

1. Brief Description of the GEO Work Programme (GWP) Activity

Title of the GWP Activity

EO4WEF (Earth observations for the Water-Energy-Food Nexus)

Overarching Tagline (All GWP Activities)

The EO4WEF Community Activity is seeking to implement W-E-F Nexus data and information systems (WEFDIS's) on appropriate spatial scales to provide advisory services to those decision-makers and policy advisors concerned with regional applications of the W-E-F Nexus principles. In addition, these systems will support contributions on larger scales to support a global W-E-F Nexus data and information system and an overall movement to implement W-E-F Nexus thinking, principles and integration across resource agencies and eventually with environmental services including links to the SDGs in several critical areas.

The activity builds on recommendations included in the final report of the Future Earth Cluster W-E-F Nexus study.

Value Statement (All GWP Activities)

In general, the water, energy and food activities are managed as separate silos both within and outside government. This leads to many inefficiencies in the management of interdisciplinary areas where the interests and concerns of these sectors overlap. The W-E-F Nexus data and information system service is intended to help identify and facilitate resource efficiencies and innovations that would allow these sectors to be effectively managed and to become more productive and more socially acceptable by contributing to environmental services and ecosystem stewardship.

These goals would be achieved by joint planning and management of the W-E-F Nexus resources using mainly in-situ and satellite observations and analytics in the water, energy and food sectors. Biophysical data for these three sectors along with appropriate socio-economic data will be brought together with models and analytical tools to assist in integrated planning and decision-making. Specific opportunities and issues will be identified in conjunction with a W-E-F Nexus Community of Practice for early promotion of the concept.

2. Progress and Impacts Achieved

Self-Assessment of Progress (All GWP Activities)

Overall assessment:

Although there has been only limited time and financial support allocated for these activities some progress has been made in the completion of the final Future Earth/Belmont Forum W-E-F Nexus cluster report and in outlining a path for the implementation of W-E-F Nexus data and information systems. In addition, a paper has been prepared and submitted to a Frontiers special issue on the W-E-F Nexus that outlines a plan and design for a W-E-F data and information system (WEFDIS).

Resource Summary:

The CA continues to advance through in-kind support. NASA has provided some support for the follow-up to the Future Earth W-E-F Nexus workshops. Currently, support is being sought for the printing of the final Future Earth/ Belmont Forum W-E-F Nexus report. In the longer term the W-E-F Nexus Science Community will seek support through proposals to appropriate funding agencies.

Progress of activities:

- 1) The W-E-F Nexus report from the Future Earth Cluster project is being finalized and will be printed in 2019. This report includes a number of recommendations related to data services that this Community Activity will explore.
- 2) A special issue of the Frontiers open journal on this topic is nearing completion. At present, more than 20 papers have been approved and at least 6 more are progressing through the review and finalization stages. The focus of the issue is to explore the balance between the role of data, information, and policies for advancing the implementation of the W-E-F Nexus.
- 3) Some members of the EO4WEF group will participate in the Water Futures conference in Bangalore, India in 2019 and will explore interest there in moving forward with a pilot project to test a WEFDIS in that region.

More generally, in moving forward some of the steps that will be taken include:

- 1) Selecting several areas for pilot projects and initiating coordination in these areas to obtain resources and facilitate the implementation of the pilot project.
- 2) Clarify the data and software needs for a data and information system through meetings with user groups either generally or within specific basins.
- 3) Building on the effort that has gone into developing an interest for this activity in one or more sub-basins of the Lake Winnipeg Basin carry out an assessment to determine if one of these sub-basins could serve as an early pilot project.
- 4) Participate in scientific conferences to encourage the engagement of the scientific community with W-E-F Nexus issues.

Major other activities:

None to add.

User engagement:

A user engagement workshop is being discussed for the Lake Winnipeg Basin. In addition, the EO4WEF project will seek to establish a W-E-F Nexus Community of Practice (CoP) to begin coordinating these W-E-F Nexus activities among interested people. Other Stakeholder consultation events and the co-design of data products will promote user engagement. One of the goals of the CoP will be to develop interest among younger scientists who will provide leadership for W-E-F Nexus activities beyond the 2020-2022 time frame.

Connectivity with relevant programs

Within the GEO Work Programme this CA will link the Water, Energy and Food SBAs through and links with GEOGLAM and other agri-food projects, with GEOGLOWS by contributing to its Water, Food, Energy, Environment, Health Nexus task and other GEO Water Initiatives including Drought and Aquawatch, and the Energy SBA through the energy atlas and IRENA data services. It will also support and learn from NextGEOSS applications.

In addition to its role as a Community Activity in GEO, the project will have links with Future Earth and Water Futures through their W-E-F Nexus activities and with the SWFP COMPASS project. In particular it will seek to develop an assessment module for the Comprehensive Assessment of Water Resources (COMPASS) analysis system. It will also have links with FAO and its activities related to the W-E-F Nexus and in the USA, with NASA (in the areas of Food and Water), and NSF (through its program on Innovations at the Nexus of Food, Energy and Water Systems). Models for funding the project will be sought by linking them to a funded effort or a proposal, or developing a small private sector activity.

Challenges and opportunities

The W-E-F Nexus faces a number of challenges which need to be addressed to ensure the sustainability of this GEO effort. These include two major challenges: a) The need for in-kind and financial resources for systems and product development and b) resources to facilitate efficient coordination of program activities to enhance synergies between related programs, to keep abreast of relevant developments, and to recommend steps for avoiding duplication of efforts.

The EO4WEF will provide an opportunity to help various GEO projects that contribute to the food, water and energy sectors to work together in a more integrated way. GEO activities with their focus on observations and service development have the capability of contributing in unique ways to the overall W-E-F Nexus approach. New avenues of development are possible through the W-E-F Nexus including the contributions to the SDGs and the integration of GEO W-E-F Nexus activities to support a grand implementation plan (yet to be developed) for the W-E-F Nexus.

Supporting Documents

At present the reports from most of the individual W-E-F workshops can be found at the Water Future website: <http://water-future.org/wp-content/uploads/2017/02/JapanWorkshopWEFnexusFinalReportApril2016.pdf>

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