No.

## **Final Report**

## on

# The Project for Development of Human Capacity for Weather Forecasting and Data Analysis in Mongolia

October 2008

JAPAN INTERNATIONAL COOPERATION AGENCY JAPAN WEATHER ASSOCIATION

> 環境 JR 08-092

# Final Report

on

The Project for Development of Human Capacity

for

Weather Forecasting and Data Analysis

in

Mongolia

October 2008

JAPAN INTERNATIONAL COOPERATION AGENCY JAPAN WEATHER ASSOCIATION

### Table of Contents

### List of Abbreviations

1. PROJECT OUTPUTS
1.1 Achievement of Outputs
1.2 List of Outputs7
2. ACTUAL IMPLEMENTATION SCHEDULE OF ACTIVITY
3. ACTUAL INPUTS
3.1. Dispatch of Short-term JICA Expert Team10
3.2. Counterpart Training in Japan 12
3.3. Provision of Equipment
3.4. Operational Expense in Mongolia 16
4. ISSUES, IDEAS AND LESSONS LEARNED ON PROJECT IMPLEMENTATION 17
5. REVISION OF PDM
6. THE SUBJECT DETERMINED IN THE JCC

#### Annexes

1. Pictures in activities in each field	1.	Pictures	in	activities	in	each	field	
---	----	----------	----	------------	----	------	-------	--

2. Outputs (in separate volumes)

### List of Abbreviations

ADB	:	Asian Development Bank
CCM	:	Community Climate Model
CMA	:	China Meteorological Administration
C/P	:	Counterpart
DB	:	Database
DDEWS	:	Drought/Dzud Early Warning System
DSS	:	Dust Storms/yellow Sand
ECMWF	:	European Centre for Medium-Range Weather Forecasts
FY	:	Fiscal Year
GCM	:	General Circulation Model
GEF	:	Global Environment Facility
GIS	:	Geographical Information System
GPS	:	Global Positioning System
GPV	:	Grid Point Value
GTS	:	Global Telecommunication System
ICC	:	Information and Computer Center
IMH	:	Institute of Meteorology and Hydrology
JCC	:	Joint Coordinating Committee
JFY	:	Japanese Fiscal Year
JICA	:	Japan International Cooperation Agency
JMA	:	Japan Meteorological Agency
KMA	:	Korea Meteorological Administration
M/M	:	Minutes of Meetings
MM5	:	Fifth-Generation NCAR / Penn State Mesoscale Model
M/P	:	Master Plan
MRI/JMA	:	Meteorological Research Institute / Japan Meteorological Agency
NADM	:	National Agency for Disaster Management
NAMHEM	:	National Agency for Meteorology, Hydrology and Environment
		Monitoring of Mongolia
NCAR	:	The National Center for Atmospheric Research
NCEP	:	National Center for Environment Prediction
NWP	:	Numerical Weather Prediction
OJT	:	On the Job Training
PCM	:	Project Cycle Management
PDM	:	Project Design Matrix
PO	:	Plan of Operation
R/D	:	Record of Discussions
RegCM3	:	Regional Climate Model Version 3
WG	:	Working Group
WMO	:	World Meteorological Organization

### 1. PROJECT OUTPUTS

### 1.1 Achievement of Outputs

The progress of the project achievements at the end of the Project is indicated in the following table.

	Progress of the Project Achievements													
Project Purpose	Objectively Verifiable I	ndicators	Achievements	Reason of Insufficiency Achievement										
useful and timely weather information including dust storms and yellow sand (DSS) data is	numerical weather predict: weather analysis methods twice a day for Short-tern for Middle-term/once a Long-term.	ion and new are provided n/once a day month for	Short-term/once a day for Middle-term/twice a year for Long-term are provided.											
capacity of the weather service	projection over Mongolia once before the end of the p	is publicized roject period.	Information on climate change projection over Mongolia was publicized before the end of October 2008.											
staff and related environmental experts.	c. Information on drought/c provided annually (at the en		A pasture capacity map on the bag scale and its summary are published through newspapers etc. Remotely sensed vegetation index and ground-surveyed biomass maps are published through the web site.											
	d. DSS monitoring data is p 300 days in a year.		Between January-July 2008 (212 days), 9 days missed=95% data acquisition rate 95% > 300 days/year=83% The objective was achieved.											
	administrators, nomads, e	etc.) on the	Satisfaction level of users, who attended to the workshops, on utilization of weather information was improved.											
Outputs	Indicators		Achievements	Reason of Insufficiency Achievement										
	system originated by N commenced in the daily ope	AMHEM is	Regional numerical weather prediction system (5-day forecast) applied with the boundary condition of JMA Global model was commenced in the daily operation											
is implemented.	1.2. Four (4) staff are capable on numerical weather prediction		Three (3) staff were developed.											
	Activities	Achievement Ratio	Achievements	Reason of Insufficiency Achievement										
	1.1. To conduct training/seminars on numerical weather prediction (NWP)	100%	Trainings/seminars on numerical weather prediction were conducted in Mongolia. Training in Japan was conducted.											
	1.2. To establish operational 5 to 7-day NWP system	100%	Five-day forecast using the boundary condition of JMA global model is daily implemented.											

projection due to	and assess its result in comparison with the existing operational forecast 1.3. To procure and set up equipment for training on numerical weather prediction Indicators 2.1. Information on climate ch global warming over I publicized		Comparison between 5-day forecast and the existing forecast was implemented. All the planned equipment were procured and installed. Achievements Information on climate change due to global warming was publicized before the end of October 2008.	Reason of Insufficiency Achievement			
using a climate model is implemented.	Two (2) staff are capable change projection		One (1) staff was developed.				
	Activities	Achievement Ratio	Achievements	Reason of Insufficiency Achievement			
	2.1. To conduct training on climate change projection using a climate model	100%	<ul> <li>Training on climate change projection using a climate model was conducted.</li> <li>Training in Japan was conducted.</li> </ul>				
	2.2. To implement climate change projection such as surface temperature, humidity, precipitation, snowfall and wind	90%	Climate change projection was implemented at the end of October 2008.				
	2.3. To procure and set up equipment for climate change projection	100%	All the planned equipment were procured and installed.				
Outputs	Indicators		Achievements	Reason of Insufficiency Achievement			
long-term weather forecasts based on	smaller than province implemented		Short/middle-term forecasts for scale smaller than aimag were implemented.				
NWP outputs are issued.	Long-term forecast for sca the province (aimag) is imp		Long-term forecast of aimag scale, especially seasonal forecast, was introduced using JMA ensemble forecast data.				
	3.3. Five (5) staff are capable weather analysis using dat models	a from NWP	Three (3) staff were developed.	One C/P was retired and another C/P is in long leave.			
	Activities	Achievement Ratio	Achievements	Reason of Insufficiency Achievement			
	3.1. To conduct training on interpretation of NWP outputs including ensemble forecasting technique	100%	Training on interpretation of NWP outputs including ensemble forecasting technique was conducted.				
	3.2. To develop operational guidance for forecasting	100%	New guidance method on daily max/min surface air temperature at each station was introduced to operational forecast on the basis of ECMWF global model outputs				

3.3.       A computer-aided case study and unusual phenomenal and unusual phenomenal study handbook on typical and unusual phenomenal and unusual phenomenal seasonal forecast.       A computer-aided case study humbook on typical precipitation probability from JAA long-term forecast, especially seasonal forecast, was introduced to receast.         3.4.       To develop new concepts of forecast such as the computer aided case study precipitation probability from JAA long-term ensemble forecast.       Image: Study and Study and Study and Study and Doppler radar system and utilization of short-range nainfall prediction for weather forecasting were conducted.         3.6.       To conduct training on very short-range forecasting using weather radar data were conducted.       Image: Study and Study and Study and Study and prediction for weather forecasting were conducted.       In JCC held in March 2008, no procurement of are developed.         0.00       Indicators       Achievements       Achievements         4.       An asture biomass and plant fore rapatial resolution (bug scale) was developed.       Reason of Insufficiency Achievement         4.       Activities       Achievement four (4) staff are capable of conceptial framework of the Dorews)       Cuidelines of activities       Of the following personnel were issuance conditions drad warning in under discussions in the Government of Mongolia.         4.1.       To conduct training on conceptial framework of the Dorews)       Cuidelines of the Conducted in Mongolia.       Reason of Insufficiency Achievement 4.1.         4.3.       To conduct training of acombined drought/dra					
computer-aided     case study handbook on typical and unusual phenomena     Long-term forecast, especially essential forecast, was introduced in forecast such as from JMA long-term ensemble form JMA long-term ensemble forecast.       3.5.     To conduct training on very short-range forecast, using weather radar data     100%       3.6.     To conduct training on very short-range forecast, using weather radar data     100%       3.6.     To conduct training on torcasting work     All the planned equipment were procured and installed.     In JCC held in March 2008, no procurement of an electronic panel for an electronic panel for an electronic panel for a electronic panel for procure and set up equipment for operational for procure and set up equipment for operational for procure and set up equipment for operational for spatial resolution (hag scale) was decided.     All the planned equipment were procured and installed.     In JCC held in March 2008, no procurement of an electronic panel for a conduct training of a combined drought/datu etchniq		3.3.		A computer-aided case study	
study handbook on typical and unusual phenomena         Long-term forecast, especially essonal forecast, especially using ensemble mean outputs forecast.           3.4.         To develop new concepts of forecast such as precipitation probability forecast.         Long-term forecast, especially using ensemble mean outputs forecast.           3.5.         To conduct training on very slotr-range forecast.         How simulation of short-range infail precipitation of short-range infail resolution (bag scale) was developed.           4.         1.         A pasture biomass and plant fore spatial resolution (bag scale) was developed.         A pasture biomass and plant fore spatial resolution (bag scale) was developed.           4.2.         Guidelines of warning and advisory messages is implemented in the operation         A pasture biomass map in a finer spatial resolution (bag scale) was developed.		1		handbook on typical and unusual	
and unusual phenomina     Long-term forecast, especially       3.4.     To develop new concepts of forecast such as precipitation probability forecast.     Long-term forecast, especially       3.5.     To conduct fraining on very short-range forecast using weather radar data     Trainings on basic knowledge of the Dorpher radar system and utilization of short-range rainfall prediction for weather forecasting were conducted.       3.6.     To procure and set up equipment for operational for procures and set up equipment for operational for costing work     All the planned equipment were procured and installed.     In ICC held in March 2008, no procurement of an electronic panel fore developed.       4.     All the planned equipment for operational forecasting work     All the planned equipment were procured and installed.     In ICC held in March 2008, no procurement of an electronic panel for eactive work       4.     March is operational fore casting work     Apasture biomass map in a finer spatial resolution (bag scale) was decided.       4.1.     March is of drought/dzud early warning using GIS data     Apasture biomass map in a finer spatial resolution (bag scale) was developed.       4.3.     Four (4) staff are capable of early warning using GIS data     The following personnel were mark warning using GIS data       4.1.     Ns. B. Canneteseg     Reason of Insufficiency Activities       Activities     Achievements Ratio       4.2.     Conduct training of cocceptual formework of a combined drought/dzd early warning system (ODEWS)       4.3.     To conduct tra		computer-aided case	100%	phenomena was made.	
3.4. To develop new concepts of forecast such as precipitation probability forecast.     100%     Long-term forecast, especially sesonal forecast, was introduced using ensemble mean outputs forecast.       3.5.     3.5.     The conduct training on very short-range forecast using weather radar data     Trainings on basic knowledge of the Doppler radar system and utilization of short-range rainfall were conducted.       3.6.     To procure and set up equipment for operational forecasting work     In ICC held in March 2008, no procurement of weather briefing was developed.       Outputs     Indicators     Achievements     Reason of Insufficiency Achievement       4.     1.0     Apsture biomass map in a finer spystem (DDEWS) developed     A pasture biomass map in a finer spital resolution (hag scale) was developed.       4.2.     Guideline of warning and advisory operation     A pasture biomass map in a finer spatial resolution (hag scale) was developed.       4.2.     Guideline of warning and advisory operation     The following personnel were developed.       4.3.     Four (4) staff are capable of early warning using GIS data     The following personnel were developed.       4.1.     To conduct training of conceptual framework of the forecast in implemented in the forecastion     Inogene and practices were conducted in Mongolia.       4.3.     Conduct training of database and GIS technique in the framework of the DDEWS     Seminars and practices were conducted in Mongolia.       4.3.     To evise the present zoo-meteorological observation programme     Seminar		study handbook on typical			
To develop new concepts of forecast such as precipitation probability forecast     100%     seasonal forecast, was introduced from JMA long-term ensemble forecast       3.5.     Trainings on basic knowledge of the Doppler radar system and were short-range forecast using weather radar data     100%       3.6.     To procure and set up equipment for operational forecasting work     100%       3.6.     To procure and set up equipment for operational forecasting work     All the planned equipment were procured and installed.       0utputs     Indicators     Achievements       4.     Dought/drud     Ap asture biomass and plant early warning height on the village (bug) scale are system (DDEWS)     A pasture biomass map in a finer spatial resolution (bag scale) was developed.       4.2.     Guideline of warning and advisory operation     Guidelines of drought/drud resolution (bag scale) was developed.       4.3.     Four (4) staff are capable of early warning using GIS data     The following personnel were developed.       4.1.     To conduct training on conceptual framework of on the framework of the framework of the f		and unusual phenomena			
To develop new concepts of forecast such as precipitation probability forecast     100%     seasonal forecast, was introduced from JMA long-term ensemble forecast       3.5.     Trainings on basic knowledge of the Doppler radar system and were short-range forecast using weather radar data     100%       3.6.     To procure and set up equipment for operational forecasting work     100%       3.6.     To procure and set up equipment for operational forecasting work     All the planned equipment were procured and installed.       0utputs     Indicators     Achievements       4.     Dought/drud     Ap asture biomass and plant early warning height on the village (bug) scale are system (DDEWS)     A pasture biomass map in a finer spatial resolution (bag scale) was developed.       4.2.     Guideline of warning and advisory operation     Guidelines of drought/drud resolution (bag scale) was developed.       4.3.     Four (4) staff are capable of early warning using GIS data     The following personnel were developed.       4.1.     To conduct training on conceptual framework of on the framework of the framework of the f		3.4.		Long-term forecast, especially	
of forecist such as precipitation probability forecast.         100%         using ensemble mean outputs fore JAL nog-term ensemble forecast.           3.5.         Tainings on basic knowledge of the Doppler radar system and utilization of short-nage rainfall prediction for weather forecasts using weather radar data         100%           3.6.         To procure and set up equipment for operation forecasting work         100%         Tainings on basic knowledge of the Doppler radar system and utilization of short-nage rainfall were conducted.           0utputs         Indicators         A the planned equipment were procured and installed.         In JCC held in March 2008, no procurement of an electronic panel for weather briefing was decided.           4.         Dought/Zad         A.1.         A pasture biomass map in a finer spatial resolution (bag scale) was developed.         Reason of Insufficiency Achievement           4.         A.1.         A pasture biomass map in a finer spatial resolution (bag scale) was developed.         Reason of Insufficiency Achievement           4.2.         Guideline of warning and advisory messages is implemented in the operation         The following personnel were four (4) staff are capable of a combined drought/dzad         Ms. B. Edenestes Ms. B. Edenestesg         Ms. B. Gansetesg           4.1.         To conduct training of a combined drought/dzad         100%         Seminars and practices were conducted in Mongolia.         Reason of Insufficiency Achievement           4.3.         To create and GIS technique					
precipitation         probability forecast.         from JMA long-term ensemble forecast.           3.5.         To conduct training on very short-range forecast using weather radar data         Trainings on basic knowledge of the Doppler radar system and utilization of short-range rainfall prediction for weather forecasting were conducted           3.6.         To procure and set up equipment for operational forecasting work         All the Dappler radar system ind utilization of short-range rainfall prediction for weather forecasting were conducted         In JCC held in March 2008, no procurement of an electronic panel for weather briefing was decident           0.         Uputs         Indicators         Achievements         Reason of Insufficiency Achievement           4.         Maps of pasture biomass and plant early         Apsture biomass map in a finer spatial resolution (bag scale) was developed.         Quidelines of drought/dzud were fore (4) staff are capable of early warning using GIS data         Guidelines of drought/dzud were warning using GIS data         Guidelines of drought/dzud were warning using GIS data         The following personnel were warning using GIS data         Reason of Insufficiency Achievements           4.1.         To conduct training on conceptual framework of a combined drought/dzud early warning system (DDEWS)         Achievements Achievements         Reason of Insufficiency Achievements           4.3.         To conduct training of acombined drought/dzud early warning system (DDEWS)         Inofficiency Achievements         Seminars and practices were conducted in Mongolia.					
Indicators         Indicators         Achievement           4.         All:         Apsture biomass and plant eright and for operational forecasting work         A pasture biomass map in a finer spatial resolution (bag scale) was developed.         Reason of Insufficiency Achievement           4.         All:         Apsture biomass and plant eright and the spatial resolution (bag scale) was developed.         Reason of Insufficiency Achievement           4.         All:         Apsture biomass and plant eright and fore operational fore casting work         A pasture biomass map in a finer spatial resolution (bag scale) was developed.           4.2.         Cuidelines of aronghi/dzud eright and the spatial resolution (bag scale)         A wintertime plant height map in a finer spatial resolution (bag scale)           4.3.         Four (4) staff are capable of early warning using GIS data         The following personnel were Now B. Endenesty warning using GIS data         Nas. B. Endenesty Ns. M. Endenesty Ns. M. Endenesty Ns. M. Endenesty Ns. M. Bayasgalan Ns. M. Bayasgalan Nongolia.         Reason of Insufficiency Achievement Achievement Nongolia.           4.1.         To conduct training of a combined dronghi/dznd early warning system (DDEWS)         Seminars and practices were conducted in Mongolia.         Reason of Insufficiency Achievement Nongolia.           4.3.         To conduct training of acombined dronghi/dznd early warning system (DDEWS)         Inops         Seminars and pract			10070		
3.5. To conduct training on very short-range forecasti using weather radar data     Trainings on basic knowledge of the Doppler radar system and utilization of short-range rainfall prediction for weather forecasting were conducted.     In JCC held in March 2008, no procurement of an electronic panel for weather broiting was decided.       Outputs     Indicators     All the planned equipment were forcured and installed.     In JCC held in March 2008, no procurement of an electronic panel for weather broiting was decided.       4. 4. 4. 4. 4. 5. 5. 5. 5. 5. 5. 5. 5. 5. 5. 5. 5. 5.					
To conduct training on very short-range frocessing     the Doppler radar system and uitization of short-range randal prediction for veather forecasting were conducted.     In JCC held in March 2008, no procurement of an electronic puel for weather briefing was decided.       Outputs     Indicators     Achievements     Reason of Insufficiency Achievement       4.     Drought/dzud database is implemented in the operation     A pasture biomass and plant early warning is established.     A pasture biomass map in a finer spatial resolution (bag scale) was developed.       4.2.     Guideline of warning and advisory messages is implemented in the operation     Cuidelines of drought/dzud were for (4) staff are capable of early warning using GIS data     The following personnel were Ms. B. Erdenetusya Ms. B. Erdenetusya Ms. B. Erdenetusya Ms. B. Barketeg     Reason of Insufficiency Achievement       4.3.     Conduct training on conceptual framework of a combined drought/dzud early warning using GIS data     The following personnel were Ms. B. Cranetusya Ms. B. Barketeg     Reason of Insufficiency Achievement       4.1.     To conduct training on conceptual framework of a combined drought/dzud early warning system (DDEWS)     Achievement Achievement     Reason of Insufficiency Achievement       4.3.     To conduct training of a combined drought/dzud early warning system (DDEWS)     Inome     Seminars and practices were conducted in Mongolia.     Reason of Insufficiency Achievement       4.3.     To conduct training of a combined drought/dzud early warning system To revise the present rovised with special focus in rearranging observed items and in cla					
very short-range forecast using weather radar data         100%         utilization of short-range rainfall prediction for weather forecasting were conducted.           3.6.         3.6.         100%         In ICC held in March 2008, no procurement of rotecasting work           Outputs         Indicators         All the planned equipment vere procured and installed.         2008, no procurement of weather briefing was developed.           Variation of short-range rainfall To procure and set up equipment for operational forecasting work         All the planned equipment were procured and installed.         Reason of Insufficiency Achievements           4.1.         Maps of pasture biomass and plant early warning is established.         A pasture biomass map in a finer spatial resolution (bag scale) was developed.         A wintertime plant height map in a finer spatial resolution (bag scale) was developed.           4.2.         Guideline of warning and advisory messages is implemented in the operation         The following personnel were warning using GIS data         The following personnel were warning using GIS data           4.3.         Activities         Achievement Ratio         Achievements         Reason of Insufficiency Achievement           4.1.         To conduct training of database and GiS1 technique in the framework of the DDEWS         100%         Seminars and practices were conducted in Mongolia.         Reason of Insufficiency Achievement           4.3.         To conduct training of database and GiS1 technique in the framework of the DDEWS <td></td> <td></td> <td></td> <td></td> <td></td>					
using weather radar data         prediction for weather forecasting were conducted.           3.6. To procure and set up equipment for operational forecasting work.         All the planed equipment wee procured and installed.         In ICC held in March 200, no procurement of an electronic panel for weather briefing was decided.           4.         Maps of pasture biomass and plant height on the village (bag) scale are system (DDEWS) is established.         A pasture biomass map in a finer spatial resolution (bag scale) was developed.         Reason of Insufficiency Achievement           4.2. Guideline of warning and advisory messages is implemented in the operation         Guidelines of are capable of early warning using GIS data         Cluidelines of drought/dzud were Guidelines         Guidelines of coverment of Mongolia.         Guidelines was developed.           4.3. Four (4) staff are capable of early warning using GIS data         Achievement Ratio         The following personnel were developed.         Ms. B. Erdenetsya Ms. B. Erdenetsetseg         Reason of Insufficiency Achievement Ms. B. Gantsetseg           4.1. To conduct training of conceptual framework of database and GIS technique in the framework of the DDEWS)         Ioon/k         Seminars and practices were conducted in Mongolia.         Seminars and practices were conducted in Mongolia.           4.3. Four vise the present ro revise the present roo-metorological observation programme         Ioon/k         Seminars and practices were conducted in Mongolia.					
3.6.     ivere conducted.     In     ICC held in March       3.6.     To procure and set up equipment for operational forecasting work     100%     All the planned equipment were procured and installed.     In JCC held in March       0.01puts     Indicators     Achievements     Reason of Insufficiency Achievement       4.     Maps of pasture biomass and plant early warning height on the village (bag) scale are system (DDEWS)     A pasture biomass map in a finer spatial resolution (bag scale) was developed.     Reason of Insufficiency Achievement of rought/dzud were Guidelines of drought/dzud were Guidelines of drought/dzud were Guidelines of drought/dzud vereared in the operation     Outputs       4.3.     The following personnel were Four (4) staff are capable of early warning using GIS data     The following personnel were Conducted in March Maps and Maps			100%		
3.6. To procure and set up equipment for operational forecasting work     100%     All the planned equipment were procured and installed.     In CC held in March 2008, no procurement of an electronic panel for weather briefing was decided.       0utputs     Indicators     Achievements     Reason of Insufficiency Achievement       4.     Maps of pasture biomass and plant height on the village (bag) scale are system (DDEWS) is established.     A pasture biomass map in a finer spatial resolution (bag scale) was developed.     A wintertime plant height map in a finer spatial resolution (bag scale) was developed.     A wintertime plant height map in a finer spatial resolution (bag scale) was developed.       4.2.     Guideline of warning and advisor messages is implemented in the operation     Cuidelines of drought/dzud were four (4) staff are capable of early warning using GIS data     The following personnel were developed.     Maps do pasture biomass min the Government of Mongolia.       4.3.     Four (4) staff are capable of early warning using GIS data     Inte following personnel were developed.     Ms. B. Erdenetsetseg Mr. R. Gankhuu Ms. B. Bayasgalan Mongolia and Japan.       4.1.     To conduct training on conceptual framework of database and GIS technique in the framework of the DDEWS     100%     Seminars and practices were conducted in Mongolia.       4.3.     To revise the present row work of the DDEWS     100%     The program and the manual were revised with special focus in rearranging observed items and in carifying the text phrases.		using weather radar data			
To procure and set up equipment for operational forecasting work         100%         procured and installed.         2008, no procurement of weather briefing was decided.           Outputs         Indicators         Achievements         Reason of Instificiency Achievement           4. Drought/dzud early warning is established.         4.1. Maps of pasture biomass and plant height on the village (bag) scale are system (DDEWS)         A pasture biomass map in a finer spatial resolution (bag scale) was developed.         A ensure biomass map in a finer spatial resolution (bag scale) was developed.           4.2. Guideline of warning and operation         advisory messages is implemented in the operation         The following personnel were developed.         Guidelines of drought/dzud prepared in the Project is not warning using GIS data           4.3. Four (4) staff are capable of early warning using GIS data         Achievement Achievement         Ms. B. Erdenetsetsg .Mr. R. Gankhuu .Ms. B. Erdenetsetsg .Mr. R. Gankhuu .Ms. B. Gautsetseg         Reason of Insufficiency Achievements           4.1. To conduct training of database and GIS technique in the framework of the DDEWS         100%         Seminars and practices were conducted in Mongolia.         Reason of Insufficiency Achievements           4.3. To revise the present zoo-meteorological observation programme         100%         The program and the manual were revised with special focus in rearranging observed items and in clarifying the text phrases.				were conducted.	
equipment for operational forecasting work     100%     an electronic panel for weather briefing was decided.       Outputs     Indicators     Achievements     Reason of Insufficiency Achievement       4.     4.1.     Maps of pasture biomass and plant height on the village (bag) scale are system (DDEWS) is established.     A pasture biomass map in a finer spatial resolution (bag scale) was developed.     A vintertime plant height map in a finer spatial resolution (bag scale) was developed.       4.2.     Guideline of warning and advisory messages is implemented in the operation     Guidelines of drought/dzud were four (4) staff are capable of early warning using GIS data     The following personnel were -Ms. B. Erdenetuse -Ms. B. Erdenetuses -Mr. R. Gankhuu -Ms. M. Erdenetusa -Ms. B. Ganzetseg     Reason of Insufficiency Activities       4.1. To conduct training on conceptual framework of a combined drought/dzud early warning system (DDEWS)     Achievement Ratio     Achievements Achievement Achievem		3.6.		All the planned equipment were	In JCC held in March
equipment for operational forecasting work     100%     an electronic panel for weather briefing was decided.       Outputs     Indicators     Achievements     Reason of Insufficiency Achievement       4.     4.1.     Maps of pasture biomass and plant height on the village (bag) scale are system (DDEWS) is established.     A pasture biomass map in a finer spatial resolution (bag scale) was developed.     A vintertime plant height map in a finer spatial resolution (bag scale) was developed.       4.2.     Guideline of warning and advisory messages is implemented in the operation     Guidelines of drought/dzud were four (4) staff are capable of early warning using GIS data     The following personnel were -Ms. B. Erdenetuse -Ms. B. Erdenetuses -Mr. R. Gankhuu -Ms. M. Erdenetusa -Ms. B. Ganzetseg     Reason of Insufficiency Activities       4.1. To conduct training on conceptual framework of a combined drought/dzud early warning system (DDEWS)     Achievement Ratio     Achievements Achievement Achievem		To procure and set up			
forecasting work         weather briefing was decided.           Outputs         Indicators         Achievements         Reason of Insufficiency Achievement           4.         4.1.         Maps of pasture biomass and plant early warning hight on the village (bag) scale are system (DDEWS)         A pasture biomass map in a finer spatial resolution (bag scale) was developed.         A wintertime plant height map in a finer spatial resolution (bag scale) was developed.           4.2.         Guideline of warning and advisory messages is implemented in the operation         Guidelines of drough/dzud grepared in the operation         Guidelines of drough/dzud were Guidelines of drough/dzud warning in under discussions in the Government of Mongolia.           4.3.         Four (4) staff are capable of early warning using GIS data         The following personnel were N. S. B. Erdenetsetseg         Ms. M. Bayasgalan           4.1.         To conduct training on conceptual framework of a combined drough/dzud early warning system (DDEWS)         100%         Seminars and practices were conducted in Mongolia.           4.2.         To conduct training of database and GIS technique in the framework of the DDEWS         100%         Seminars and practices were conducted in Mongolia.			100%	*	
Outputs         Indicators         Achievements         Reason of Insufficiency Achievement           4.         1.         Maps of pasture biomass and plant bright on the village (bag) scale are system (DDEWS) is established.         A pasture biomass map in a finer spatial resolution (bag scale) was developed.         Reason of Insufficiency Achievement           4.2.         Guideline of warning and advisory messages is implemented in the operation         Guidelines of drought/dzud were Guidelines of drought/dzud warning using GIS data           4.3.         The following personnel were Four (4) staff are capable of earth warning using GIS data         The following personnel were Activities         Ms. B. Gantsetseg           4.1.         Conduct training on conceptual framework of a combined drought/dzud early warning system (DDEWS)         100%         Seminars and practices were conducted in Mongolia.         Reason of Insufficiency Achievement           4.3.         To revise the present roo-meteorological observation programme         100%         Seminars and practices were revised with special focus in rearranging observed items and in clarifying the text phrases.					
Outputs         Indicators         Achievements         Reason of Insufficiency Achievement           4. Drought/dzud early         4.1. Maps of pasture biomass and plant early         A pasture biomass map in a finer spatial resolution (bag scale) was developed.         Reason of Insufficiency Achievement           4.2. Guideline of warning and operation         a diversite guidelines of drought/dzud were Guidelines of drought/dzud were operation         Guidelines of drought/dzud were four (4) staff are capable of early warning using GIS data         The following personnel were -Mr. R. Gankhuu         Guidelines were conducts early warning using GIS data           4.1. To conduct training on conceptual framework of a combined drought/dzud early warning system (DDEWS)         Achievement Activities         Achievement Achievement Ratio           4.2. Guidelines of drought/dzud warning using GIS data         The following personnel were -Mr. R. Gankhuu ·Ms. M. Bayasgalan ·Ms. B. Gantsetseg         Reason of Insufficiency Achievement           4.1. To conduct training on conceptual framework of a combined drought/dzud early warning system (DDEWS)         Ioon%         Seminars and practices were conducted in Mongolia.         Reason of Insufficiency Achievement           4.2. To rovise the present zoo-meteorological observation programme         Ioon%         The program and the manual were revised with special focus in rearranging observed items and in clarifying the text phrases.		ioreedoung work			
Outputs     Indicators     Achievements     Achievement       4.     Drought/dzud early warning system (DDEWS) is established.     4.1.     A pasture biomass map in a finer spatial resolution (bag scale) was developed.     Achievement       4.2.     developed     A wintertime plant height map in a finer spatial resolution (bag scale) was developed.     Guidelines of drought/dzud were Guidelines of drought/dzud prepared in the Project is not operationally used since issuance conditions of dzud warning using GIS data     The following personnel were -Mr. R. Gankhuu -Ms. B. Erdenetuya -Ms. B. Cantsetseg     Guidelines of Insufficiency Achievement       4.1.     Activities     Achievement Ratio     Achievement     Achievement Achievement       4.3.     Four (4) staff are capable of early warning using GIS data     The following personnel were -Ms. B. Cantsetseg     Reason of Insufficiency Achievement       4.1.     Activities     Achievement Ratio     Achievements     Achievement Achievement       4.2.     To conduct training of a combined drought/dzud early warning system (DDEWS)     100%     Seminars and practices were conducted in Mongolia.       4.3.     To revise the present zoo-meteorological observation programme     100%     The program and the manual were revised with special focus in rearranging observed items and in clarifying the text phrases.					
4.       4.1.         Drought/dzud       4.1.         Maps of pasture biomass and plant early       A pasture biomass map in a finer spatial resolution (bag scale) was developed.         4.2.       Guideline of warning and advisory messages is implemented in the operation       A wintertime plant height map in a finer spatial resolution (bag scale)         4.3.       Four (4) staff are capable of early warning using GIS data       The following personnel were developed.       Guidelines of drought/dzud were issuance conditions of dzud warning in under discussions in the Government of Mongolia.         4.3.       Four (4) staff are capable of early warning using GIS data       The following personnel were developed.       Reason of Insufficiency Activities         Activities       Achievement Ratio       Achievements       Reason of Insufficiency Achievement         4.1.       To conduct training on conceptual framework of a combined drought/dzud early warning system (DDEWS)       100%       Seminars were conducted in Mongolia.       Mongolia.         4.3.       To revise the present zoo-meteorological observation programme       100%       Seminars and practices were revised with special focus in rearranging observed items and in clarifying the text phrases.	Outputs	Indicators		Achievements	
Drought/dzud early       Maps of pasture biomass and plant height on the village (bag) scale are system (DDEWS) is established.       Spatial resolution (bag scale) was developed.         4.2.       A wintertime plant height map in a finer spatial resolution (bag scale)         6uideline of warning and advisory messages is implemented in the operation       Guidelines of drought/dzud were drought/dzud prepared in the Project is not operationally used since issuance conditions of dzud warning using GIS data         4.3.       The following personnel were developed.         Four (4) staff are capable of early warning using GIS data       The following personnel were developed.         Activities       Activities         Activities       Chievement         Ratio       Seminars and practices were conducted in Mongolia.         4.1.       To conduct training of database and GtB technique in the framework of the DDEWS       100%         4.3.       To revise the present zoo-meteorological       100%         V4.2.       To revise the pr	4	4.1		A ( 1: : C:	Achievement
early warning height on the village (bag) scale are system (DDEWS) is established.					
system (DDEWS) is established. 4.2. Guideline of warning and advisory messages is implemented in the operation 4.3. Four (4) staff are capable of early warning using GIS data 4.3. Four (4) staff are capable of early warning using GIS data 4.3. Four (4) staff are capable of early warning using GIS data 4.1. To conduct training of conceptual framework of to conceptual framework of to conduct training of database and GIS technique in the framework of the DDEWS 4.3. To revise the present zoo-meteorological observation programme 100% to carly with the program and the manual were revised with special focus in rearranging observed items and in clarifying the text phrases.					
is established.       A winterme plain height ap in a file spatial resplation (bag scale) was developed.         4.2.       Guidelines of drought/dzud vere Guidelines of drought/dzud prepared in the operation         9       Guidelines of acought/dzud prepared in the Project is not operationally used since issuance conditions of dzu warning in under discussions in the Government of Mongolia.         4.3.       The following personnel were Four (4) staff are capable of early warning using GIS data       The following personnel were developed.         4.3.       The following personnel were Mongolia.       Ms. B. Erdenetsetseg         Mr. R. Gankhuu       Ms. B. Erdenetsetseg         Mr. R. Gankhuu       Ms. M. Bayasgalan         Ms. M. Bayasgalan       Ms. M. Bayasgalan         4.1.       Seminars were conducted in Mongolia and Japan.         To conduct training of acombined drought/dzud early warning system (DDEWS)       100%         4.3.       To revise the present zoo-meteorological observation programme       Seminars and practices were revised with special focus in rearranging observed items and in coardiging observed items and in clarifying the text phrases.			scale are	developed.	
Is established.       finer spatial resolution (bag scale) was developed.         4.2.       Guideline of warning and advisory messages is implemented in the operation       finer spatial resolution (bag scale) was developed.         4.3.       Four (4) staff are capable of early warning using GIS data       The following personnel were developed.         4.3.       Four (4) staff are capable of early warning using GIS data       Mr. R. Gankhou         4.1.       To conduct training on conceptual framework of a combined drought/dzud early warning system (DDEWS)       Activities       Achievement Ratio       Achievement Seminars and practices were conducted in Mongolia.         4.3.       To conduct training of database and GIS technique in the pDEWS       100%       Seminars and practices were conducted in Mongolia.         4.3.       To revise the present zoo-meteorological observation programme       100%       The program and the manual were revised with special focus in caranging observed items and in charifying the text phrases.		developed		A wintertime plant height map in a	
4.2.       Guideline of warning and advisory messages is implemented in the operation       Guidelines of drought/dzud were Guidelines of drought/dzud prepared in the Project is not operationally used since conditions of dzud warning in under discussions in the Government of Mongolia.         4.3.       The following personnel were Geveloped.       Ms. B. Erdenetsteseg         Warning using GIS data       Ms. B. Erdenetsteseg       Mr. R. Gankhuu         Ms. M. Erdenetuya       Ms. M. Erdenetuya       Achievement         Activities       Achievement Ratio       Achievement Achievements       Reason of Insufficiency Achievement         4.1.       To conduct training of a combined drought/dzud early warning system (DDEWS)       100%       Seminars and practices were conducted in Mongolia.         4.2.       To revise the present zoo-meteorological observation programme       100%       The program and the manual were revised with special focus in rearranging observed items and in clarifying the text phrases.	is established.				
4.2.       Guideline of warning and advisory messages is implemented in the operation       Guidelines of drought/dzud were of drought/dzud prepared in the project is not operationally used since issuance conditions of dzud warning in under discussions in the Government of Mongolia.         4.3.       The following personnel were developed.       Ms. B. Erdenetsetseg       Ms. M. Bayasgalan         4.1.       Activities       Achievement Ratio       Achievement Ratio       Achievement Achievements       Reason of Insufficiency Achievement         4.1.       To conduct training on conceptual framework of a combined drought/dzud early warning system (DDEWS)       100%       Seminars and practices were conducted in Mongolia.       Mongolia.         4.2.       To revise the present zoo-meteorological observation programme       100%       The program and the manual were revised with special focus in rearranging observed items and in clarifying the text phrases.       The program made the text phrases.					
Guideline of warning and advisory messages is implemented in the project is not operationally used since issuance conditions of dzud warning in under discussions in the Government of Mongolia.       drought/dzud prepared in the Project is not operationally used since issuance conditions of dzud warning in under discussions in the Government of Mongolia.         4.3.       The following personnel were developed.       Ms. B. Erdenetsetseg         Four (4) staff are capable of early warning using GIS data       Ms. B. Erdenetsetseg       Mr. R. Gankhuu         Ms. M. Erdenetuya       Ms. M. Erdenetuya       Ms. B. Gantsetseg         Mr. R. Gankhuu       Ms. B. Gantsetseg       Reason of Insufficiency Achievement Ratio         4.1.       To conduct training on conceptual framework of a combined drought/dzud early warning system (DDEWS)       100%         4.2.       To evise the present zoo-meteorological observation programme       100%         4.3.       The program and the manual were revised with special focus in rearranging observed items and in clarifying the text phrases.		4.2			Guidalinas of
messages is implemented in the operation       in the project is not operationally used since issuance conditions of dzud warning in under discussions in the Government of Mongolia.         4.3.       Four (4) staff are capable of early warning using GIS data       The following personnel were developed.         4.3.       Warning using GIS data       Mr. R. Gankhuu         Mr. R. Gankhuu       Ms. M. Erdenetuya         Ms. M. Erdenetuya       Ms. M. Bayasgalan         Ms. M. Erdenetuya       Ms. M. Erdenetuse         Activities       Achievement Ratio         Activities       Achievement Ratio         Seminars were conducted in Mongolia and Japan.         Mongolia and Japan.         (DDEWS)       100%         4.3.       The program and the manual were revised with special focus in rearranging observed items and in clarifying the text phrases.			and advisory		
operation       operation       operationally used since issuance conditions of dzud warning in under discussions in the Government of Mongolia.         4.3.       The following personnel were developed.       • Ms. B. Erdenetsetseg         Yumming using GIS data       • Mr. R. Gankhuu       • Ms. M. Erdenetsetseg         Maximum Markov       • Ms. M. Bayasgalan       • Ms. B. Bayasgalan         Maximum Markov       • Ms. M. Bayasgalan       • Ms. B. Gantsetseg         Activities       Achievement Ratio       Achievements       Reason of Insufficiency Achievement         4.1.       Seminars were conducted in Mongolia and Japan.       • Mongolia and Japan.       • Achievement         4.1.       To conduct training on conceptual framework of a combined drought/dzud early warning system (DDEWS)       100%       Seminars and practices were conducted in Mongolia.         4.2.       To conduct training of database and GIS technique in the framework of the DDEWS       100%       Seminars and practices were conducted in Mongolia.         4.3.       The program and the manual were revised with special focus in revised with special focus in clarifying the text phrases.       Image: Comparison of the clarifying the text phrases.				prepared.	
4.3.       The following personnel were         Four (4) staff are capable of early warning using GIS data       The following personnel were         4.3.       Warning using GIS data       Ms. B. Erdenetsetseg         Ms. B. Erdenetsetseg       Mr. R. Gankhuu       Ms. B. Gantsetseg         Ms. M. Erdenetuya       Ms. B. Gantsetseg       Achievement         Activities       Achievement       Achievement         Ratio       Seminars were conducted in       Mongolia.         4.1.       To conduct training on conceptual framework of a combined drought/dzud early warning system       100%         4.2.       To conduct training of database and GIS technique in the framework of the DDEWS       100%         4.3.       To revise the present zoo-meteorological observation programme       100%         To revise the present zoo-meteorological observation programme       100%			ned in the		
4.3.The following personnel were developed.Four (4) staff are capable of early warning using GIS dataThe following personnel were developed.M. B. Erdenetsetseg Mr. R. Gankhuu Ms. M. Bayasgalan Ms. B. GantsetsegMs. B. GantsetsegActivitiesAchievement RatioAchievements Mongolia and Japan.ActivitiesAchievement RatioAchievements Mongolia and Japan.4.1. To conduct training on conceptual framework of a combined drought/dzud early warning system (DDEWS)100%4.2. To conduct training of database and GIS technique in the framework of the DDEWS100%4.3. To revise the present zoo-meteorological observation programmeThe program and the manual were revised with special focus in revised with special focus in carafying the text phrases.		operation			
4.3.       The following personnel were         Four (4) staff are capable of early       developed.         warning using GIS data       Mr. R. Gankhuu         Mr. R. Gankhuu       Ms. B. Erdenetsetseg         Mr. R. Gankhuu       Ms. M. Bayasgalan         Ms. M. Bayasgalan       Ms. B. Gantsetseg         Activities       Achievement Ratio       Achievements         Activities       Achievement Ratio       Achievements         4.1.       Seminars were conducted in Mongolia and Japan.       Mongolia and Japan.         (DDEWS)       100%       Seminars and practices were conducted in Mongolia.         4.2.       To conduct training of database and GIS technique in the framework of the DDEWS       100%         4.3.       The program and the manual were revised with special focus in corretorological observation programme       The program and the manual were revised with special focus in clarifying the text phrases.					
4.3.       The following personnel were developed.         Four (4) staff are capable of early warning using GIS data       Ms. B. Erdenetsetseg         Ms. B. Erdenetsetseg       Mr. R. Gankhuu         Ms. M. Erdenetuya       Ms. M. Bayasgalan         Ms. M. Bayasgalan       Ms. B. Gantsetseg         Activities       Achievement Ratio         Activities       Achievement Ratio         Seminars were conducted in To conduct training on conceptual framework of a combined drought/dzud early warning system (DDEWS)       100%         4.2.       To conduct training of database and GIS technique in the framework of the DDEWS       100%         4.3.       The program and the manual were revised with special focus in conceptual in Mongolia.         100%       The program and the manual were revised with special focus in clarifying the text phrases.					
4.3.       Four (4) staff are capable of early warning using GIS data       The following personnel were developed.         Warning using GIS data       · Ms. B. Erdenetsetseg       · Ms. B. Erdenetsetseg         Mr. R. Gankhuu       · Ms. B. Erdenetsetseg       · Ms. B. Gantsetseg         Activities       Achievement Ratio       Achievements       Reason of Insufficiency Achievement         4.1.       To conduct training on conceptual framework of a combined drought/dzud early warning system (DDEWS)       100%       Seminars were conducted in Mongolia.         4.2.       To conduct training of database and GIS technique in the framework of tababase and GIS technique in the framework of tababase and GIS technique in the framework of the DDEWS       100%       Seminars and practices were revised with special focus in reiser and process.         4.3.       The program and the manual were revised with special focus in rearranging observed items and in clarifying the text phrases.       The program and the manual were revised with special focus in reserved items and in clarifying the text phrases.					
Four (4) staff are capable of early warning using GIS datadeveloped. · Ms. B. Erdenetsetseg · Mr. R. Gankhuu · Ms. M. Brednetuya · Ms. M. Bayasgalan · Ms. B. GantsetsegActivitiesAchievement RatioAchievementsReason of Insufficiency Achievement4.1. To conduct training on conceptual framework of a combined drought/dzud early warning system (DDEWS)Seminars were conducted in Mongolia and Japan.Reason of Insufficiency Achievements4.2. To conduct training of database and GIS technique in the framework of the DDEWSSeminars and practices were conducted in Mongolia.Seminars and practices were conducted in Mongolia.4.3. To revise the present zoo-meteorological observation programme100%The program and the manual were revised with special focus in rearranging observed items and in clarifying the text phrases.					Mongolia
warning using GIS data· Ms. B. Erdenetsetseg · Mr. R. Gankhuu · Ms. M. Erdenetuya · Ms. M. Bayasgalan · Ms. B. GantsetsegActivitiesAchievement RatioReason of Insufficiency Achievements4.1.Seminars were conducted in Mongolia and Japan.Reason of Insufficiency Achievement4.1.Seminars were conducted in Mongolia and Japan.Mongolia and Japan.4.2.100%Seminars and practices were conduct training of database and GIS technique in the framework of the DDEWSSeminars and practices were conducted in Mongolia.4.3.100%The program and the manual were revised with special focus in rearranging observed items and in clarifying the text phrases.		4.3.		The following personnel were	
Mr. R. Gankhuu · Ms. M. Erdenetuya · Ms. M. Bayasgalan · Ms. B. GantsetsegActivitiesAchievement RatioAchievementsReason of Insufficiency Achievement4.1. To conduct training on conceptual framework of a combined drought/dzud early warning system (DDEWS)100%Seminars were conducted in Mongolia and Japan.4.2. To conduct training of database and GIS technique in the framework of the DDEWS100%Seminars and practices were conducted in Mongolia.4.3. To revise the present zoo-meteorological observation programme100%The program and the manual were revised with special focus in rearranging observed items and in clarifying the text phrases.		Four (4) staff are capa	able of early	developed.	
Mr. R. Gankhuu · Ms. M. Erdenetuya · Ms. M. Bayasgalan · Ms. B. GantsetsegActivitiesAchievement RatioAchievementsReason of Insufficiency Achievement4.1. To conduct training on conceptual framework of a combined drought/dzud early warning system (DDEWS)100%Seminars were conducted in Mongolia and Japan.4.2. To conduct training of database and GIS technique in the framework of the DDEWS100%Seminars and practices were conducted in Mongolia.4.3. To revise the present zoo-meteorological observation programme100%The program and the manual were revised with special focus in rearranging observed items and in clarifying the text phrases.					
ActivitiesAchievement RatioAchievement Achievement RatioReason of Insufficiency Achievement4.1.ActivitiesAchievement RatioAchievementsReason of Insufficiency Achievement4.1.Seminars were conducted in ocnceptual framework of a combined drought/dzud early warning system (DDEWS)100%Seminars and practices were conduct training of database and GIS technique in the framework of the DDEWS100%Seminars and practices were conducted in Mongolia.4.3. To revise the present zoo-meteorological observation programme100%The program and the manual were revised with special focus in rearranging observed items and in clarifying the text phrases.		6 6			
ActivitiesAchievement RatioAchievement AchievementReason of Insufficiency Achievement4.1.Seminars were conducted in Mongolia and Japan.Reason of Insufficiency Achievement4.1.Seminars were conducted in Mongolia and Japan.Mongolia and Japan.4.1.Seminars and practices were conduct training of database and GIS technique in the framework of the DDEWS100%4.3.The program and the manual were revised with special focus in rearranging observed items and in clarifying the text phrases.					
ActivitiesAchievement RatioAchievementsReason of Insufficiency Achievement4.1.To conduct training on conceptual framework of a combined drought/dzud early warning system (DDEWS)Seminars were conducted in Mongolia and Japan.Mongolia and Japan.4.2.100%Seminars and practices were conduct training of database and GIS technique in the framework of the DDEWSSeminars and practices were conducted in Mongolia.4.3.100%To revise the present zoo-meteorological observation programme100%				· Ms. M. Bayasgalan	
ActivitiesAchievement RatioAchievementsReason of Insufficiency Achievement4.1. To conduct training on conceptual framework of a combined drought/dzud early warning system (DDEWS)100%Seminars were conducted in Mongolia and Japan.Mongolia and Japan.4.2. To conduct training of database and GIS technique in the framework of the DDEWS100%Seminars and practices were conducted in Mongolia.4.3. To revise the present zoo-meteorological observation programme100%The program and the manual were revised with special focus in rearranging observed items and in clarifying the text phrases.					
ActivitiesRatioActivitiesAchievement4.1. To conduct training on conceptual framework of a combined drought/dzud early warning system (DDEWS)100%Seminars were conducted in Mongolia and Japan.Achievement4.2. To conduct training of database and GIS technique in the framework of the DDEWS100%Seminars and practices were conducted in Mongolia.conducted in Mongolia.4.3. To revise the present zoo-meteorological observation programme100%The program and the manual were revised with special focus in rearranging observed items and in clarifying the text phrases.			Achievement		Reason of Insufficiency
4.1. To conduct training on conceptual framework of a combined drought/dzud early warning system (DDEWS)100%Seminars were conducted in Mongolia and Japan.4.2. To conduct training of database and GIS technique in the framework of the DDEWS100%Seminars and practices were conducted in Mongolia.4.3. To revise the present zoo-meteorological observation programme100%The program and the manual were revised with special focus in rearranging observed items and in clarifying the text phrases.		Activities		Achievements	
To conduct training on conceptual framework of a combined drought/dzud early warning system (DDEWS)100%Mongolia and Japan.4.2.100%100%4.2.Seminars and practices were conduct training of database and GIS technique in the framework of the DDEWS100%4.3.100%The program and the manual were revised with special focus in rearranging observed items and in clarifying the text phrases.		4.1	Natio	Saminars were conducted in	
conceptual framework of a combined drought/dzud early warning system (DDEWS)100%100%4.2. To conduct training of database and GIS technique in the framework of the DDEWSSeminars and practices were conducted in Mongolia.4.3. To revise the present zoo-meteorological observation programme100%100%The program and the manual were revised with special focus in rearranging observed items and in clarifying the text phrases.					
a combined drought/dzud early warning system (DDEWS)     100%       4.2.     Seminars and practices were conduct training of database and GIS technique in the framework of the DDEWS       4.3.     100%       4.3.     The program and the manual were revised with special focus in rearranging observed items and in clarifying the text phrases.				mongona and Japan.	
a combined drought/dzud       early warning system         (DDEWS)       4.2.         To conduct training of database and GIS technique in the framework of the DDEWS       100%         4.3.       The program and the manual were revised with special focus in rearranging observed items and in clarifying the text phrases.					
(DDEWS)Seminars and practices were conduct training of database and GIS technique in the framework of the DDEWSSeminars and practices were conducted in Mongolia.4.3. To revise the present zoo-meteorological observation programme100%The program and the manual were revised with special focus in rearranging observed items and in clarifying the text phrases.					
<ul> <li>4.2.</li> <li>To conduct training of database and GIS technique in the framework of the DDEWS</li> <li>4.3.</li> <li>To revise the present zoo-meteorological observation programme</li> <li>100%</li> <li>Seminars and practices were conducted in Mongolia.</li> <li>The program and the manual were revised with special focus in rearranging observed items and in clarifying the text phrases.</li> </ul>					
To conduct training of database and GIS technique in the framework of the DDEWS100%conducted in Mongolia.4.3. To revise the present zoo-meteorological observation programme100%The program and the manual were revised with special focus in rearranging observed items and in clarifying the text phrases.		· · · · ·			<u> </u>
databaseandGIS100%techniqueintheframeworkoftheDDEWS4.3.The program and the manual were revised with special focus in rearranging observed items and in clarifying the text phrases.					
techniqueintheframeworkoftheDDEWS4.3.4.3.The program and the manual were revised with special focus in rearranging observed items and in clarifying the text phrases.				conducted in Mongolia.	
techniqueintheframeworkoftheDDEWS4.3.4.3.The program and the manual were revised with special focus in rearranging observed items and in clarifying the text phrases.		database and GIS	10004		
DDEWS4.3.To revise the present zoo-meteorological observation programme100%100%The program and the manual were revised with special focus in rearranging observed items and in clarifying the text phrases.		technique in the	100%		
DDEWS4.3.To revise the present zoo-meteorological observation programme100%100%The program and the manual were revised with special focus in rearranging observed items and in clarifying the text phrases.		framework of the			
4.3. To revise the present zoo-meteorological observation programmeThe program and the manual were revised with special focus in rearranging observed items and in clarifying the text phrases.					
To revise the present zoo-meteorological observation programme 100% revised with special focus in rearranging observed items and in clarifying the text phrases.				The program and the manual were	
zoo-meteorological observation programme 100% rearranging observed items and in clarifying the text phrases.					
observation programme <sup>100%</sup> clarifying the text phrases.					
			100%		
		1 0		energing the text philuses.	
	L	and mundul	1		

Seminars using the revised manual were held.           4.4.         To produce guidelines of warning and advisory         100%           4.5.         Guidelines of drought/dzud were designed.         Apasture capacity map combining livestock numbers on the bag scale was developed.           4.6.         To produce pasture condition maps on the garozon-meteorology and GIS         100%           5.         5.         All the planned equipment for agrozon-meteorology and GIS         Achievements           5.         5.         S.         Pasture related information         043 people participated in the workshops on utilization of metering equipment, receiving explanation on use of weather workshops on utilization of metering equipment, receiving explanation on use of weather workshops on utilization of metering explanation on use of weather workshops on utilization of metering explanation on understandings.         Reason of Insufficiency Achievement           5.1.         Souther seminars in circuit general public including nomads project launching and and general public         Reason of Insufficiency Achievement           5.1.         To conduct wenkshops in general workshops in strated to government including nomads progenci taunching and and wrapping-up seminars.         Reason of Insufficiency Achievement           100%         Southshop held The number of participants: 226         Reason of Insufficiency Achievement           5.2.         To conduct workshops in set of the destandings for end-sacer (public daministrator, momaks etc.)         100%					
4.4. To produce guidelines of warming and advisory messages     100%     Guidelines of drought/dzud were designed.       4.5. To produce guidelines of voltage (bag) scale     100%     A pasture capacity map combining biomass, pasture area and biomass, pasture scale and scale was developed.       4.6. To procure and set up equipment for agro/zoo-meteorology and GIS     100%     A pasture capacity map combining biomass, pasture area and procured and installed.       0utputs     Indicators     A chievements     Reason of Insufficiency Achievement       5. Knowledge and understandings about weather and information circantal continue governments, related     943 people participated in the vorkshops on utilization of in all aimags in Mongolia: 14.000       7. Computs     Discource sensinars in circa and end-use tradiced source sensinars in circa and end-use including nomads and general public     Sensinars at the middle term of the Project were conducted in June 2008 as well as project launching and wrapping-up     Reason of Insufficiency Achievement       5.3. To conduct sensinars in circa and end-uses including in Mongolia     100%     Seminars at the middle term of the Project were conducted in June 2008 as well as project launching and wrapping-up     Seminars at the middle term of the Project were conducted in June 2016       5.3. To conduct workshops ingleted to government organizations/agencies     100%     Seminars to tal a aimags x 5 times each = 15 times in total seminars/workshops       5.4. To conduct surveys to asses the needs of weather information of end-users (ubhing eductioned for or end-sers (ubhing eductioned for seninars/workshops     100%<				Seminars using the revised manual	
To produce guidelines of warning and advisory messages         100%         designed.           4.5. To produce pasture condition mays on the village (bag) scale         100%         A pasture capacity map combining biomass, pasture area and ivestock numbers on the bag scale was developed.           4.6. To procure and set up equipment for agr/200-meteorology and GIS         100%         All the planned equipment were procured and installed.           5.         S.         Indicators         Achievements         Reason of Insufficiency Achievement           5.         S.         S.         Hunderstandings information         Achievements         Reason of Insufficiency Achievement           6         To conduct seminars in receiving explanation on use of weather including nomadia and general public         Achievements         Reason of Insufficiency Achievement           7.1         To conduct seminars in rocipct lanuching and and general public         To conduct seminars in rocipct lanuching and wrapping-up         To conduct seminars in rocipct lanuching and wrapping-up         To conduct servinaria in the mumber of participants: 236           7.0         conduct workshops targeted to local government (aimg/sourn) and end users including herefers and general public         100%         3 aimags x 5 times cach = 15 times in total government (aimg/sourn) and end users including herefers and general public         100%         All the planned equipment were procured and installed.           5.4. To procure and set up equipment for to conduct sur		4.4			
warring and advisory     100%       4.5.     To produce pasture condition maps on the village (bag) scale     A pesture capacity map combining biomass, pasture area and livestock numbers on the bag scale was developed.       4.6.     To procure and set up equipment for agro/zoo-meteorology and GIS     100%       Outputs     Indicators     Achievements       5.     Knowledge excliving explanation on use of weather information information     943 people participated in the workshops on utilization of adviet weather and information     943 people participated in the workshops on utilization of adviet weather and information       5.     To conduct seminars in ciscs and end-user including nomads and general public     Scale and was developed.       7.1     To conduct seminars in ciscs and end-user including nomads and general public     Scale and was project launching and wrapping-up     Reason of Insufficiency Achievements       7.3.     Conduct seminars in pick tamching and and wrapping-up     Scale and advisor biol (10%     Scale and advisor biol (10%       8.5.3.     Conduct workshops Ingleted to government organization/agencie S.3.     3 aimags x 5 times cach = 15 times in total means of weather information ungeted to local government (aimags/out) and end users including herdees and general public     All the planned equipment were procured and installed.       5.6.     To conduct surveys to usesse the mecks of weather information and end users (public edustoch to he related if the masse scale and government (aimags/out) and end users (public edusto to he related if the meanse (public edustoch to he relat					
messages         Apsture capacity map combining           10         produce pasture condition maps on the village (log) scale         Apsture capacity map combining           4.5.         produce pasture condition maps on the village (log) scale         Apsture capacity map combining           4.6.         To procure and set up equipment for agro/zoo-meteorology and GIS         All the planned equipment were procured and installed.           Outputs         Indicators         Achievements         Achievements           Knowledge and GIS         S.         943 people participated in the workshops on utilization of about weather and information         Not evalue information         Not evalue workshops on utilization of and anages in Mongolis: 14.000           Corputs         S.         Not evalue organizations/agen cies and end-users         Achievement Ratio         Reason of Insufficiency Achievement           S.1.         To conduct seminars in organizations/agen cies and end-users         Seminars at the middle term of the project taunching and and wrapping-up         Seminars at the middle term of the 2008 as well as project launching and wrapping-up seminars.           S.2.         To conduct workshops in Mongoli acto government, organizations/agencies         6 workshop held The number of participants: 236           S.3.         To conduct servicys to assess the indexing in use of weather information         100%           S.4.         To procure and set up equipment for         100% <td></td> <td></td> <td>100%</td> <td>ucorgiicu.</td> <td></td>			100%	ucorgiicu.	
4.5. To produce pasture condition maps on the village (bag) scale     100%     A pasture capacity map combining bitmass, pasture area and scale was developed.       4.6. To procure and set up equipment for agro7200-meteorology and GIS     100%     A bit the planned equipment were procured and installed.       0utputs     Indicators     A chievements     Reason of Insufficiency Achievement       5.     5.     943 people participated in the mederstandings about weather and information     943 people participated in the vorkshops on utilization of understandings     Reason of Insufficiency Achievement       5.     5.     943 meople participated in the receiving explanation on use of weather shout weather and information     State in the middle term of the project lumabatar both for the Ulanabatar both for the Ulanabatar both for the Ulanabatar both for the urapping-up or conduct workshops in project lunching and edepened.     Reason of Insufficiency Achievement Project were conducted in June 2008 as well as project launching and guerral public s.3.     Reason of Insufficiency Achievement information       100%     5.3     conduct workshops in project lunching and urageted to local government for ous of weather information urgeted to local government for assess the needs of the equipment for assess the needs of the duests including herders and general public 5.5.     All the planned equipment were procured and installed.       5.5. To conduct surveys to assess the needs of the understandings for end-users (public administrators, nomads, etc.)     All the planned equipment were procured and installed.       5.6. To conduct surveys to assess the needs of to analyze the sur		•			
To produce pasture condition maps on the village (bag) scale         100% 4.6.         iomass, pasture and ivestok numbers on the bag scale was developed.           4.6.         To procure and set up equipment for agrozon-meteorology and GIS         100%         All the planned equipment were procured and installed.           5.         5.         Nowledge and discussed excloses         943 people participated in the workshops on utilization of weather information.         Reason of Insufficiency Achievement           5.         5.         100%         Participated in the workshops on utilization of weather information.         Reason of Insufficiency Achievement           6.         5.         10%         Participated in the workshops on utilization of weather information.         Reason of Insufficiency Achievement           7.1         Activities         Achievement Ratio         Achievement Scale was well as project launching and wrapping-up seminars.         Reason of Insufficiency Achievement           6 workshop held         To conduct seminars in 100%         100%         S aimags x 5 times each = 15 To conduct surveys to assess the needs of weather information or as of weather information use of weather information         3 aimags x 5 times each = 15 To conduct surveys to assess the needs of weather information and level of understandings for end-users (public administrators, nomads, etc.)         Opinion exchange and questionnaire surveys were implemented in the workshops.           5.5.         To conduct surveys to assess the needs of weather information and		0		A pasture capacity man combining	//
condition maps on the village (bag) scale     100%     livestock numbers on the bag scale was developed.       4.6.     To procure and set up equipment for agro7zon-meteorology and GIS     100%     All the planned equipment were procured and installed.       0utputs     Indicators     Achievements     Reason of Insufficiency Achievement       5.     S.     Six Hundred and Forty (640) users are understandings     4/3 people participated in the workshops on utilization or unitization or weather information.     Reason of Insufficiency Achievement       5.     To conduct seminars in ciccuing nomads and general public including nomads mad general public in dongolia are deepened.     Activities     Achievement Ratio     Reason of Insufficiency Achievement       5.3.     To conduct seminars in cics and end-users including nomads mad general public in dubter information in deepened.     Solution on solution sequences     Reason of Insufficiency Achievement       5.3.     To conduct seminars in cics and end-users including in dongolia are deepened.     Solution on solution sequences     Solution on solution sequences       5.3.     To conduct workshops inglot aimags (Henii, Donodgobi, Gobialia) on use of weather information ageverment (aimag/sourd)     100%     Solution on solution sequences     Solution sequences       5.4.     To procure and set up equipment for meather information and level of understandings for end-users (public administrors, nomads, etc.)     100%     All the planned equipment were procured and installed.       5.5.     T					
village (bag) scale         scale was developed.           4.6.         All the planned equipment were procured and installed.           Outputs         Indicators           All the planned equipment were procured and installed.         Reason of Insufficiency Achievement           5.         Six Hundred and Forty (640) users are workshops on utilization of information         943 people participated in the workshops on utilization of information           6.         Six Hundred and Forty (640) users are workshops on utilization of information         Noneolia: He number of leaftet distributed in all aimags in mal aimags in mal aimags in mal aimags in monophilit 14,000         Reason of Insufficiency Achievement           7         Conduct seminars in Usanbatar both for the ungenerations/agen including nomads         Seminars at the middle term of the Project launching and wrapping-up         Seminars at the middle term of the Project launching and wrapping-up           5.3.         Conduct workshops to generations/agencies         So workshop held         No workshop held           5.3.         Conduct surveys to assess the needs of weather information use of weather information uses for end-users (public administrators, nomads, etc.)         All the planned equipment were procured and installed.           5.4.         To conduct surveys to assess the needs of weather information and level of understandings for end-users (public administrators, nomads, etc.)			100%	· 1	
4.6. To procure and set up equipment for agro700-meteorology and GIS     100%     All the planned equipment were procured and installed.       Outputs     Indicators     Achievements     Reason of Insufficiency Achievement       5. Knowledge and bits Hundred and Forty (640) users are about weather and climate     643 people participated in the workshops on utilization of weather information     Reason of Insufficiency Achievement       5. Knowledge and Gimate     5. Activities     Achievement Ratio     Reason of Insufficiency Achievement       600 are started governments, related     Activities     Achievement Ratio     Reason of Insufficiency Achievement       5. To conduct seminars in clouding nomads mad general public including and mad general public including intervers to assess the needs of weather information and level of understandings for end-users (public administrators, nomads, etc.)     100%     All the planned equipment were procured and installed.       5.5. To conduct surveys to assest the neads of weather information and level of understandings fo					
To procure and set up equipment for agro/zoo-meteorology and GIS         100%         procured and installed.           Outputs         Indicators         Achievements         Reason of Insufficiency Achievement           5.         5.         Monted and Forty (640) users are workshops on utilization of receiving explanation on use of weather about weather and climate information         943 people participated in the workshops on utilization of understandings about weather and climate         Achievements         Reason of Insufficiency Achievement           Activities         Achievement Ratio         Seminars at the middle term of the project were conduced in June 2008 as well as project launching and wrapping-up         Reason of Insufficiency Achievement           information         100%         Seminars at the middle term of the project were conduced in June 2008 as well as project launching and wrapping-up and wrapping-up in Mongolia are deepened.         So conduct seminars/workshops in pilot aimage (Henti, Donodogoh, Gobiatian)         100%         6 workshop held The number of participants: 236           70         conduct seminars/workshops in pilot aimage (Henti, Donodogoh, Gobiatian)         100%         3 aimags x 5 times each = 15 times in total         100%           5.5.         To conduct surveys to assess the needs of weather information and level of understanding terkers and general public         100%         All the planned equipment were procured and installed.           5.6.         To conduct surveys to asess the needs of weaths information and level of u				-	
equipment for agrozoro-meteorology and GIS         100%         100%           Outputs         Indicators         Achievements         Reason of Insufficiency Achievement           5.         5.         5.         943 people participated in the workshops on utilization of receiving explanation on use of weather about weather and information         943 people participated in the workshops on utilization of receiving explanation on use of weather about weather and climate         843 people participated in the workshops on utilization of receiving explanation on use of weather alout weather and climate         943 people participated in the workshops on utilization of receiving explanation on use of weather alout weather and governments, related         843 people participated in the workshops in the middle term of the Project were conducted in June 2008 as well as project launching and wrapping-up to conduct workshops to general public mages (Henti, 100%         8emianas withe middle term of the Project were conducted in June 2008 as well as project launching and wrapping-up seminars.         8emianas were and wrapping-up seminars.           100%         100%         6 workshop held The number of participants: 236         3 aimags x 5 times each = 15 To conduct surveys to assess the needs of weather information al evel of understandings for end-users (public administrators, nomads, etc.)         All the planned equipment were procured and installed.           5.6.         To conduct surveys to assess the needs of weather information and level of understandings for end-users (public administrators, nomads, etc.)         The results of questionnaire surveys were shared among Japanese/Mongolian experts.					
and GIS         Reason of Insufficiency Achievements           Outputs         Indicators         Achievements         Reason of Insufficiency Achievement           S.         5.         S.         943 people participated in the workshops on utilization of receiving explanation on use of weather information         943 people participated in the workshops on utilization of weather information.           citinate information citinate governments, related         Activities         Achievement Ratio         943 people participated in the workshops on utilization of weather information.           To conduct seminars in including nomads project launching and and general public         Activities         Achievement Ratio         Reason of Insufficiency Achievements           To conduct workshops targeted to government (aimage (Henti, Dondogobi, Gobialtai) on use of weather information and end users including herders and general public         100%         6 workshop held The number of participants: 236           5.3.         To conduct surveys to assess the needs of weather information and end users including herders and general public         100%         3 aimags x 5 times each = 15 The number of participants: 707           5.4.         To conduct surveys to assess the needs of weather information and level of understandings for end-users (public edministrators, nomads, etc.)         100%         All the planned equipment were procured and installed.           5.6.         To conduct surveys to assess the needs of weather information administrators, nomads, etc.)         The		equipment for	100%	•	
Outputs         Indicators         Achievements         Reason of Insufficiency Achievement           5.         5.         Si. Hundred and Forty (640) users are understanding: about weather and climate information         943 people participated in the workshops on utilization of weather information.         Achievements         Reason of Insufficiency Achievement           about weather and climate information         Indicators         Activities         Achievement Ratio         Morekale and anages in Mongolia: 14,000         Reason of Insufficiency Achievement           governments, related organizations/agent         5.1.         To conduct seminars in Ulanabaatar both for the longing-up         Seminars at the middle term of the Project launching and wrapping-up seminars.         Reason of Insufficiency Achievement           100%         To conduct workshops targeted to government organizations/agencies         5.2.         Sominars, workshops in pilot aimags (Henti, Dondogobi, Gobialtai) on use of weather information targeted to local government (aimag/sourd) and end users including herdres and general public.         3 aimags x 5 times each = 15 times in total         3           5.5.         To conduct surveys to assess the needs of weather information and level of understandings for end-users (public administrycorkshops         100%         All the planned equipment were procured and installed.           5.6.         To conduct surveys to assess the needs of weather information and level of understandings for end-users (public administrycorkshops         100%         The result					
Outputs     Indicators     Achievement     Achievement       5.     5.     S.     943 people participated in the workshops on utilization of receiving explanation on use of weather information.     Achievement     Achievement       about weather information     information     information     The number of leaflet distributed in all almags in Mongolia: 14,000     Reason of Insufficiency Achievements       central/local governments, related     5.1.     Conduct seminars in Ulaanbaat pool for the project launching and wrapping-up seminars.     Beeminars at the middle term of the Project launching and wrapping-up seminars.     Reason of Insufficiency Achievement       in Mongolia are deepened.     5.2.     To conduct workshops in pilot aimags (Henti, Dondogobi, Gobiatal) on use of weather information and end users including herders and general public     3 aimags x 5 times each = 15 times in total government (aimag/soum) and end users including herders and general public     3 aimags x 5 times each = 15 times in total government (aimag/soum) and end users including herders and general public       5.5.     To conduct surveys to assess the needs of weather information and level of understandings for end-users (public administrators, normads, etc.)     Opinion exchange and level of understandings for end-users (public administratos, normads, etc.)       5.6.     To analyze the survey results and provide feetback to the related     The results of questionnaire surveys were shared among Japanese/Mongolian experts.		and GIS			
5.       5.       S.       Hundred and Forty (640) users are understandings about weather and information       943 people participated in the workshops on utilization of weather information.       Activement         about weather and climate information incestand understanding overmments, related       Activities       Achievement       Reason of Insufficiency         S.1.       To conduct seminars in Cies and end-upbubic including nomads and general public understanding and general public users are information and general public users are information and general public users are for the related       Seminars at the middle term of the Project launching and wrapping-up in Mongolia are 5.2.       Reason of Insufficiency Achievement 2008 as well as project launching and wrapping-up seminars.         ad general public       5.1.       To conduct workshops in gpilot aimags (Henti, Dondogoth, Gobialial) on use of weather information and end users including herders and general public       6 workshop held         To procure and set up equipment for seminars/workshops       100%       3 aimags x 5 times each = 15 times in total         To conduct surveys to assess the needs of weather information and level of understandings for end-users (public administrators, nomads, etc.)       All the planned equipment were implemented in the workshops.         5.6.       To analyze the survey results and provide feedback to the related       The results of questionnaire surveys were shared among lapanese/Mongolian experts.	Outputs	Indicators		A chievements	
Knowledge and understandings       Six Hundred and Forty (640) users are workshops on utilization of receiving explanation on use of weather about weather and finormation       workshops on utilization of weather information.         Climate information information central/local governments, related       information       Information       The number of leaflet distributed in all aimags in Mongolia: 14,000         Seminars at the middle term of the project launching and and general public including nomads and general public in Mongolia       To conduct seminars in project launching and wrapping-up       Seminars at the middle term of the Project were conducted in June 2008 as well as project launching and wrapping-up seminars.         100%       To conduct workshops in Mongolia       To conduct workshops in ganizations/agencies       6 workshop held The number of participants: 236         5.3. To use of weather information targeted to local government (aimag/soum) and end users including herdres and general public       100%       3 aimags x 5 times each = 15 times in total         5.5. To seminars/workshops       100%       All the planned equipment were procured and installed.         5.5. 5.6. To conduct surveys to assess the needs of weather information and level of understandings for end-users (public administrators, nomads, etc.)       00pinion       exchange       and questionnaire surveys were implemented in the workshops.         5.6. To analyze the survey results and provide feedback to the related       The results of questionnaire surveys were shared among Japanese/Mongolian experts.	-				Achievement
understandings about weather and information in central/local governments, related organizations/agen cies and end-users including nomads and general public in Mongolia are deepened.					
about weather and climate information inf					
climate information in central/local governments, related organizations/agen Cies and end-users including nomads and general public in Mongolia and deepened.			ise of weather	weather information.	
information in central/local governments, related organizations/agen cies and end-users deepened.		information		The number of leaflet distributed	
central/local governments, related     Activities     Achievement Ratio     Achievements     Reason of Insufficiency Achievement       organizations/agen cies and end-users including nomads and general public in Mongolia ar deepened.     To conduct seminars in Ulaanbaatar both for the broject launching and wrapping-up     100%     Seminars at the middle term of the Project were conducted in June 2008 as well as project launching and wrapping-up seminars.       5.2.     To conduct workshops targeted to government organizations/agencies     100%     6 workshop held The number of participants: 236       5.3.     To     conduct seminars/workshops in pilot aimags (Hentii, Dondogobi, Gobiatiai) on use of weather information and end users including herders and general public     100%     3 aimags x 5 times each = 15 times in total       5.4.     To     procure and set up equipment for seminars/workshops     100%       5.5.     To conduct surveys to assess the needs of weather information and level of understandings for end-users (public administrators, nomads, etc.)     100%       5.6.     To analyze the survey results and provide feedback to the related     100%					
governments, related organizations/agen including normads and general public in Mongolia ard deepened.     Activities     Ratio     Achievements     Achievements       5.1.     To conduct seminars in Ulaanbaatar both for the project launching and and general public in Mongolia ard deepened.     5.1.     Seminars at the middle term of the project launching and wrapping-up seminars.     Seminars at the middle term of the 2008 as well as project launching and wrapping-up seminars.       5.2.     To conduct workshops targeted to government organizations/agencies     100%     6 workshop held The number of participants: 236       5.3.     To conduct seminars/workshops in plot aimags (Hentii, Dondogobi, Gobiatia) on use of weather information targeted to gocal government (aimag/soum) and end users including herders and general public     100%     3 aimags x 5 times each = 15 The number of participants: 707       5.4.     To procure and set up equipment for seminars/workshops     100%     All the planned equipment were procured and installed.       5.5.     To conduct surveys to assess the needs of weather information tere, information administrators, nomads, etc.)     100%     Dipinion exchange and questionnaire surveys were implemented in the workshops.       5.6.     To analyze the survey results and provide feedback to the related     The results of questionnaire surveys were shared among Japanese/Mongolian experts.			Achievement		Reason of Insufficiency
organizations/agen tics and end-users including nomads and general public in Mongolia are deepened.To conduct seminars in tuanbaatar both for the project launching and wrapping-upProject were conducted in June 2008 as well as project launching and wrapping-up seminars.75.2. To conduct workshops argeted to government organizations/agencies100%6 workshop held The number of participants: 2365.3. To conduct seminars/workshops in pilot aimags (Henti, Dondogobi, Gobiatai) on use of weather information and end users including herders and general public100%3 aimags x 5 times each = 15 times in total The number of participants: 7075.4. To conduct surveys to assess the needs of weather information and level of understandings for end-users (public administrators, nomads, etc.)100%All the planned equipment were procured and installed.5.6. To analyze the survey results and provide feedback to the related feedback to the related100%The results of questionnaire surveys were shared among Japanese/Mongolian experts.		Activities		Achievements	
cies and end-users including nomads ad general public in Mongolia are deepened.	related	5.1.		Seminars at the middle term of the	
including nomads and general public 5.2. deepend.		To conduct seminars in			
and general public in Mongolia are deepened.       wrapping-up       0       11 0 1 10 10 1000         5.2. To conduct workshops targeted to government organizations/agencies       100%       6 workshop held The number of participants: 236         5.3. To conduct seminars/workshops in pilot aimags (Hentii, Dondogobi, Gobialtai) on use of weather information targeted to local government (aimag/soum) and end users including herders and general public       100%       3 aimags x 5 times each = 15 times in total The number of participants: 707         5.4. To procure and set up equipment seminars/workshops       100%       All the planned equipment were procured and installed.         5.5. To conduct surveys to assess the needs of weather information allevel of understandings for end-users (public administrators, nomads, etc.)       100%       Opinion exchange and questionnaire surveys were implemented in the workshops.         5.6. To analyze the survey results and provide feedback to the related       100%       The results of questionnaire surveys were shared among Japanese/Mongolian experts.			100%		
in Mongolia are deepened. 1004 5.2 To conduct workshops targeted to government organizations/agencies 5.3 To conduct seminars/workshops in pilot aimags (Hentii, Dondogobi, Gobialtai) on use of weather information targeted to local government (aimag/soum) and end users including herders and general public 5.4. To procure and set up equipment for seminars/workshops 5.5. To conduct surveys to assess the needs of weather information level of understandings for end-users (public administrators, nomads, etc.) 5.6 To analyze the survey results and provide feedback to the related 100%				and wrapping-up seminars.	
deepened.       To       conduct workshops targeted to government organizations/agencies       100%       The number of participants: 236         5.3.       To       conduct seminars/workshops in pilot aimags (Henti, Dondogobi, Gobialtai) on use of weather information targeted to local government (aimag/soum) and end users including herders and general public       100%       3 aimags x 5 times each = 15 times in total         5.4.       To procure and set up equipment for seminars/workshops       100%       All the planned equipment were procured and installed.         5.5.       To conduct surveys to assess the needs of weather information administrators, nomads, etc.)       100%       Opinion exchange and questionnaire surveys were implemented in the workshops.         100%       100%       100%       100%					
10       10%       10%       10%       10%         10%       10%       10%       10%       10%         10%       10%       10%       10%       10%         5.3       10%       3 aimags x 5 times each = 15       15         To       conduct       10%       10%       10%         10       aimags (Hentii, Dondogobi, Gobialtai) on use of weather information targeted to local government (aimag/soum) and end users including herders and general public       100%       10%         5.4.       To procure and set up equipment for seminars/workshops       100%       All the planned equipment were procured and installed.         5.5.       To conduct surveys to assess the needs of weather information and level of understandings for end-users (public administrators, nomads, etc.)       100%       Opinion exchange and questionnaire surveys were implemented in the workshops.         5.6.       To analyze the survey results and provide feedback to the related       100%       The results of questionnaire surveys were shared among Japanese/Mongolian experts.		5.2.			
organizations/agencies5.3.Toconductseminars/workshopsinpilotaimags(Henti,Dondogobi, Gobialtai) onuse of weather informationtargetedtolocalgovernment (aimag/soum)and end users includingherders and general public5.4.Totototorequipmentforseminars/workshops5.5.5.5.Toconduct surveys toassess the needs ofweather information andlevel of understandingsforedu.foredu.100%100%The results of questionnairesecure (adulta)toanalyze the surveyresultsresultsresultsand providefeedback to the related100%	deepened.		100%	The number of participants: 236	
5.3.       To       conduct         To       conduct         seminars/workshops       in         pilot       aimags       (Henti,         Dondogobi, Gobialtai) on       use of weather information       100%         targeted       to       local         government       (aimag/soum)       100%         All       the planned equipment were         ro       procure and set up         equipment       for         seminars/workshops       100%         5.5.       To         To conduct surveys to       assess the needs of         weather information and       100%         level of understandings       100%         for       etc.)         5.6.       To analyze the survey         results       and provide         feedback to the related       100%					
Toconduct seminars/workshopsin pilottimes in totalpilotaimags (Hentii, Dondogobi, Gobialtai) on use of weather information targeted to derders and general public100%100%5.4. To equipment seminars/workshops100%All the planned equipment were procured and installed.5.4. To equipment seminars/workshops100%Opinion exchange and end users including herders and general public5.4. To o procure and set up equipment seminars/workshops100%All the planned equipment were procured and installed.5.5. To conduct surveys to assess the needs of weather information and level of understandings for end-users (public administrators, nomads, etc.)100%Dinion exchange surveys were implemented in the workshops.5.6. To analyze the survey results and provide feedback to the related100%The results of questionnaire surveys were shared among Japanese/Mongolian experts.				2	
seminars/workshopsin pilotThe number of participants: 707pilotaimags(Hentii, Dondogobi, Gobialtai) on use of weather information targeted100%100%100%100%5.4. To procure and set up equipment seminars/workshops100%5.5.100%5.5.Opinion5.6. To conduct surveys to assess the needs of weather information and level of understandings for end-users (public administrators, nomads, etc.)Opinion5.6.To analyze the survey results and provide feedback to the related100%					
pilotaimags(Hentii, Dondogobi, Gobialtai) on use of weather information targeted to local government (aimag/soum) and end users including herders and general public100%5.4. To procure and set up equipment seminars/workshops100%All the planned equipment were procured and installed.5.5. To conduct surveys to assess the needs of weather information and level of understandings for end-users (public administrators, nomads, etc.)Opinion exchange surveys were implemented in the workshops.5.6. To analyze the survey results and provide feedback to the related100%The results of questionnaire surveys were shared among Japanese/Mongolian experts.					
Dondogobi, Gobialtai) on use of weather information targeted to local government (aimag/soum) and end users including herders and general public100%5.4. To procure and set up equipment for seminars/workshops100%All the planned equipment were procured and installed.5.5. To conduct surveys to assess the needs of weather information and level of understandings for end-users (public administrators, nomads, etc.)0pinion exchange and questionnaire surveys were implemented in the workshops.5.6. To analyze the survey results and provide feedback to the related100%				The number of participants. 707	
use of weather information targeted100%100%100%government (aimag/soum) and end users including herders and general publicAll the planned equipment were procured and installed.5.4. To procure and set up equipment seminars/workshops100%5.5. To conduct surveys to assess the needs of weather information and level of understandings for end-users (public administrators, nomads, etc.)Opinion exchange surveys were implemented in the workshops.5.6. To analyze the survey results end provide feedback to the related100%					
government (aimag/soum) and end users including herders and general publicAll the planned equipment were procured and installed.5.4. To procure and set up equipment for seminars/workshops100%All the planned equipment were procured and installed.5.5. To conduct surveys to assess the needs of weather information and level of understandings for end-users (public administrators, nomads, etc.)Opinion exchange and questionnaire surveys were implemented in the workshops.5.6. To analyze the survey results and provide feedback to the related100%The results of questionnaire surveys were shared among Japanese/Mongolian experts.			100%		
and end users including herders and general publicAll the planned equipment were procured and installed.5.4. To procure and set up equipment for seminars/workshops100%All the planned equipment were procured and installed.5.5. To conduct surveys to assess the needs of weather information and level of understandings for end-users (public administrators, nomads, etc.)00pinion exchange and questionnaire surveys were implemented in the workshops.5.6. To analyze the survey results and provide feedback to the related100%		targeted to local			
herders and general publicAll the planned equipment were procured and installed.5.4. To procure and set up equipment for seminars/workshops100%All the planned equipment were procured and installed.5.5. To conduct surveys to assess the needs of weather information and level of understandings for end-users (public administrators, nomads, etc.)Opinion exchange and questionnaire surveys were implemented in the workshops.5.6. To analyze the survey results and provide feedback to the relatedThe results of questionnaire surveys were shared among Japanese/Mongolian experts.					
5.4. To procure and set up equipment seminars/workshopsAll the planned equipment were procured and installed.5.5. To conduct surveys to assess the needs of weather information and level of understandings for end-users (public administrators, nomads, etc.)Opinion exchange and questionnaire surveys were implemented in the workshops.5.6. To analyze the survey results and provide feedback to the relatedThe results of questionnaire surveys were shared among Japanese/Mongolian experts.					
To procure and set up equipment100%procured and installed.seminars/workshops100%05.5.005.6.100%100%5.6.100%100%5.6.To analyze the survey results and provide feedback to the related100%		· ·			
equipment seminars/workshopsfor for seminars/workshops100%5.5.5.5.5.5.Opinion exchange and questionnaire implemented in the workshops.5.5.005.5.100%100%100%100%100%5.6.100%To analyze feedback to the related100%100%100%					
equipment       for         seminars/workshops       5.5.         5.5.       Opinion       exchange       and         To conduct surveys to       assess the needs of       weather information and       level of understandings       for       end-users       (public administrators, nomads, etc.)       100%         5.6.       The results of questionnaire surveys were shared among       results and provide feedback to the related       100%       Japanese/Mongolian experts.			100%	procured and installed.	
5.5.       Opinion exchange and questionnaire surveys were implemented in the workshops.         70 conduct surveys to assess the needs of weather information and level of understandings for end-users (public administrators, nomads, etc.)       100%         5.6.       The results of questionnaire surveys were shared among Japanese/Mongolian experts.					
To conduct surveys to assess the needs of weather information and level of understandings for end-users (public administrators, nomads, etc.)100%questionnaire surveys were implemented in the workshops.5.6. To analyze the survey results and provide feedback to the related100%The results of questionnaire surveys were shared among Japanese/Mongolian experts.		•		Opinion avalante 1	
assess the needs of weather information and level of understandings for end-users (public administrators, nomads, etc.)100%implemented in the workshops.5.6.The results of questionnaire surveys were shared among Japanese/Mongolian experts.					
weather information and level of understandings for end-users (public administrators, nomads, etc.)100%5.6.The results of questionnaire surveys were shared among Japanese/Mongolian experts.					
level of understandings for end-users (public administrators, nomads, etc.)     100%       5.6.     The results of questionnaire surveys were shared among Japanese/Mongolian experts.				impremented in the workshops.	
for end-users (public administrators, nomads, etc.)The results of questionnaire surveys were shared among Japanese/Mongolian experts.5.6. To analyze the survey results and provide feedback to the relatedThe results of questionnaire surveys were shared among Japanese/Mongolian experts.			100%		
administrators, nomads, etc.)The results of questionnaire surveys were shared among Japanese/Mongolian experts.5.6. To analyze the survey results and provide feedback to the relatedThe results of questionnaire surveys were shared among Japanese/Mongolian experts.					
5.6.The results of questionnaire surveys were shared among Japanese/Mongolian experts.5.6.The results of questionnaire surveys were shared among Japanese/Mongolian experts.					
To analyze the survey results and provide feedback to the related 100% surveys were shared among Japanese/Mongolian experts.		etc.)			
results and provide 100% Japanese/Mongolian experts.		5.6.			
feedback to the related		5			
			100%	Japanese/Mongolian experts.	
project activities					
		project activities			

Outputs	Indicators		Achievements	Reason of Insufficiency Achievement			
6. Weather		ropriate operating rates of weather rate: 99.7%					
observation and forecasting systems especially weather radar and	radar are maintained		Regular maintenance with the check sheets was included in the routing work.				
computer network are stably operated.			Efficiency of the maintenance work improved due to familiarization with the measuring instrument operation.				
			The engineers' stance for system operation and maintenance was positively expanded.				
	6.2. Three (3) staff are capable maintenance of radar	of	Five (5) staff were developed.				
	6.3. System problems of comp in NAMHEM are properly		NAMHEM Head Office and aimag Centers become easy to connect the Internet.				
			The existing access limitation among the International Airport, the Radar Station and NAMHEM Head Office was released.				
	6.4. More than two (2) staff a maintenance of computer n		Five (5) staff were developed.				
	Activities	Achievement Ratio	Achievements	Reason of Insufficiency Achievement			
	6.1. To produce operation and maintenance manual of weather radar system		Daily, weekly, monthly, biannual and annual maintenance check sheets of the Excel file were prepared.				
		100%	<ul> <li>Check sheets with pictures of;</li> <li>1) measuring instrument connection procedures,</li> <li>2) unit replacement procedures, and,</li> </ul>				
			<ol> <li>appropriate wave form displayed by the instrument, were prepared.</li> </ol>				
	6.2. To conduct training on operation and		Technique transfer on principle operation and trouble shooting was implemented.				
	maintenance of weather radar system	100%	Training on procurement and management of the spare parts of the equipment was implemented.				
			Training on operation of the measurement instrument was implemented.				
			Training on utilization of the check sheets was implemented.				
	6.3. To make overall plan of computer network in NAMHEM	100%	Solution plan for the existing network was prepared.				
	6.4. To conduct training on	100%	Trainings on solving problem solution with equipment newly				

	computer networking		procured were implemented.	
Outputs	Indicators		Achievements	Reason of Insufficiency Achievement
7. Information on monitoring of DSS	2	g information	DSS information is unloaded onto the www server set at NAMHEM.	
issued.	7.2. Four (4) staff are cap monitoring	able of DSS	The following personnel were developed. • Mr. D. Batdorj (NAMHEM) • Ms. J. Shulentuya (Sainshand) • Mr. Kh. Enhkbayar (Zamin-uud) • Mr. D. Otogonbayar (Dalanzadgad)	
	Activities	Achievement Ratio		Reason of Insufficiency Achievement
	7.1. To procure and set up DSS monitoring system	100%	According to the schedule, equipment installation at the 4 sites was completed.	
	7.2. To conduct training on operation and maintenance of DSS monitoring network and data analysis	100%	The engineers from the 4 DSS monitoring sites were trained in Ulaanbaatar.	

### 1.2 List of Outputs

The outputs of the Project are listed in the following table.

Field	Output							
Numerical Weather Prediction	Middle-term forecast (provided once a day)							
Climate Change Projection	Information on climate change due to global warming over Mongolia (surface air temperature, precipitation, snowfall, humidity and wind)							
	Short-term forecast (provided twice a day)							
Weather Forecasting	Long-term forecast (provided twice a year)							
	Computer-aided case study handbook on typical and unusual phenomena							
Weather Interpretation Method	Suggestion for the Precipitation Guidance using Product of RSM of mean rainfall amount							
Weather Radar Analysis	Utilization of Doppler radar for weather observation							
	Information on drought/dzud provided annually (at the end of August)							
	Maps of pasture biomass on the village (bag) scale, outline							
Drought/Dzud Early Warning	Information on drought/dzud provided on the web							
System	(Vegetation map, Biomass map, Drought map and Snow map)							
GIS Technique	Maps of plant height on the village (bag) scale							
Zoo-meteorology	Guideline of warning and advisory messages							
	Revised zoo-meteorological observation program							
	Revised zoo-meteorological observation manual							
	Participants list of workshops							
Use of Weather Information	Results of questionnaire survey							
	Leaflet on practical use of weather information							
Operation and Maintenance of	Operation and maintenance manual of weather radar system							
Weather Radar System	AVR and UPS Check Sheet (Weekly)							
Computer Networking	Overall plan of computer network in NAMHEM							
Computer Networking	The problems and the future expansion plan of the NAMHEM network							
Dust and Sand Storm (DSS)	Equipment for Kosa Monitoring Network							
Monitoring Network	DSS monitoring data							

### 2. ACTUAL IMPLEMENTATION SCHEDULE OF ACTIVITY

The actual implementation schedule of the Project during 5 years is as the Flow Chart at the next page.



Italic type = Japanese expert

FLOWCHART (Project)

### 3. ACTUAL INPUTS

### 3.1 Dispatch of Short-term JICA Expert Team

The following 15 JICA short-term experts have involved the Project for five years (total M/M of 75.87) in accordance with the schedule attached hereunder.

- 1) Leader/ Numerical Weather Prediction/Climate Change projection
- 2) Deputy Leader/ Weather Services Planning
- 3) Weather Forecasting
- 4) Weather Interpretation Method
- 5) Weather Radar Analysis
- 6) Drought/Dzud Early Warning System (DDEWS)
- 7) GIS Technique
- 8) Zoo-meteorology
- 9) Use of Weather Information
- 10) Operation and Maintenance of Weather Radar System
- 11) Computer Networking
- Operation and Maintenance of DSS Monitoring Network/ Processing and Sharing of DSS Monitoring Data
- Equipment Planning and Overall Quality Control of DSS Monitoring System/ Analysis of DSS Monitoring Data
- 14) DSS Monitoring System Installation and Supervision Planning
- 15) Installation Supervision and Support of Mongolian Scope of Work on DSS Monitoring System

				1st FY				2nd FY							3rd								4th FY			Ę	ith FY		
			FY	FY2004		0 7		Y2005			0 1			7 0	FY2		4 40	4	0 1	- I	0 7		FY200				FY20		
No.	Field	Name	Month Phase	1   2   3 Preparatio	5	6 7	8	9   10	11 12		3 4 sic Trai		6	8	9	10 1	1 12	1 2	3 4	5	6 7	8		) 11 12 1 Establishment			1	8 9	10 11
1	Leader/ Numerical Weather Prediction	Dr. Yasuo SATO (Mr.)	1 11000	15	7	'8		81		57			89					9			60		6		21	28		22	
2	Deputy Leader/ Weather Services Planning	Mr. Yoshihisa UCHIDA		24	21		15	5		15				22	2		7	9							7	6		14	
3	Weather Forecasting	Dr. Takehiko FURUKAWA (Mr.)		15	7	78		81		57			89					9											
4	Weather Interpretation Method	Ms. Ritsuko SASAKI						:9															15			15			
5	Weather Radar Analysis	Mr. Hideshige IIDA				30							30															10	
6	Drought/Dzud Early Warning System	Dr. Masato SHINODA (Mr.)		9	7					6					7							7							
7	GIS Technique	Dr. Kaoru TACHIIRI (Mr.)		13	30		31	L		19					20			20				2			7				
8	Zoo-meteorology	Dr. Yuki MORINAGA (Ms. Yuki SHINODA)					20								20														
9	Use of Weather Information	Mr. Soshi IWATA		15	30		51					I	25					9			30		3	30		28		17	
10	Operation and Maintenance of Weather Radar System	Mr. Takehiro YOSHIDA			30								18								15								
11	Computer Networking	Mr. Shinya SHIMODA			24									18															
12	Operation and Maintenance of DSS Monitoring Network/ Processing and Sharing of DSS Monitoring Data	Dr. Ichiro MATSUI (Mr.)															5	11		15		36			10	15			
13	Equipment Planning and Overall Quality Control of DSS Monitoring System/ Analysis of DSS Monitoring Data	Dr. Nobuo SUGIMOTO (Mr.)																										5	
14	DSS Monitoring System Installation and Supervision Planning	Mr. Yoshihisa UCHIDA															12	6		15		7							
15	Installation Supervision and Support of Mongolian Scope of Work on DSS Monitoring System	Mr. Toshihide ENDO		XX = XX d													12	11		15		36							

XX = XX days

### 3.2 Counterpart Training in Japan

The C/P Trainings conducted in Japan in 2nd FY and 3rd FY are indicated in the following table.

Curriculum	Major contents	Period	Name of Trainee
2nd FY			
technique using the regional	To assess model performances of the Mongolian regional climate model to represent Mongolian climate by comparing results of the Mongolian model with the results of an MRI model and two observation data using MRI/JMA super-computer system.	to 2 December, 2005	Mr. P. Gomboluudev (C/P of field of Numerical Weather Prediction/ Climate Change Projection)
numerical weather prediction outputs (Field of Numerical			Ms. L. Oyunjargal Mr. G. Bayasgalan Ms. B. Tsatsral Mr. B. Buyantogtokh (Numerical Weather Prediction/ Guidance Working Grope)
3rd FY			
regional meso-scale short-term forecast models (Field of Numerical Weather Prediction)	To learn theoretical background of advanced data assimilation technique (3D-VAR) and to obtain practical training on one of the MRI workstations using surface observation or satellite data in a regional meso-scale short-range forecast model similar to the Mongolian regional short-range forecast model (MM5).	February, 2007	(C/P of field of Numerical Weather Prediction/ Climate Change Projection)
Japan's Weather forecasting activities from numerical weather prediction outputs	forecasting in Japan Meteorological Agency, local weather observatory and private weather provider etc.		(C/P of field of Use of Weather Information)
Drought/Dzud Early Warning System			Ms. M. Bayasgalan Ms. M. Erdenetuya Ms. B. Erdenetsetseg Ms. B. Gantsetseg (C/P of the field of Drought/Dzud Early Warning System)

### 3.3 Provision of Equipment

The equipment provided to NAMHEM under the Project is listed in the following table.

Name of Equipment	Model Name, Specifications	Q'ty
1st FY		
GPS	Handy type	25
Dry Cell for GPS	AAA Cell Battery	8
GPS	Handy type	5
Electric scales	NJW-300	30
Weighing Instruments	RP-500	2
Weighing Instruments	RP-100	8
Standard weight 5kg		80
Standard weight 20kg		16
Desktop PC	DELL17" Optiplex GX170L	14
LCD Monitor	DELL17" LCD	18
CD-RW	700 MB	1400
MS-Windows XP	Professional	14
MS-Office 2003	Professional	15
Linux OS	Freeware	10
Net CDF	Freeware	10
NCARG	Freeware	10
UPS	MGE Premium	18
Inkjet Printer	Canon i6100	2
Inkjet for Canon i6100	BCI-3E	16
Switch	D-Link	3
Cable	UTP	500m
Connector	RJ-45	30
Power Extension Cable	MGE Pulsar 5	10
PC Workstation	DELL Precision 380 N	2
Server	DELL PowerEdge 800	2
Linux OS	Red Hat Enterprise	4
Tape Cartridge	20/40GB DDS4	40
Fortran Software	PGI(1user)	2
Fortran Software	PGI(10 user)	1
GIS Software	ArcGIS9.1(with ArcView + Spatial Analyst)	2
Remote Sensing Soft	Imagine 8.7	2
Projector	HP VP6121	1
Projector Case	Carrying	1
Projector Lump	Lamp Unit	3
Laser Pointer		1
Note PC	DELL Latitude D510	1
USB Memory	256MB	1
Mouse	Optical	1
Color Copy Machine	Canon iRC3100	1
Printer Unit for Color Copy Machine	Canon E1	1
Toner for Color Copy Machine	Cyan, Magenta, Yellow, Black	20
Copy Paper for Color Copy Machine	White, 500 sheets	10
	James R. Holton, "An Introduction to Dynamic Meteorology/	
Books	Fourth Edition"	5
Books	Eugenia Kalnay, "Atmospheric Modeling Data Assimilation and Predictability"	5
Books	Shunlin Liang, "Quantitative Remote Sensing of Land Surfaces"	5
Books	Peter A. Burrough and Rachael A.M.Donnell, "Principles of Geographical Information System"	5
Books	Craig Hunt, "TCP/IP Network Administration"	3
Book	Philip Miller, "TCP/IP Explained"	1

2nd FY		
Drying Instrument		5
Book	Bill Kropla, "MapServer: Open Source GIS Development"	1
Book	Schuyler Erle, "Mapping Hacks"	1
Book	Tyler Mitchell, "Web Mapping Illustrated"	1
	Neil Matthews, "Beginning Databases With PostgreSQL:	
Book	From Novice To Professional, Second Edition"	1
3rd FY		
Broadband Gateway	D-Link DI-808HV	4
Router	Cisco CISCO1811/K9	2
Switch	D-Link DES1008D	4
Desktop PC with Monitor	DELL Optiplex Gx210L	2
UPS	APC 1500VA	1
Switch	D-Link DES1008D	2
GIS Extension 1	ESRI ArcGIS 3D Analyst	2
GIS Extension 2	ESRI ArcGIS Geostatistical Analyst	2
Ground-based Kosa Monitoring	ESKI AICOIS Geostatistical Allalyst	L
System	TOADKK DUB-222(S)	1
Data Collection and Analyzing		
System	TOADKK DNS-309(S)	1
Data Display and Publication System	TOADKK DNS-101W(S)	1
Data Display and Publication System Data Publication System	TOADKK DNS-101W(S) TOADKK DNS-101W(S2)	1
Firewall	Cisco Cisco1712	1
Modem	OMRON OMRON5614	
		$\frac{1}{2}$
Ethernet Switch	Allied Telesis FS716TXL	2
	Bluestein, H., 1993: Synoptic-Dynamic Meteorology in	1
Book	Midlatitudes, Observations and Theory of Weather System,	1
	Vol.II, Oxford University Press, New York.	
Books	Houze, R.A., Jr., 1993 "Cloud Dynamics", Academic Press,	2
	San Diego. 2 volumes .	
4th FY		1
Lidar Aerosols Monitoring System	Sibata L 2S-SM II (cold resistance type)	1
Ground-based Kosa Monitoring	TOADKK DUB-222(S)	1
System		
Container-type Shed for Aerosols	Sibata	1
Monitoring System		
Firewall	Cisco Cisco 1712	1
Modem	OMRON OMRON5614	1
Ethernet Switch	Allied Telesis FS716TXL	1
Turn Buckle Support for Container	Sibata FR-2.25-TB	1
Iron Square Frame Support for	Sibata FR-2.25-SS	1
Container Top Panel		-
Consumable parts and Tool for Using	Sibata	1
at Container Shed Instaurations		
Installation Materials for Lidar	Sibata	1
Lidar Aerosols Monitoring System	Sibata L 2S-SM II (cold resistance type)	2
		2
Ground-based Kosa Monitoring	$TOADKK DUB_{222}(S)$	
Ground-based Kosa Monitoring System	TOADKK DUB-222(S)	2
Ground-based Kosa Monitoring System Auxiliary Power Unit	TOADKK DUB-222(S) TOADKK DAP-19(S)	1
Ground-based Kosa Monitoring System Auxiliary Power Unit Container-type Shed for Aerosols	TOADKK DAP-19(S)	1
Ground-based Kosa Monitoring System Auxiliary Power Unit Container-type Shed for Aerosols Monitoring System		
Ground-based Kosa Monitoring System Auxiliary Power Unit Container-type Shed for Aerosols	TOADKK DAP-19(S)	1
Ground-based Kosa Monitoring System Auxiliary Power Unit Container-type Shed for Aerosols Monitoring System	TOADKK DAP-19(S)         Sibata FR-2.25S         TOADKK DNS-309(S2)         Cisco Cisco1712	1
Ground-based Kosa Monitoring System Auxiliary Power Unit Container-type Shed for Aerosols Monitoring System Data Collection and Transfer System	TOADKK DAP-19(S) Sibata FR-2.25S TOADKK DNS-309(S2)	1 1 1
Ground-based Kosa Monitoring System Auxiliary Power Unit Container-type Shed for Aerosols Monitoring System Data Collection and Transfer System Firewall	TOADKK DAP-19(S)         Sibata FR-2.25S         TOADKK DNS-309(S2)         Cisco Cisco1712	1 1 1 2
Ground-based Kosa Monitoring System Auxiliary Power Unit Container-type Shed for Aerosols Monitoring System Data Collection and Transfer System Firewall Modem	TOADKK DAP-19(S)         Sibata FR-2.25S         TOADKK DNS-309(S2)         Cisco Cisco1712         OMRON OMRON5614	1 1 1 2 2
Ground-based Kosa Monitoring System Auxiliary Power Unit Container-type Shed for Aerosols Monitoring System Data Collection and Transfer System Firewall Modem Ethernet Switch	TOADKK DAP-19(S)Sibata FR-2.25STOADKK DNS-309(S2)Cisco Cisco1712OMRON OMRON5614Allied Telesis FS716TXLSibata FR-2.25-TB	1 1 2 2 2 1
Ground-based Kosa Monitoring System Auxiliary Power Unit Container-type Shed for Aerosols Monitoring System Data Collection and Transfer System Firewall Modem Ethernet Switch Turn Buckle Support for Container	TOADKK DAP-19(S)         Sibata FR-2.25S         TOADKK DNS-309(S2)         Cisco Cisco1712         OMRON OMRON5614         Allied Telesis         FS716TXL	1 1 1 2 2 2
Ground-based Kosa Monitoring System Auxiliary Power Unit Container-type Shed for Aerosols Monitoring System Data Collection and Transfer System Firewall Modem Ethernet Switch Turn Buckle Support for Container Iron Square Frame Support for	TOADKK DAP-19(S)Sibata FR-2.25STOADKK DNS-309(S2)Cisco Cisco1712OMRON OMRON5614Allied Telesis FS716TXLSibata FR-2.25-TB	1 1 2 2 2 1
Ground-based Kosa Monitoring System Auxiliary Power Unit Container-type Shed for Aerosols Monitoring System Data Collection and Transfer System Firewall Modem Ethernet Switch Turn Buckle Support for Container Iron Square Frame Support for Container Top Panel	TOADKK DAP-19(S)Sibata FR-2.25STOADKK DNS-309(S2)Cisco Cisco1712OMRON OMRON5614Allied Telesis FS716TXLSibata FR-2.25-TBSibata FR-2.25-SS	1 1 2 2 2 1 1

Band Pass Filter 532µm for Lidar	Sibata	6
Band Pass Filter 1064µm for Lidar	Sibata	3
De Ionization Cartridge Filter for Lidar	Sibata	3
Flash Lamp for Lidar	Sibata	6
In-Line Filter for Lidar	Sibata	3
Circulation Pump for Lidar	Sibata MEC281	3
Power Supply Unit with Leaser head for Lidar	Sibata	1
Spare Parts Unit for TSP & PM10 Monitor	TOADKK	2
Isolation Transformer	TOADKK DUB-223 (S)	4
UPS	TOADKK DNS-33A(S)	1
Hard Disc Unit	500GB	4
Books	Bluestein, H., 1993: Synoptic-Dynamic Meteorology in Midlatitudes, Principles of Kinematics and Dynamics, Vol.I, Oxford University Press, New York.	2

### 3.4 Operational Expense in Mongolia

The local operational expense in Mongolia generated in the Project is listed in the following table.

	1st FY	1st FY	2nd FY	3rd FY	4th FY	5th FY
	(Part 1)	(Part 2)	2110111	510111	401111	(Plan)
Local employment	228,022	261,178	2,525,029	1,278,718	2,141,038	650,433
Consumables	2,418	32,880	239,898	111,888	42,181	142,722
Expenditure for the Workshops	-	-	377,887	330,389	672,493	934,636
Inland Transportation for Experts and C/P	64,211	3,010	56,380	51,698	67,707	99,216
Documents/materials Preparation	632	397,582	768,806	5,568	474,676	298,060
Rent-a-Car	212,895	247,749	1,603,460	1,023,429	2,367,563	1,283,602
Communication	-	-	536,750	-	-	-
GIS Data	-	-	184,200	-	-	-

(Unit: Japanese Yen)

# 4. ISSUES, IDEAS AND LESSONS LEARNED ON PROJECT IMPLEMENTATION

Field	Issues for the Project Implementation	Ideas of Solution for the issues	Recommendation to NAMHEM
Numerical Weather Prediction	None.	None.	None.
Climate Change Projection	None.	None.	None.
Weather Forecasting	We obtained JMA ensemble forecast outputs to use meteorological elements at 850 hPa. However, the south-western part of Mongolia is covered by high mountains, therefore the 850 hPa level is under the mountains.	700 hPa data of JMA climate data server was used alternatively.	None.
Weather interpretation Method	Guidance team had not prepared long-term analysis data.	Guidance team used past 1 year data archived by NWP team.	None.
Weather Radar Analysis	None.	None.	None.
Drought/Dzud Early Warning System	C/Ps' English skills were insufficient.	Japanese↔Mongolian↔English interpreters were used C/Ps learning English was encouraged.	Training of English.
GIS Technique	GPS data collection was delayed due to the lack of fuel charge. Data for some observation points far from the soum centers were replaced with those of easily-accessible points.	<ul> <li>Observation plans were rearranged to reduce the fuel required.</li> <li>Horses were used</li> </ul>	Securing enough fund for fuels to be used for the observation.
	Motivation of the local staff for obtaining accurate data was low. There were some inconsistencies in bag names/borders between maps/organizations.	The local staff's skills in data handling were improved since seminars were conducted. Bag names/borders were confronted using GPS data and observation note as much as possible.	local staff by seminars is important. Development of an official map using consented bag
Zoo-meteorology	Insufficient understanding on contents of the revised manual by the people concerned to zoo-meteorology was available.	Seminars for the people concerned to zoo-meteorology were held.	Seminars for the people concerned to zoo-meteorology to improve their knowledge should be continuously conducted.
Use of Weather Information	Many participants for the workshops in the pilot aimags and Ulaanbaatar were required.	Workshops were conducted in June when nomadic herders are in rest period. Some workshops were conducted in soum (village) as well as in aimag center. Subjects of workshops were selected due questionnaire surveys and exchange of opinions among the participants, NAMHEM and the experts.	Needs of the users must be considered.

		14.000 1 (1.4	,
	Wider dissemination of the	14,000 leaflets on utilization of weather information were made and distributed to all aimags of Mongolia.	
	workshops other than the participants of the workshops was required.	For accelerating the practical use of the leaflets, glossary of weather forecast and protection technique against lightning, etc. were selected.	dissemination of weather
		Graphics-rich leaflets were made for easy understanding	
	Capacity building on presentation of the staff of NAMHEM aimag centers was required.	Opportunities for presentation were provided to the staff of NAMHEM aimag centers. Preparation for presentation by the staff of NAMHEM aimag centers were supported by the experts	Periodical opportunities for presentation to the staff of NAMHEM aimag center must be made.
	failures and punctures were occurred during the long-distance movements.	2 vehicles were used for any long-distance movements for safety.	None.
Operation and Maintenance of Weather Radar System	Some differences between checked points and check sheets were found	The check sheets were revised to be suitable for the routine works.	None.
Computer Networking	The existing modem and the router were obsolete.	Advising for update implementation was made.	The required budget for updating equipment every several years should be secured.
Processing and Sharing of DSS Monitoring Data	Frequent commercial power stoppages are available.	A power failure alarm was additionally furnished with the equipment	None.
Equipment Planning and Overall Quality Control of DSS Monitoring System/ Analysis of DSS Monitoring Data	Calibration of the PM10 meters using the high-volume sampler was difficult for the dss and normal conditions.	Appropriate calibration periods were defined.	None.
DSS Monitoring System Installation and Supervision Planning	None.	None.	None.
Installation Supervision and Support of Mongolian Scope of Work on DSS Monitoring System	None.	None.	None.

### 5. REVISION OF PDM

Since the activities of DSS monitoring, etc. were added, PDM set up at the Project inception was not satisfied the existing situation. Therefore the Project Purpose and its Indicators in the PDM had been revised. The summary of the revised points in the PDM are indicated in the following table.

	Revised Point Reasons
Project Purpose	e. Satisfaction level of users (public administrators, In order to confirm satisfaction level of users (public nomads, etc.) on the available weather forecast information is improved. information is improved. forecast information, the study for trends of satisfaction level of users is required.
	The following indicator items were revised.
	a. Weather forecasts using regional numerical In order to confirm the indicators, the numerical weather prediction and new weather analysis methods are provided twice a day for Short-term/once a day for Middle-term/once a month for Long-term.
	<ul> <li>b. Information on climate change projection over Mongolia is publicized once before the end of the project period.</li> <li>c. Information on drought/dzud is provided</li> </ul>
	<ul> <li>annually (at the end of August).</li> <li>d. DSS monitoring data is provided for 300 days in a year.</li> </ul>
Output	1.1. Regional numerical weather prediction system originated by NAMHEM is commenced in the daily operation       1.1. "Commencement of operating regional numerical weather prediction system originated by NAMHEM" was revised more concretely.         1.2. Four (4) staff are capable of operational       1.2. The numerical target and the quantitative
	numerical weather prediction (NWP) indicator for capacity building were set up.
	<ul> <li>2.1. Information on climate change due to global 2.1. "Publication of information on climate change warming over Mongolia is publicized due to global warming <i>over Mongolia</i>" was rivesed as</li> <li>2.2. Two (2) staff are capable of climate change a more concrete expression.</li> </ul>
	projection 2.2. The numerical target and the quantitative indicator for capacity building were set up.
	3.1. Short/middle-term forecasts for scale smaller 3.1. and 3.2. were revised more concretely. than province (aimag) is implemented
	3.2. Long-term forecast for scale similar to the province (aimag) is implemented indicator for capacity building were set up.
	3.3. Five (5) staff are capable of advanced weather analysis using data from NWP models
	4.1. Maps of pasture biomass and plant height on 4.1. and 4.2. were revised more concretely. the village (bag) scale are developed
	4.2. Guideline of warning and advisory messages is implemented in the operation for capacity building were set up.
	4.3. Four (4) staff are capable of early warning using GIS data
	5. Six Hundred and Forty (640) users are for capacity building were set up.
	6.1. Appropriate operating rates of weather radar are maintained The individual indicators of the Weather Radar System and the Weather Forecasting System
	6.2. Three (3) staff are capable of maintenance of (computer network) were made. radar
	6.3. System problems of computer networks in NAMHEM are properly managedThe numerical target and the quantitative indicator for capacity building of 6.2. and 6.4. were set up.
	6.4. More than two (2) staff are capable of maintenance of computer networks

Table: Summary of the revised points in the PDM

	7.1. Analyzed DSS monitoring information is developed	7.1. was revised more concretely.
	7.2. Four (4) staff are capable of DSS monitoring	7.2. The numerical target and the quantitative indicator for capacity building were set up.
Important Assur	nption: the following Important Assumptions were adde	ed.
	Activities $\rightarrow$ Outputs	Since appropriate maintenance of the equipment
	Sufficient budget on equipment maintenance will be	supplied under is significant for the Project activities,
	allocated to NAMHEM.	conditions of the maintenance cost have been added.
	Outputs $\rightarrow$ Project Purpose	It was expected that maintaining the Project effect
	Sufficient budgets will be allocated to NAMHEM in	might be difficult since aggravation of the financial
	a timely manner.	situation of NAMHEM, "budgets will be
		allocated" was added in the Important Assumption.

The original PDM, 1st revised PDM (revised parts: red color), and 2nd revised PDM (revised parts: blue color) are attached hereunder.

PDM (Original)							
Narrative Summary	<b>Objectively Verifiable Indicator</b>	Means of Verification	Important Assumption				
<b>Overall Goal</b> Weather information is utilized for natural disaster management and climate change impact assessment in Mongolia.	Work plans of natural disaster management and climate change impact assessment of Mongolia are established and implemented.	Research studies for use of weather information					
<b>Project Purpose</b> To provide more reliable, useful and timely weather information including DSS data through developing the capacity of the weather service staff and related environmental experts		a. Final Report of the Project	State policy on weather services for natural disaster management and climate change impact assessment remains unchanged.				
<ul> <li>Outputs</li> <li>1. Operational numerical weather prediction using a regional model around Mongolia is implemented.</li> </ul>	· · · · · · · · · · · · · · · · · · ·	1.1. Forecast Operation Room					
2. Climate change projection due to global warming using a climate model is implemented.		2. Bulletin of Institute of Meteorology and Hydrology (IMH) of NAMHEM					
<ol> <li>Short/middle/long-term weather forecasts based on NWP outputs are issued.</li> </ol>	<ul><li>(aimag)</li><li>3.2. Use of a ensemble method for long-term forecast</li><li>3.3. 5 staff capable of advanced weather analysis using data</li></ul>	<ul><li>3.1. Record files of forecasts</li><li>3.2. Forecast Operation Room</li><li>3.3. Final Report of the Project</li></ul>					
4. Drought/dzud early warning system (DDEWS) is established.	<ul><li>from NWP models</li><li>4.1. Maps of pasture biomass and plant height on the village (bag) scale</li><li>4.2. 4 staff capable of early warning using GIS data</li></ul>	<ul><li>4.1. Agrometeorological and Environmental Bulletin</li><li>4.2. Final Report of the Project</li></ul>					
<ol> <li>Knowledge and understandings about weather and climate information in central/local governments, related organizations/agencies and end-users including herders and general public in Mongolia are deepened.</li> <li>Weather observation and forecasting systems especially</li> </ol>	<ol> <li>Number of persons who receive explanation on use of weather information</li> </ol>	<ol> <li>Final Report of the Project</li> <li>Records of system failure</li> </ol>					
6. Weather observation and forecasting systems especially weather radar and computer network are stably operated.	b. Operating rates of weather observation and forecasting system (weather radar and computer network)	o. Records of system failure					

PDM (Original)

Acti	vities	Inputs			
1.1.	To conduct training/seminars on numerical weather	(Japanese Side)	(Mo	ongolian Side)	Trained staff continues to work at
	prediction (NWP)	1. Dispatch of experts	1.	Provision of project office and places for	their positions.
1.2.	To establish operational 5 to 7-day NWP system and	<long-term experts=""></long-term>		equipment to be supplied	
	assess its result in comparison with the existing	-1 Numerical weather prediction (Leader)	2.	Setting up of working groups	
	operational forecast	-1 Weather forecasting	3.	Allocation of counterpart personnel	
1.3.	To procure and set up equipment for training on	<short-term experts=""></short-term>	4.	Security of offices or places to be used for	
	numerical weather prediction	-1 Weather services planning (Deputy leader)		the Project	
		-1 Weather interpretation method	5.	Provision of financial sources for on-site	
2.1.	To conduct training on climate change projection using a	-1 GIS technique		project management	
	climate model	-1 Weather radar analysis			
2.2.	To implement climate change projection such as surface	-1 Drought/dzud early warning system			
	temperature, humidity, precipitation, snowfall and wind	-1 Zoo-meteorology			
2.3.	To procure and set up equipment for climate change	-1 Use of weather information			
	projection	-1 Operation and maintenance of weather radar			
		-1 Computer networking			
3.1.	To conduct training on interpretation of NWP outputs				
	including ensemble forecasting technique	2. Equipment supply			
3.2.	To develop operational guidance for forecasting	3. Provision of training in Japan			
3.3.	To develop a computer-aided case study handbook on				
	typical and unusual phenomena				
3.4.	To develop new concepts of forecast such as precipitation				
	probability forecast				
3.5.	To conduct training on very short-range forecast using				
	weather radar data				
3.6.	To procure and set up equipment for operational				
	forecasting work				

4	4.1. To conduct training on conceptual framework of a
	combined drought/dzud early warning system (DDEWS)
4	4.2. To conduct training of database and GIS technique in the
	framework of the DDEWS
4	4.3. To revise the present zoo-meteorological observation
	programme and manual
4	4.4. To produce guidelines of warning and advisory messages
	4.5. To produce pasture condition maps on the village (bag)
	scale
4	4.6. To procure and set up equipment for
	agro/zoo-meteorology and GIS
5	5.1. To conduct seminars in Ulaanbaatar both for the project
	launching and wrapping-up
5	5.2. To conduct workshops in Ulaanbaatar on use of weather
5	information targeted to government
	organizations/agencies
5	5.3. To conduct seminars/workshops in pilot aimags (Hentii,
3	
	Dondogobi, Gobialtai) on use of weather information
	targeted to local government (aimag/soum) and end users
~	including herders and general public
3	5.4. To procure and set up equipment for seminars/workshops
6	6.1. To produce operation and maintenance manual of weather
	radar system
6	6.2. To conduct training on operation and maintenance of
	weather radar system
6	6.3. To make overall plan of computer network in NAMHEM
6	

PDM (1st Revision)							
Narrative Summary		<b>Objectively Verifiable Indicator</b>	Means of Verification	Important Assumption			
<b>Overall Goal</b> Weather information is utilized for natural disaster n and climate change impact assessment in Mongolia.		1 8 8	Research studies for use of weather information				
Project Purpose	information a. city of the rts b.	Times of provision of short/middle/long-range weather forecasts using regional numerical weather prediction and new weather analysis methods Times of provision of information on climate change projection over Mongolia Times of provision of information on drought/dzud	a. Final Report of the Project	State policy on weather services for natural disaster management and climate change impact assessment remains unchanged.			
Outputs <ol> <li>Operational numerical weather prediction using model around Mongolia is implemented.</li> </ol>	g a regional 1.1.	Commencement of operation of regional numerical weather prediction system originated by NAMHEM 5 staff capable of operational numerical weather prediction (NWP)	<ol> <li>1.1. Forecast Operation Room</li> <li>1.2. Final Report of the Project</li> </ol>				
<ol> <li>Climate change projection due to global warm climate model is implemented.</li> </ol>	ing using a 2.	Publication of information on climate change due to global warming over Mongolia	2. Bulletin of Institute of Meteorology and Hydrology (IMH) of NAMHEM				
<ol> <li>Short/middle/long-term weather forecasts base outputs are issued.</li> </ol>	3.2.	Short/middle-term forecasts for scale smaller than province (aimag) Use of a ensemble method for long-term forecast 5 staff capable of advanced weather analysis using data from NWP models	<ul><li>3.1. Record files of forecasts</li><li>3.2. Forecast Operation Room</li><li>3.3. Final Report of the Project</li></ul>				
4. Drought/dzud early warning system (DI established.		Maps of pasture biomass and plant height on the village (bag) scale 4 staff capable of early warning using GIS data	<ul><li>4.1. Agrometeorological and Environmental Bulletin</li><li>4.2. Final Report of the Project</li></ul>				
5. Knowledge and understandings about weather information in central/local government organizations/agencies and end-users including general public in Mongolia are deepened.	and climate 5. s, related herders and	Number of persons who receive explanation on use of weather information	5. Final Report of the Project				
<ol> <li>Weather observation and forecasting systems weather radar and computer network are stably of Information on monitoring of dust storms and y (DSS) is issued.</li> </ol>	operated.	Operating rates of weather observation and forecasting system (weather radar and computer network) Analyzed DSS monitoring information	<ol> <li>Records of system failure</li> <li>Central Monitoring System in Ulaanbaatar</li> </ol>				

#### **PDM** (1st Revision)

Activities	Inputs		
1.1. To conduct training/seminars on numerical weather	(Japanese Side)	(Mongolian Side)	Trained staff continues to work at
prediction (NWP)	1. Dispatch of experts	1. Provision of project office and places for	r their positions.
1.2. To establish operational 5 to 7-day NWP system and	<long-term experts=""></long-term>	equipment to be supplied	
assess its result in comparison with the existing	-1 Numerical weather prediction (Leader)	2. Setting up of working groups	
operational forecast	-1 Weather forecasting	3. Allocation of counterpart personnel	
1.3. To procure and set up equipment for training on	<short-term experts=""></short-term>	4. Security of offices or places to be used for	r
numerical weather prediction	-1 Weather services planning (Deputy leader)	the Project	
	-1 Weather interpretation method	5. Provision of financial sources for on-site	e
2.1. To conduct training on climate change projection using a	-1 GIS technique	project management	
climate model	-1 Weather radar analysis		
2.2. To implement climate change projection such as surface	-1 Drought/dzud early warning system		
temperature, humidity, precipitation, snowfall and wind	-1 Zoo-meteorology		
2.3. To procure and set up equipment for climate change	-1 Use of weather information		
projection	-1 Operation and maintenance of weather radar		
	-1 Computer networking		
3.1. To conduct training on interpretation of NWP outputs	-1 Analysis and processing of DSS data		
including ensemble forecasting technique	-1 Operation and maintenance of DSS monitoring	ç.	
3.2. To develop operational guidance for forecasting	network		
3.3. To develop a computer-aided case study handbook on	-1 Equipment planning of DSS monitoring		
typical and unusual phenomena	system		
3.4. To develop new concepts of forecast such as precipitation			
probability forecast	2. Equipment supply		
3.5. To conduct training on very short-range forecast using	3. Provision of training in Japan		
weather radar data			
3.6. To procure and set up equipment for operational			
forecasting work			

4.1.	То	conduct	training	on	conceptual	framework	of	a
	con	nbined dro	ought/dzu	d ea	rly warning s	system (DDE	WS	)

- 4.2. To conduct training of database and GIS technique in the framework of the DDEWS
- 4.3. To revise the present zoo-meteorological observation programme and manual
- 4.4. To produce guidelines of warning and advisory messages
- 4.5. To produce pasture condition maps on the village (bag) scale
- 4.6. To procure and set up equipment for agro/zoo-meteorology and GIS
- 5.1. To conduct seminars in Ulaanbaatar both for the project launching and wrapping-up
- 5.2. To conduct workshops in Ulaanbaatar on use of weather information targeted to government organizations/agencies
- 5.3. To conduct seminars/workshops in pilot aimags (Hentii, Dondogobi, Gobialtai) on use of weather information targeted to local government (aimag/soum) and end users including herders and general public
- 5.4. To procure and set up equipment for seminars/workshops

26

- 6.1. To produce operation and maintenance manual of weather radar system
- 6.2. To conduct training on operation and maintenance of weather radar system
- 6.3. To make overall plan of computer network in NAMHEM
- 6.4. To conduct training on computer networking
- 7.1. To procure and set up DSS monitoring system
- 7.2. To conduct training on operation and maintenance of DSS monitoring network and data analysis

#### Pre-conditions

To be able to obtain cooperation of organizations/agencies related to natural disaster management

Narrative Summary	PDM (2nd Revision) Objectively Verifiable Indicators	Means of Verification	Important Assumption
	Objectively vermable multators		Important Assumption
<b>Overall Goal</b> Weather information is utilized for natural disaster management and climate change impact assessment in Mongolia.		Research studies for use of weather information	
<b>Project Purpose</b> More reliable, useful and timely weather information including dust storms and yellow sand (DSS) data is provided through developing the capacity of the weather service staff and related environmental experts.	prediction and new weather analysis methods are provided	<ul> <li>b. Final report of the Project</li> <li>c. Final report of the Project</li> <li>d. Final report of the Project *1</li> </ul>	State policy on weather services for natural disaster management and climate change impact assessment remains unchanged.
<b>Outputs</b> 1. Operational numerical weather prediction using a regional model around Mongolia is implemented.	<ul><li>1.1. Regional numerical weather prediction system originated by NAMHEM is commenced in the daily operation</li><li>1.2. Four (4) staff are capable of operational numerical weather prediction (NWP)</li></ul>	<ul><li>1.1. Forecast Operation Room</li><li>1.2. Final report of the Project</li></ul>	Sufficient budgets will be allocated to NAMHEM in a timely manner.
2. Climate change projection due to global warming using a climate model is implemented.	<ul><li>2.1. Information on climate change due to global warming over Mongolia is publicized</li><li>2.2. Two (2) staff are capable of climate change projection</li></ul>	<ul> <li>2.1. Bulletin of Institute of Meteorology and Hydrology (IMH) of NAMHEM</li> <li>2.2. Final report of the Project</li> </ul>	
3. Short/middle/long-term weather forecasts based on NWP outputs are issued.	<ul> <li>3.1. Short/middle-term forecasts for scale smaller than province (aimag) is implemented</li> <li>3.2. Long-term forecast for scale similar to the province (aimag) is implemented</li> <li>3.3. Five (5) staff are capable of advanced weather analysis using data from NWP models</li> </ul>	<ul><li>3.1. Record files of forecasts</li><li>3.2. Forecast Operation Room</li><li>3.3. Final report of the Project</li></ul>	

#### **PDM** (2nd Revision)

\*1: This phrase is not seen on PDM (1st Revision).

27

4. Drought/dzud early warning system (DDEWS) is established.	<ul> <li>4.1. Maps of pasture biomass and plant height on the village (bag) scale are developed</li> <li>4.2. Guideline of warning and advisory messages is implemented in the operation</li> <li>4.3. Four (4) staff are capable of early warning using GIS data</li> </ul>	<ul> <li>4.1. Agrometeorological and environmental Bulletin</li> <li>4.2. Final report of the Project</li> <li>4.3. Final report of the Project</li> </ul>
5. Knowledge and understandings about weather and climate information in central/local governments, related organizations/agencies and end-users including nomads and general public in Mongolia are deepened.	explanation on use of weather information	5.1. Final report of the Project
6. Weather observation and forecasting systems especially weather radar and computer network are stably operated.	<ul> <li>6.1. Appropriate operating rates of weather radar are maintained</li> <li>6.2. Three (3) staff are capable of maintenance of radar</li> <li>6.3. System problems of computer networks in NAMHEM are properly managed</li> <li>6.4. More than two (2) staff are capable of maintenance of computer networks</li> </ul>	<ul><li>6.1. Records of system failure</li><li>6.2. Final report of the Project</li><li>6.3. Records of system failure</li><li>6.4. Final report of the Project</li></ul>
7. Information on monitoring of DSS issued.	<ul><li>7.1. Analyzed DSS monitoring information is developed</li><li>7.2. Four (4) staff are capable of DSS monitoring</li></ul>	<ul> <li>7.1. Central monitoring system in Ulaanbaatar</li> <li>7.2. Final report of the Project</li> </ul>

Activities	Inputs			
OUTPUT 1 - Operational numerical weather prediction using a	(Mongolian Side)	Trained staff continues to work at		
regional model around Mongolia is implemented.	1. Dispatch of experts	1.	Provision of project office and places for	their positions.
1.1. To conduct training/seminars on numerical weather			equipment to be supplied	_
prediction (NWP)	Numerical weather prediction (Leader)	2.	Setting up of working groups	Sufficient budget on equipment
1.2. To establish operational 5 to 7-day NWP system and assess	Weather forecasting	3.	Allocation of counterpart personnel	maintenance will be allocated to
its result in comparison with the existing operational	<short-term experts=""></short-term>	4.	Security of offices or places to be used for	NAMHEM.
forecast	Weather services planning (Deputy Leader)		the Project	
1.3. To procure and set up equipment for training on numerical	Weather interpretation method	5.	Provision of financial sources for on-site	
weather prediction	GIS technique		project management	
	Weather radar analysis			
OUTPUT 2 - Climate change projection due to global warming	Drought/dzud early warning system			
using a climate model is implemented.	Zoo-meteorology			
2.1. To conduct training on climate change projection using a	Use of weather information			
climate model	Operation and maintenance of weather radar			
2.2. To implement climate change projection such as surface	Computer networking			
temperature, humidity, precipitation, snowfall and wind	Analysis, processing and sharing of DSS data			
2.3. To procure and set up equipment for climate change	Operation and maintenance of DSS monitoring			
projection	network			
	Equipment planning of DSS monitoring system			
OUTPUT 3 - Short/middle/long-term weather forecasts based on	DSS monitoring system installation and			
NWP outputs are issued.	supervision planning *2			
3.1. To conduct training on interpretation of NWP outputs	Installation supervision and support of			
including ensemble forecasting technique	Mongolian scope of work on DSS monitoring system *3			
3.2. To develop operational guidance for forecasting 3.3. To develop a computer-aided case study handbook on	2. Equipment Supply			
typical and unusual phenomena	<ol> <li>Equipment Suppry</li> <li>Provision of training in Japan</li> </ol>			
3.4. To develop new concepts of forecast such as precipitation	5. I Tovision of training in Japan			
probability forecast				
3.5. To conduct training on very short-range forecast using				
weather radar data				
3.6. To procure and set up equipment for operational				
forecasting work				
*2 *3: These experts were added after mid-term evaluation.				
	i i i i i i i i i i i i i i i i i i i			•

OUTPUT 4 - Drought/dzud early warning system (DDEWS) is established.

- 4.1. To conduct training on conceptual framework of a combined drought/dzud early warning system (DDEWS)
- 4.2. To conduct training of database and GIS technique in the framework of the DDEWS
- 4.3. To revise the present zoo-meteorological observation programme and manual
- 4.4. To produce guidelines of warning and advisory messages
- 4.5. To produce pasture condition maps on the village (bag) scale
- 4.6. To procure and set up equipment for agro/zoo-meteorology and GIS

OUTPUT 5 - Knowledge and understandings about weather and climate information in central/local governments, related organizations/agencies and end-users including nomads and general republic in Mongolia are deepened.

- 5.1. To conduct seminars in Ulaanbaatar both for the project launching and wrapping-up
- 5.2. To conduct workshops targeted to government organizations/agencies
- 5.3. To conduct seminars/workshops in pilot aimags (Hentii, Dondogobi, Gobialtai) on use of weather information targeted to local government (aimag/soum) and end users including herders and general public
- 5.4. To procure and set up equipment for seminars/workshops
- 5.5. To conduct surveys to assess the needs of weather information and level of understandings for end-users (public administrators, nomads, etc.)
- 5.6. To analyze the survey results and provide feedback to the related project activities

#### **Pre-conditions**

To be able to obtain cooperation of organizations/agencies related to natural disaster management

OUTPUT 6 - Weather observation and forecasting systems especially weather radar and computer network are stably operated.	,
6.1. To produce operation and maintenance manual of weather radar system	
6.2. To conduct training on operation and maintenance of weather radar system	f
6.3. To make overall plan of computer network in NAMHEM	
6.4. To conduct training on computer networking	
OUTPUT 7 - Information on monitoring of DSS is issued.	
7.1. To procure and set up DSS monitoring system	
7.2. To conduct training on operation and maintenance of DSS monitoring network and data analysis	

### 6. THE SUBJECT DETERMINED IN THE JCC

The Minutes of the Joint Coordinating Committee (JCC) held on 5 March, 2008 are attached hereunder.

### **Minutes of Meeting**

### on

### the Technical Working Group Meeting

of

### Project for Development of Human Capacity for Weather Forecasting and Data Analysis in Mongolia

The series of discussions on the captioned project among the officials concerned was made. As the result of the discussions, both sides have confirmed the main items described in the attached sheets.

Ulaanbaatar, March 5, 2008

Yasur Sato

Yasuo Sato Team Leader JICA Project Team

Enkhtuvs

Director-General National Agency for Meteorology, Hydrology and Environment Monitoring

#### ATTACHMENT

#### 1. Project Name

The Project for Development of Human Capacity for Weather Forecasting and Data Analysis in Mongolia

#### 2. Implementing Agency

National Agency for Meteorology, Hydrology and Environment Monitoring (NAMHEM)

#### Relevant Items discussed

 Report on activities in the Japanese fiscal year 2007 and plan of activities in the first half of Japanese fiscal year 2008

The activities done and its outputs achieved in the Japanese fiscal year 2007 and the prospect of its achievements in the Japanese fiscal year 2008 were presented by the JICA experts.

The Mongolian side expressed their expectation that the numerical weather prediction for five-day forecast would be commenced by the completion of the Project using the output of the numerical weather prediction model of Japan Meteorological Agency as the boundary condition.

Regarding the progress of introduction of 'guidance' for long-range forecast, the Japanese side explained that the counterpart personnel had been implementing the activities with support of the chief adviser of the JICA expert team utilizing the technology which had been transferred on 'ensemble forecast' by the related JICA expert to the counterpart personnel during the phase of basic training in the Project and continual efforts of the counterpart personnel personnel would accomplish the final goal of the output on this field in the Project.

Regarding the field of drought and dzud early warning system (hereinafter referred to as "DDEWS"), the Mongolian side explained that DDEWS itself had not been established even though a pasture condition map and other related results had been accomplished as parts of DDEWS. Also the Mongolian side explained that the definition of 'dzud' was being discussed and reviewed in the Government of Mongolia according to the climate change in the recent years and the guideline of DDEWS would be authorized by NAMHEM after the review.

Regarding dust storm and yellow sand monitoring network, the Mongolian side mentioned that discussions on the framework of this field had been being made among China, Japan,

4.S.

Korea, Mongolia. The Mongolian side also mentioned that the function of the air quality management of the Ministry of Nature and Environment had been shifted to NAMHEM recently.

4. Other Relevant Issues discussed

1) Completion evaluation to be conducted by JICA

JICA explained that JICA would dispatch a completion evaluation team comprising officials of JICA and consultants to be contracted by JICA in June, 2008 and the main purpose of the evaluation was to confirm whether the Project Purpose and the Outputs were achieved. The Mongolian understood the purpose and expressed their commitment to support activities of the team for smooth implementation of the evaluation.

 Time to be spared by counterpart personnel for the implementation of the Project activities and for utilization of the technologies transferred after the completion of the Project

The Japanese side expressed their suggestion that, referring to the recommendation by the mid-term evaluation team dispatched in August, 2006, more staff of NAMHEM should be assigned for each of the fields to avoid from any suspensions of the activities of the Project and to assure continual operation even with long term absence of some of the key personnel. The Mongolian side expressed their intention that maximum considerations were taken for the counterpart personnel to work with the Japanese experts during their stay in Mongolia. The Mongolian side also mentioned that staff allocation to cover the continual operation of the system for each of the fields after the completion of the Project was given priority in the personnel policy of NAMHEM and any efforts to allocate its staff was still required.

 Measures taken in response to the recommendations of the Minutes of Meeting on the Mid-term Evaluation signed on August 25, 2006

The Mongolian side mentioned that the steering committee for the Project had been established among Ministry of Nature and Environment, NAMHEM and JICA in 2006. The list of the members of the steering committee will be circulated among the persons concerned.

The Mongolian side emphasized that the counterpart personnel had been learning English by themselves and by internal short-term learning courses to improve their English proficiency level.

4) Equipment and training in Japan proposed for the Japanese Fiscal Year 2007

The Mongolian side inquired for any possibilities of provision in the Japanese fiscal year

y.S.

2

35

2008 of the equipment for the forecast support system which had been proposed for the Japanese fiscal year 2007. The Japanese side recognizes its necessity and requested the Mongolian side that the equipment would be prepared by the Mongolian side under the circumstances of affordable increased revenue of the Government of Mongolia. The Mongolian side agreed that they would make necessary arrangement for the provision of the equipment from their side.

The Mongolian side also inquired for any possibilities of provision in the Japanese fiscal year 2008 of the training in Japan for weather forecasting technique proposed for the Japanese fiscal year 2007. The Japanese side explained that JICA had been making their maximum efforts for the inputs from the Japanese side and the level for knowledge and skills of the counterpart personnel was enhanced to the degrees where they could accomplish the activities concerned on their own. The Mongolian side agreed with the exclusion of the provision in the Japanese fiscal year 2008.

The Japanese side reminded the Mongolian side that in the scheme of technical cooperation of JICA a certain portion of the Project was never agreed on at the time of its commencement and the budget was allocated annually accordingly. The Mongolian side understood that all the planned inputs from the Japanese side for the Project are subject to the budget of the Government of Japan.

Annex-1 'List of Attendants of the Meeting on Project Implementation'

3

Y.S.

Y.S.

### List of Attendants

of

#### the Meeting on Project Implementation

For

The Project for Development of Human Capacity for Weather Forecasting and Data Analysis Location: Conference Room, National Agency for Meteorology, Hydrology and Environment Monitoring (NAMHEM), Ulaanbaatar

Time: 10:00, 5 March, 2008

Name	Position	
Mr. Enkhtuvshin Sevjid	Project Director and Director General, NAMHEM	
Dr. Erdenebat Eldev-Ochir	Project Manager	
Mr. J. Tsogt	Head, Weather Forecast Section (WFS), Institute of Meteorology and Hydrology (IMH)	
Mr. P. Gomboluudev	Chief, Forecast Research Laboratory (FRL), WFS, IMH, NAMHEM	
Mr. A. Batbold	Researcher, FRL, WFS, IMH, NAMHEM	
Ms. L. Oyunjargal	Researcher, FRL, WFS, IMH, NAMHEM	
Mr. G. Bayasgalan	Researcher, FRL, WFS, IMH, NAMHEM	
Mr. B. Buyantogtoh	Engineer, FRL, WFS, IMH, NAMHEM	
Mr. D. Batdorj	Engineer, Climate Study Section, IMH, NAMHEM	
Ms. B. Gaandulam	Ministry of Finance and Economy	
Mr. Tsutomu Moriya	Resident Representative, Japan International Cooperation Agency (JICA)	

Ms. B. Tuguldur	Program Officer, JICA
Dr. Yasuo Sato	Leader of JICA expert team
Dr. Masataka Nishikawa	National Institute of Environmental Studies of Japan
Mr. Hiroaki Mizukami	JICA expert

#### List of Attendants

Name Position D. J. GOMBOLHUNDEV FXX-man sapra. Chief. Forecast Research Lab. Nor noz ayganzaanor rasoporopi A-Jone Ony yggl Researcher, FRL A. Farry A. BATBOLA Kead, weather forecast section \* Your J. TSOGT Hogrevan regeatur cerogorer apachery engineer, FRL G. BATCHIMIG Apicg men um a con 1 T. Barranon B, BUYANTOGTOH Engeneet, FRL Jule, npornegou Dygnsserod 1 Osoynsua plene L. OYUNSARCAL Reacher, FRL, WFS 8. Faingopme D. BATDORJ engineer, climate study section J. Sacy your Camise clar. Chief Adviser. JICA Expert Yasoo SATO NIES Masataka NISHIKAWA JICO expert., (JWA) Hiroaki MIZULAMI

### Annexes

### 1. Pictures in activities in each field

### 2. Outputs (in separate volumes)

Field		Outputs
Annex 1	Numerical Weather Prediction	Middle-term forecast (provided once a day)
Annex 2	Climate Change Projection	Information on climate change due to global warming over Mongolia
		Short-term forecast (provided twice a day)
Annex 3	Weather Forecasting	Long-term forecast (provided twice a year)
Allilex 5	weather Forecasting	Computer-aided case study handbook on typical and unusual
		phenomena
Annex 4	Weather Interpretation Method	Suggestion for the Precipitation Guidance using Product of RSM
Alliex 4	weather interpretation wethod	of mean rainfall amount
		Information on drought/dzud provided annually (at the end of
		August)
	Drought/Dzud Early Warning	Maps of pasture biomass on the village (bag) scale, outline
	System GIS Technique Zoo-meteorology	Information on drought/dzud provided on the web
Annex 5		(Vegetation map, Biomass map, Drought map and Snow map)
		Maps of plant height on the village (bag) scale
	Zoo-meteorology	Guideline of warning and advisory messages
		Revised zoo-meteorological observation program
		Revised zoo-meteorological observation manual
		Participants list of workshops
Annex 6	Use of Weather Information	Results of questionnaire survey
		Leaflet on practical use of weather information
Annex 7	Operation and Maintenance of	Operation and maintenance manual of weather radar system
Alliex /	Weather Radar System	AVR and UPS Check Sheet (Weekly)
		Overall plan of computer network in NAMHEM
Annex 8	Computer Networking	The problems and the future expansion plan of the NAMHEM
		network
Annex 9	Dust and Sand Storm (DSS)	Equipment for Kosa Monitoring Network
Annex 9	Monitoring Network	DSS monitoring data