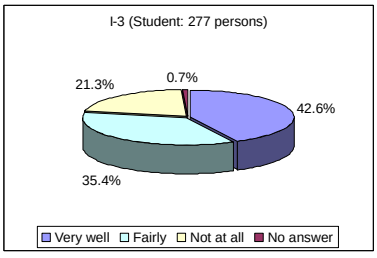
Ans.:

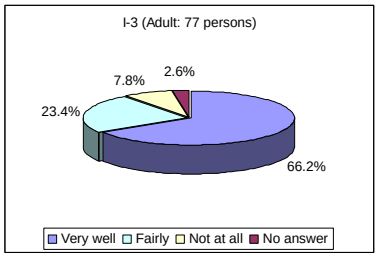




Q: Do you understand the Siren Patterns?

Ans.:





The answers to these questionnaire resulted that the majority of adult shows a high understanding degree but the student's understanding level is low. Especially, the understanding level of the hazard map is big different between adults and students, and it is understood that the student for some student too difficult to understand from the current explanation. Therefore, it is necessary to improve presentation and the explanation according to participant's level in the future. On the other hand, students are spoken about the flood management with family and friend higher than adults. It seems that it is effective to do the awareness activity with the student in order to aware flood risk management and its knowledge. Besides, there were a lot of opinions from the participant such as the followings.

- The information should be sent promptly widely by using mass media such as the televisions and the newspapers.

- It is necessary to think about the strategy of awareness activity intended for the housewife etc. because the woman is often in the home.
- It is necessary to build the demonstration into the program such as sounding a siren actually, and it listens to the difference between Alert and Evacuation.

Task Force should develop the activity in compliance with these residents' needs in the future. The approach in present activity progress and the future of Task Force is shown as follows.

Table 7-11 Current Situation and Future Efforts of Task Force Activities

Items	Current Situation	Issues	Future Efforts
Flood Hazard Map	・ Both whole area and each zone have been developed. (English, Urdu)	・ It is difficult for resident to understand the base map based on satellite image	・ When road map is developed, the base map should be replaced ・ To be improved as resident understands easily
	・ The collection and update work are easy since the map was assembled by each part using software of Illustrator / Power Point	・ Flood analysis is necessary for reviewing probable flood area ・ It is necessary to accumulate the information of flooding and dangerous area based on actual flood incident.	・ Flood hazard map based on the actual flood area with high frequency will be developed
Awareness Program	・ The member has a sufficient ability to explain in each area	・ As a result of the questionnaire, student's understanding level is lower than the adult.	・ Presentation and explanation are prepared according to participant's level.
	・ The difficulty remains in the scheduling and the arrangement with the related agencies	・ Lack of recognition of importance of preliminary work and sense of responsibility	・ It is necessary to exercise the leadership and improve each member’s awareness
	・ Guideline for awareness program was developed	・ The member who is familiar with the procedure of each program is limited	・ It is necessary to exercise the leadership and improve each member’s awareness
	・ Task Force member is conducting the awareness program to the resident.	・ The resident who can participate in the awareness program is limited	・ The teacher of school and the leader of various areas and groups are trained as trainer and the activity of awareness program will be spread out
Map Exercise	・ The exercise was implemented several times during project period	・ Basically the procedure was understood but of lack of the experience. Problem remains for smooth implementing	・ It is necessary to execute the map exercise at the early stage, and to search for the existing problem.
	・ Base map was prepared for all zones ・ Equipment such as marker, which is prepared in the project, was handed over to task force	・ The shortfall of the equipment should be prepared	・ The necessary equipment, which is mentioned in the guideline, should be prepared
	・ Moderator is limited to the member of Task Force	・ Number of holding awareness is limited and resident's participation is not many.	・ To increase the number of moderator and number of implementation of the awareness.
Evacuation Drill	・ The drill was implemented two times during project period	・ Although the procedure was understood, smooth execution is difficult because of lacking of the experience	・ It is necessary to execute at the early stage, and to search for the existing problem.
Awareness Materials	・ Original edition of each material has been developed (English, Urdu)	・ Update and correction procedures are uncertain.	・ To prepare the planning manual and edit materials based on new manual
	・ Leaflet was distributed and Billboard and Panel have been installed in the pilot area	・ There is no specific plan for the distribution of leaflet and the installation of Billboard and Panel	・ Scheduled distribution of leaflet ・ Selection of the location of the installation Billboard and Panel
	・ Parts of Billboard and Panel need repairs and maintenance	・ The system of repair and maintenance is not established	・ Establishment of the system of repair and maintenance
Budget Implementation	・ A part of the budget was executed for the first time on November 13, 2009. ・ The activity budget expense at current year is secured.	・ It is necessary to monitor the budget can be executed systematically in the future	・ The budget execution plan is made at the early stage, and consumed it according to schedule.

Website, Media	・ Original edition of Website was developed	・ The system of update and maintenance is not established	・ Establishment of the system of updater and maintenance ・ Information disclosure and opinion collection from resident by Website
	・ Interview of TV and newspaper has been carried out so far	・ Aggressive approach to media was not conducted	・ To use of local media must be considered
Other Activities	・ Record of the activity is carried out by the secretary.	・ Reliable record of the activities and safe keeping data.	・ Making annual activity report and distribution of the report to the concerned agencies ・ Report of awareness activity and lending the material to NGO or other training project
Monitoring on Evacuation Center	・ Expert conducted the investigation of actual conditions of the evacuation center. Problems are explained to C/P and Task Force	・ Monitoring on the repair works by CDGR	・ Proposed maintenance of the facilities based on the minimum requirement to use as evacuation center

7.4.5 Explanation of Evaluation of Output 4

Flood Relief Plan (FRP) was modified on 2008 and 2009. In the 2009 version improved many subject and it is particularly worth noting that a communication drill for emergency was conducted based on the command structure in FRP 2009.

Table 7-12 Current Situation and Future Efforts of Flood Risk Management

Items	Current Situation	Issues	Future Efforts
Information Sharing	・ Established website on FFC and PMD homepage.	・ Update and correction procedures are uncertain.	・ To record the activities and update a data regularly
	・ To transmit information to concerned agencies and residence by website and leaflet	・ One way transmits information, no method to received comment from residence and concerned agencies.	・ Use the website created by the Expert
Institutional Management	・ FFC is acting as the coordination body with all concerned agencies	・ JCC and C/P monthly meeting were conducted during the Project. It is necessary to established new committee for monitoring the sustainability of the Project activities	・ It was proposed to establish a steering committee for monitoring by counterpart.
	・ To conduct a Flood Risk Management meeting with all concerned agencies	・ Some participants are not joined.	・ It is necessary to aware the importance of Flood Risk management
Institutional Enforcement	・ Organization for FFWS and FRP will setup before the monsoon season every year, therefore, experienced member might move and changed	・ Lack of system for technical transfer during the shifting personnel and maintain the record and data	・ To establish the system of inheritance of technique and data. ・ To identify the responsible person for safe keeping the data and manuals.

CHAPTER 8 LESSON LEARNED AND RECOMMENDATION

8.1 Lesson Learned

8.1.1 Pre-Condition of the Project

The Government of Pakistan and Rawalpindi City are still experiences political instability and deteriorating condition of public safety, which cause the difficulty of Project activities. Learnt from the experience of Phase-I & II, the following cases become clear:

1) Security Problems

- Security not get better at last two years, at the Phase-I, due to the assassination of Ms. Banazir Bhutto, presidential election was postponed from Jan. to Feb. 2008 and there was three time for national and local election in Rawalpindi on 2008. Due to these elections, activities of the project start late and meetings were canceled and postponed sometimes.
- Suicide bombers' terrorism happened four times in Rawalpindi. Political and security turmoil caused difficulty to conducting the awareness program in public area and mosque.
- Safety, clothing, food and housing of the life are first priority for the residence and local district government, therefore, flood risk management activities after the monsoon season was became low-priority issue of local government.
- Terrorist explosions also limited JICA Expert activities and changed the priority of C/P's assignment, which made difficult to attend the awareness program.
- Continuously cross-border attack by NATO Force has resulted in moving of refugees to Rawalpindi City. They might stay at river channel area (dangerous area) of Rawalpindi.

2) FFWS Equipment problem at start up of the Project

FFWS equipment had several problems at the start of the Project. Major problems are;

- PC's were inflected by virus in PMD and DPCC
- Wireless LAN is not working in FFC
- Monitor display and warning control display were out of order in DPCC
- Warning Post No. 4 out of order for long time (complete discharge of battery due to a long period of power failure caused by unpaid of electricity bill)
- Local supply/technical support company was merger and takeover by other company.
- There was additional task for expert to coordinate with the local supply company in Pakistan and manufacture company in Japan.

3) Counterpart and Organization

- Operation for Warning System was transferred from TMA office to CDGR and it was decided to be operated by Rescue1122 during the first JCC Meeting. TMA had soft-component training at the Grand Aid Project but they did not transferred acknowledgement and skills of O/M to Rescue1122. In the Phase-II, expert team changed the program in order to improve the basic O/M skill of Rescue1122 and budget problem.
- Based on the result of national election, C/P in CGDR has changed. DCO-CGDR who is the Project Manager of this Project changed several time (5 times in 2 years).

- From Feb. 2009 to April 2009, CDGR lost power of control administration due to the political ferment. Some important issues were not able to make a decision.
- Awareness Program at the Phase-I, Expert prepare all the awareness activities based on the Union Council (UC) basis, however UC in 2009, Nazim is going to disappearance by the government policies.
- Counterpart changed often and most of time they moved without transferring of acknowledgement to successor.

8.1.2 Activities of the Project

- To understand the operation of the simulation model takes some time and require in practice with computer. In order to achieve the project target, the capacity development method was difficult within the Project. In the Phase-II, the Expert changed the training procedure to face-to-face with limited number of trainees according the trainee's working hour. This procedure required more time and patience for both party.
- Approve of budget does not means cash support and it need another process to release money.
- Activities were concentrated to few persons (due to scale of project)
- It still difficult for Task Force to conduct the awareness activities such as evacuation drill, map exercise etc. and the coordination with other agencies by themselves. In order to continue awareness activities, it is necessary to provide a focal person for support it.
- The project is too short to consider the governing institutions of Target area. Target area have several local aspect, therefore, it is difficult to approach with single method. Because of two years project, expert have to teach only his way to approach residence and government officer. Due to time limitation alternative way and modification approach was not fully attempt.
- Seasonally priority for residence is changing, therefore local government have to shift personnel based on people's need. Officer involved the project is not fully assignment, somehow it is only give him additional role and responsibly.
- To training the officers, who are the front line of residence and disaster, in field level is important but it required some paper works. On the other hand, training administrator and officer in office are easy to arrange but it is hard for them to go to field and working in group.
- Evacuation Centers need pay more attention by local government and national government agencies which involve disaster risk management.
- Flood Hazard Map is designed for residence to understand easily by using the photo of evacuation center since it is difficult for residence to read Map.
- The resident who had participated in the awareness activity in last two years of the project was about 2,000 people, which is about 1% of about 200,000 people of the population in the target area. The task force was established in February 2009 and awareness activities were conducted by seven member. Although the achievement was satisfied but it needs to improve method to approach the residence in order to expend the flood awareness to the residence in short time periods..

8.2 Recommendation for Future

1. It is necessary to require additional support from supplier (2 months) as an Expert for repair and trouble shooting of FFWS system with CP in Pakistan. Teaching repair skill on the job training with C/P will be the best method. Especially for the interference of frequency of wireless RAN wave.

2. Require a long-term Expert in several years for evaluating the awareness activities plan and monitoring achievement of Task Force.

3. Promote counterpart autonomy, it is required an evaluation system for reward and punishment.

4. Target group is concerning many kinds of people, it should select in specified group or area. Then it can be changed phase by phase for different target group.

5. Hydrology review is necessary after getting few years data. At that time it is necessary to evaluate and examine by the Expert.

6. Require strong leadership for Task Force activities from local government administration side for sustainability otherwise it will cause overload for counterpart personnel.

7. The base map of Flood Hazard Map should be changed from satellite image to urban planning map or road map in order to easily understanding by residence. (There was no appropriate map while executing the project.)

8. Regular maintenance and dredging of Lai Nullah is required (no later than end of April) before the monsoon season every year in coordination with concerned agencies, especially dredging works should be completed in advance to allow PMD to examine the Warning Code.

9. In order to monitor the sustainability of the Project activities, a Steering Committee is recommended to take care of issues and support Flood Risk Management in Lai Nullah on regular basis in future,

10. Institutional strengthening for Counterpart Agencies is required

11. The awareness activity of Task Force will be converted to the training of moderator for awareness activities whom intended for teacher of school, NGO, leader of the areas and groups. Moderator will conduct the awareness program to their students and the member of the areas and groups. Thus, the awareness program activity will be expanded to the community quickly. The following figure is an image of the expansion of awareness program.