

Implementation Plan for GEO Community Activity

In-Situ Observations and Applications for Typical Ecosystem Status of China and

Central-Asia

(In-Situ TESCCA)

1. Executive Summary

(This section will appear in the main GEO Work Programme document presented to GEO Plenary)

(1) Title of the Community Activity

In-Situ Observations and Applications for Typical Ecosystem Status of China and

Central-Asia

(In-Situ TESCCA)

(2) Rationale and objective

In situ observations, regardless for validating remote sensing or for direct analysis, are important to synthetically analyze biodiversity and ecosystem assessment. In situ observations are research focuses of many international organizations such as ILTER, CBD, IPBES, and UNEP. The CERN along with some Chinese organizations (such as MEE, MARA) have collected a huge amount of in-situ ecological observational data in China. However, the values of the data have not been fully recognized due to lack of data products, which can help to synthesize analyses of national biodiversity and ecosystem service assessment. Meanwhile, the RCEECA has also acquired some data which can be contributed as data stakeholder. Moreover, UNEP can collaboratively act as an organizer or coordinator of the activity in spreading out and training activities.

The objectives of the project are 1) to collect the in-situ ecological observation data in China and Central Asia produced by the above mentioned organizations and institutions using standard data quality control methodology, 2) to produce and share in-situ long-term ecological observational data products to support the SDG13 and SDG15 of the United Nations 2030 Agenda with 17 SDGs.

(3) Planned activities for 2020-2022

- *Recognizing the methodologies and procedures of generating datasets and long-term continuous data products from in-situ observations in CERN, and instructing these procedures to other participants including MEE, MARA, sub-centers of RCEECA in Tadjikistan, Kazakhstan and Kyrgyzstan, and UNEP.*

- *Producing crucial data products related to EBVs and EESVs (such as plant species richness, ecosystem productivity), jointly with MEE, MARA, and other participants.*
- *Constructing a data portal to share the data with communities and public users.*

(4) Points of Contact

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2. Purpose

(1) Rationale (i.e. evidence of need) for the Community Activity.

In-situ ecological observational data collected from the field stations are the most important sources for measuring and monitoring the ecosystem status. Meanwhile, the implementation and monitoring of SDG13 and SDG15 targets needs the in-situ long-term ecological observation data products.

At present, many agencies and institutions have been collecting the in-situ ecological observational data in China and Central Asia, There are several networks such as CERN, CNERN, and CFERN in China, doing in-situ monitoring, research and demonstrations at typical ecosystems. The RCEECA has 12 field observation and research stations established in Kazakhstan, Kyrgyzstan, Tajikistan and Uzbekistan since 2013. UNEP had been working with different research agencies in collecting information and organizing the Global Environment Outlook and other global assessment reports.

However, the national standard procedure for data production has not been developed, thus leading to the lack of reliable long term continuous data products. Therefore, the values of the huge

amount of in-situ observation data collected in the last few decades have not been fully recognized.

There is an urgent need under the GEO framework to facilitate, coordinate and advocate for the aggregation of in-situ ecological observation data, production of data product, and their wide applications. The main object of this project is to enhance the Community's ability to produce long-term accurate ecological data products from raw in-situ observation data. This will be achieved by:

1) Coordinating In-Situ TESCCA related activities to enhance the collaboration of the existed in-situ observation networks in China and Central-Asia within the GEO framework.

2) Promoting the integration of In-Situ TESCCA data products from different networks and agencies.

3) Forming a standard procedure to ensure the sustainability of the data production by using the ecological modeling and data assimilation methodologies.

4) Producing several long-term in-situ continuous ecological observational data products using the proposed procedure.

5) Carrying out cross-site ecosystem service assessment researches through analyzing the spatial pattern and temporal dynamics of ecosystem status.

6) Fostering wide use of the in-situ data products by negotiating with potential users, and promoting the provision of value-added In-Situ TESCCA information and knowledge service for decision makers.

(2) Actual and/or planned outputs of the Community Activity

(i.e. data sets, open methods, information products or services, or other openly available results intended for external users) and their geographical scope)

The outputs will consist of:

1) A draft presenting the procedure for generating the in-situ observation data products.

2) Crucial data products related to EBVs and EESVs (such as plant species richness, ecosystem productivity).

3) A thematic report about the ecosystem services.

4) A data portal to share data products and link to GEO BON through metadata standards.

3. Background and Previous Achievements

CERN, CNERN, CAEON, RCEECA and other organizations have experiences on data collection, data processing and data sharing.

Data collection:

a) long-term ecological and environmental monitoring data at 51 CERN/CNERN field sites across China, including meteorological, soil, biological, hydrological, and aquatic data for more than 20 years.

b) Central Asia environment and resources database built on CAEON 12 field sites in Kazakhstan, Kyrgyzstan, Tajikistan and Uzbekistan along Altai Mts., northern slope and southern slope of Tianshan Mts., and Pamir covering various ecosystems.

c) Thematic observation data including carbon and water flux data, forest biodiversity data, soil nutrition data, water quality data and etc.

Data processing: develop systematic quality control methods of observation data, and multi-source data model fusion for data rebuild.

Data sharing: provide open datasets access as a formal DataONE member node and participate in ILTER as a member network.

The UNEP-IEMP is the global collaboration center in the South and for the South initiated jointly by UN Environment and the CAS with support from Chinese government. Its work has been focusing on the implementation of UN Environment's Ten-year flagship programme on "Climate, Ecosystem and Livelihoods (CEL)". It aims to assist developing countries to improve livelihoods through ecosystem restoration and conservation in a changing climate. It provides services of assessment and knowledge, capacity building, technology demonstration and science for policy. It is currently implementing over 20 projects in 30 developing countries. In this project, UNEP-IEMP will provide coordination and capacity building services, especially linking with UNEP's science division on big data and global/regional assessment, as well as engaging more Central Asia stakeholders.

The RCEECA focuses on 7 research domains including ecosystem, water resources, geology, climate change, environmental pollution, sustainable development and agricultural technology. It aims at 1) enhancing capacity on eco-environment monitoring and early-warning, 2) enhancing capacity on eco-environment research and assessment; 3) enhancing capacity on joint research and adaptation to eco-environmental change; 4) provide research platform under the framework of Shanghai Cooperation Organization; 5) providing S&T support for Shanghai Cooperation Organization and Belt

and Road Initiative. The 12 field stations were selected by different gradients of moisture and temperature along Altai Mts., northern slope and southern slope of Tianshan Mts., and Pamir covering various ecosystems such as glacier, mountain, forest, pasture, farmland, wetland and desert. All the field stations have unified instruments, observation and data management format, according to the experiences of the CERN. In this project RCEECA will share in-situ monitoring data and participate in different project activities.

4. Key Activities

(Summary of key planned tasks to be undertaken by the Community Activity during 2020-2022 period)

Discuss and form some community-driven and science-based protocols to guide participants to generate data products supported by in-situ observations, via organizing a series of workshops. Establish long-term stable cooperation among relevant research institutions within national or global scale. Cooperative agencies include CERN, MEE, MARA, NFGA, RCEECA and other relevant departments. Discussed topics include:

(1) In-situ observational data collection

Forming the integration and normalization of in-situ observational data about biodiversity and/or ecosystem assessment, e.g. a) what kind of data should be collected? b) How to control the quality of the observational data?

(2) In-situ observational data products and cross-site ecosystem assessment research

a) How to promote the cross-site, multi-source observational data analysis to produce data products which focus on some EBVs or EESVs

b) How to analyze and mine in-situ observational data

(3) Data portal construction

a) Understanding the metadata elements of GEO BON datasets or data products

b) Establishing observational database and data portal framework

c) Implementing data portal system

The time-scheduled activities are listed as following:

Year 2020:

Organize a workshop or exchange ideas through other ways (i.e. email, video conference) to discuss the community-driven and science-based protocols to guide participants to generate data

products supported by in-situ observations. Participants include researchers from CERN, MEE, MARA, NFGA, sub-centers of RCEECA in Tadjikistan, Kazakhstan and Kyrgyzstan, and UNEP. A draft will be put forward to illustrate following topics:

- a) The data product indicators*
- b) Gaps between existing data and the proposed indicators*
- c) Data quality control and data producing procedures*
- d) Functions of the data portal and the links to GEO BON*

Year 2021:

- *Setting up a data method group to study methodologies of data product development from observations.*
- *Collecting data by the participants according to the gaps between existing data and the proposed indicators*
- *developing the data products*
- *Providing training of data product development for sub-centers of RCEECA in Tadjikistan, Kazakhstan and Kyrgyzstan*
- *Organizing a workshop to discuss the progress of the year*

Year 2022:

- *Establishing the data portal and to share the data with communities and public users*
- *Studying on analysis and mining of cross-site, multi-source data*
- *Organizing a workshop to discuss the progress of the year*

Abbreviations:

TESCCA, Typical Ecosystem Status of China and Central-Asia

MEE, Ministry of Ecology and Environment,

MARA, Ministry of Agriculture and Rural Affairs

NFGA, National Forestry and Grassland Administration

CERN, Chinese Ecosystem Research Network

CNERN, National ecosystem research network of China

CFERN, Chinese forest ecosystem research network

DataONE, Data of Observation Network on Earth

ILTER, International Long Term Ecological Research Network

UNEP, United Nations Environment Programme

IEMP, International Ecosystem Management Partnership

CAS, Chinese Academy of Sciences

EBVs, Essential Biodiversity Variables

EESVs, Essential Ecosystem Services Variables

CBD, Convention on Biological Diversity

IPBES, Intergovernmental Science Policy Platform on Biodiversity and Ecosystem Services

CAEON, Central Asia Ecosystem Observation Network

RCEECA, Research Center for Ecology and Environment of Central Asia

SDGs, sustainable development goals