GEOSS and AWCI -2

Prediction and evaluation of influences by precipitation change on the multi scale to meteorological, hydrological and vegetation environments in Mongolia

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BACKGROUND OF THE PROJECT

The 4th assessment report of IPCC projects that:

- **Rainfall likely to increase at the high latitudes, while the subtropical region likely to become drier. Therefore, future climate of Mongolia can be highly variable in time and space with great uncertainties (National communication report-2).**

- **TEMPERATURE AND DRYNESS ARE INCREASED (Glacier melt, permafrost degradation, drying rivers and lakes, decrease in ground water level, natural desertification).**

- **Droughts in the last decades threaten the people of the country that is highly dependent on the natural resources.**

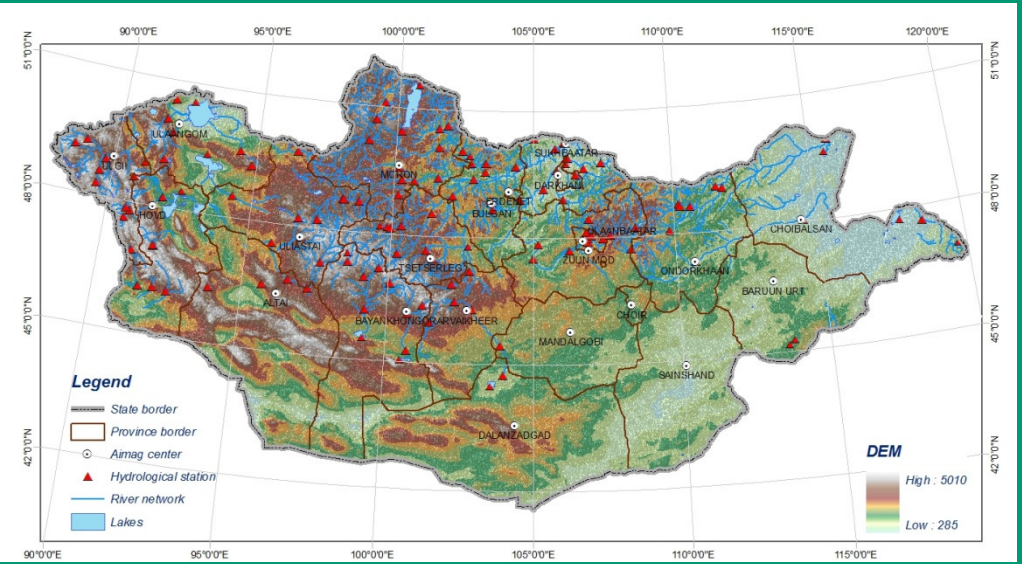
IWRM and Desertification

Mitigation to desertification, as degradation of land, caused by a variety of factors, such as climate change and human activities, for that **the solution could be a development and implementation of IRBM strategy and plans.**

"Integrated river basin management (IRBM) plans are being and will be developed for 29 basins in Mongolia.

•Needs:
• Advancing current monitoring system
•Climate and hydrological modeling and assessment
•Improving data shearing mechanism
• Environmental Data integration and assimilation system

Data availability and urgent needs for improvement



Current monitoring system

Needs:

•to increase density of hydrological and meteorological network;

• to use GCM, RCM, Distributed Hydrological Model, and Land Surface Models for studying climate change impacts in Mongolia.

• IMHE, NAMEM need high class level instruments, advanced Automated weather station (AWS) for River Hydrological Automatic Station (RHAS), Water and Energy Cycle Station (WECS), and Flux WECS in order to understand change in conditions of water and energy cycle and to estimate water and energy balance for elements with more accurate measurement data to assist IWRM.

Overall Goal

To enhance hydrological and meteorological network in Mongolia to support network's optimization, harmonization and unification requirements, rising from weather forecasting, hydrological and climate modeling techniques for provision of better services, knowledge, awareness to people of Mongolia for environmental protection, water resources supply, weather forecasting and disasters prediction and adaptation to the climate change

Project Purpose:

1. To build up an advanced observation system (with a nearly real time data acquisition system of monitoring elements of water and energy cycle by integrating satellites (*e.g.,* AMSR2 and SMAP) and in situ water and energy cycle stations (RHAS, WECS an Flux WECS)

2) To improve and develop NAMEM monitoring system (To upgrade some NAMEM stations)

Propose of the project

3. To carry out intensive observations on elements of water cycle and quality using the advanced observation system.
4. To understand mechanism of unstable change of rainfall on the multi scale in space and time
5) To assess influence of precipitation change on water/energy cycle and vegetation in study areas
6) To construct monthly and yearly more precise water balance in the Tuul river mid-upper basin
7) To simulate and predict of water cycle using DHM, Land surface model and GCM and/or RCM for supporting to build up a high accuracy prediction model of weather forecasting
8) To develop models of early warning of drought and storm rainfall/flood
9) Open the data of observation/monitoring
10) Development capacity (Capacity building: training course, WS, etc.)

Outputs

1) Advanced monitoring system of water and energy cycle with satellite observation and in situ water cycle stations with nearly real time data acquisition system (NAS)
2) More precise monitoring by advanced AWS of NAMEM and NAS
3) Revealing unstable change mechanism of rainfall on the multi scale in space and time
4) Multi scale evaluation of climate change and/or global warming
5) Early warning systems of drought and flood
6) Better and precise estimation of water resources and optimal operation system of water resources for future
7) Prediction of water cycle and climate change considering hydrological conditions
8) Capacity building
9) Support for sustainable and green developments and JCM (Joint Crediting Mechanism) /BOCM (Bilateral Offset Crediting mechanism) between Japan and Mongolia

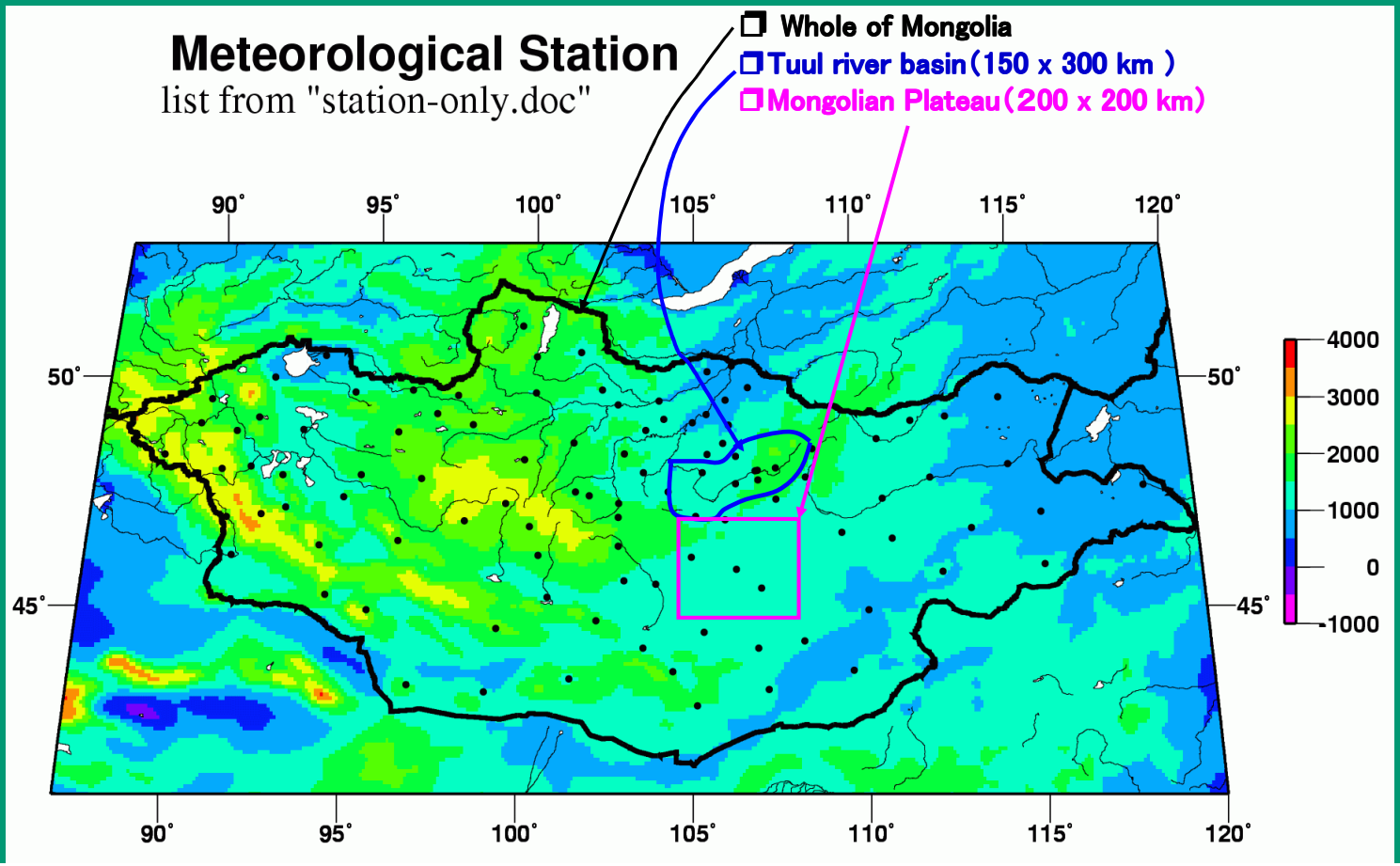
Area to be covered by the Project

Multi-scale area

A. Whole of Mongolia

B. Tuul river basin (150 x 300 km)

C. Central Mongolian Plateau (200 x 200 km)



Project Activities

i) Monitoring and Intensive observations by Advanced monitoring system to produce water and energy cycle information with satellite observation and in situ water cycle parameters
ii) Data analysis of the existing data for development and calibration of multi scale evaluation of climate change models
iii) Numerical model studies to understand better and precise estimation of water resources, unstable change mechanism of rainfall and prediction of water cycle and climate change considering hydrological conditions and also to support early warning systems of drought
iv) Data base for optimal operation system of water resources for future
v) Training courses and WS, to enchase research capacity building of the Mongolian hydro-meteorological service and to provide project sustainability.

Project Activities

Counterpart members: 6 project members and 3 support members
IMHE, NAMHEM and NUM, MUST, UB Government, Mongolia

Office space, running cost by counter part.

Equipment: Existing state meteorological, hydrological stations, soil and vegetation laboratory, Numerical weather prediction bureau

Input from the Japanese Government:
Key expert: Prof. Ichirow Kaihotsu (HU: Hiroshima University)
Experts and consultants: 7 experts from 5 Universities of Japan (Uts, KU, HoU, HU, ChU)
Supporting team: 7 members from 5 Universities and Institutes, Japan

Contents of training courses, seminars and workshops

Instruments will be installed

1. Advanced 5 automated weather stations for supporting NAMEM monitoring system
2. RHAS: River Hydrological Automatic stations to monitor river flow elements.
3. WECS: Water and Energy Cycle Station monitor fundamental elements of meteorology and hydrology.
4. Flux WECS to monitor turbulent flux by a sonic anemometer and CO_2
5. Advanced computerized system

Implementation Schedule

Period: May, 2014 ~ December, 2019

2014:

May-November, 2014: Preparation for project, Investigation of study areas, Fundamental investigation of water and energy cycle and the relevant routine data

December, 2014: Preparation for installation of all the stations and calibration

2015:

January-March: Analysis of the relevant routine data, preparation for installation of all the stations and calibration

April-July: Installation of all the stations

August: Start of monitoring of all the stations and satellites, Intensive observations I

September: Intensive observations II, Workshop (Hiroshima)

October- December: Data analysis of all the stations, Numerical analysis

December: Training course (Tokyo)

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2019:

January-June: Final data analysis of all the stations, Final numerical analysis

July: Workshop (Tokyo)

November: Final report

Thank You