

UPDATED PROPOSAL

Cover Page

1. Project Leader: Dr. Toshio Koike, Professor (University of Tokyo, Japan)

2. Project Reference: ARCP2010-10NMY-Koike

3. Project Title

River Management System Development in Asia Based on Data Integration and Analysis
System (DIAS) under the GEOSS

Part One: Project Summary (14 columns: 2 pages)

Column 1:

Title of proposed project: River Management System Development in Asia Based on Data Integration and Analysis System (DIAS) under the GEOSS

Column 2:

Proponent's Name and Title: Toshio Koike/ Professor
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Column 4:

Has the proponent or collaborators been awarded APN Grant(s) in the past? If yes, provide details.
Yes, he was awarded as the proponent in 2006/07 and 2007/08, consecutively for the project title: The International Integrated Water Data Access and Transfer in Asia (IIWaDATA). He has also been awarded as a collaborator in 2008/09 and 2009/10, consecutively for the project title: The Global Earth Observation System of Systems Asian Water Cycle Initiative Observation Convergence and Data Integration (GEOSS/AWCI/OCDI) led by Mr. Chu Ishida.

Column 5:

Provide a concise abstract (100 words): Based on the successful achievements in planning, data policy and data archiving which have been supported by APN, the Global Earth Observation System of Systems (GEOSS) Asian Water Cycle Initiative (AWCI), consisting of 19 countries in Asia, makes a well coordinated regional challenge in support to the integrated water resources management (IWRM) in each country. This project develops a prototype of the IWRM system, which can be also used for climate change adaptation in each GEOSS/AWCI demonstration river basin, by integrating in-situ and satellite data, numerical weather prediction (NWP) model outputs, and climate prediction model outputs archived on DIAS, which has been developed by the Ministry of Education, Culture, Sports, Science and Technology (MEXT) of Japan.

Column 6:

How is the project relevant to the APN Science & Policy Agendas, and to policy processes? Based on recognition of the commonality in the water-related issues and socio-economic needs in the Asia-Pacific Region, a well coordinated regional challenge GEOSS/AWCI has been organized in cooperation among the 19 countries in Asia. It focuses on convergence and harmonization of observation activities, interoperability arrangements for observed data and collected information, effective and comprehensive data management, and capacity building of the member countries as the most functional elements. The Asian countries cooperatively integrate data from earth observation satellites and in-situ networks with other types of data, including NWP and climate model outputs, geographical information, and socio-economic data, to generate information for making sound water resources management decisions.

Column 7:

Outline the activities to be conducted and state why you believe these activities are necessary: GEOSS/AWCI made the stage 1 for implementation planning and data policy agreement from 2005 to 2007, and will complete the stage 2 for data archiving, data quality control and metadata generation by the middle of 2010 by the strong supports by APN, MEXT and the member countries. 17 member countries have already submitted their data to DIAS. They are now implementing data quality check and generating metadata in cooperation with DIAS.

DIAS is now in its application phase. It is ready for stepping forward into demonstration for supporting the IWRM in each member country, in cooperation between global observations and local applications and between research communities and operational sectors.

Column 8:

Provide information, including contact details, of the APN member and/or approved countries involved.

Each member of the International Coordination Group (ICG) of GEOSS/AWCI works as a project team member in well-coordinated ways. Each member country supports his/her tasks for data preparation and system application. Bangladesh: S. Karmakar (Meteorological Department), Bhutan: K. Chhophel (Hydro-met Services), Cambodia: S. I. Monichoth (Department Hydrology and River Works), China: Q. Mingkai (Huaihe River Commission, Ministry of Water Resources), India: S. Kaur (India Meteorological Department), Indonesia: J.

Loebis (Research Institute for Water Resources), Japan: T. Koike (The University of Tokyo), Korea: D.-H. Bae (Sejong University), Lao: C. Amphaychith (Lao National Mekong Committee), Malaysia: A. J. Shaaban (National Hydraulic Research Institute), Mongolia: G. Davaa (Institute of Meteorology and Hydrology), Myanmar: H. H. Than (Dept. of Meteorology and Hydrology), Nepal: S. K. Sharma (Department of Water Induced Disaster Prevention), Pakistan: B. Ahmad (Water Resources Research Institute/National Agriculture Research Center), Philippines: F. Hilario (PAGASA/DOST), Sri Lanka: S. B. Weerakoon (University of Peradeniya), Thailand: T. Sukhapunaphan (Ministry of Agriculture and Cooperatives), Uzbekistan: S. Myagkov (Hydromet. Res. Institute), Vietnam: K. Van Duong (National Hydro-met. Forecasting Center)

Column 9:

Summarise the proposed project methodologies: By integrating in-situ and satellite data, numerical weather prediction model outputs, and climate prediction model outputs archived on DIAS, this project implement to:

- 1) To develop a distributed hydrological model in each basin by integrated in-site and satellite data and model outputs.
- 2) To predict river discharge by using observed and/or model prediction data.
- 3) To develop optimization schemes for IWRM practices in each river basin.
- 4) To evaluate impacts of climate change on water resources management of each river basin.
- 5) To make design of measures for climate change adaptations.

Column 10:

Describe the mode of operation of the project team (i.e. what is the specific role of each team member?) and provide evidence from country-team members that they have agreed to carry out these roles: Each team member will have expertise in at least one of four Capacity Working Group areas: (i) GEOSS/AWCI Flood; (ii) GEOSS/AWCI Drought; (iii) GEOSS/AWCI Water Quality; (iv)GEOSS/AWCI Climate Change. The expertise of each member will complement the others, so that requirements can be stated, benefits understood and tools developed to meet the needs of both science and policy communities for the maximum benefit to society.

Column 11:

What are the expected outcomes/products, and how sustainable will the activities be upon completion of an APN Grant, if awarded? The outcome will result in usable information on sound decision making on flood disaster reduction, drought early warning, water quality management and climate change adaptation.

Column 12:

How will these outcomes/products be relevant to and/or mainstreamed into policy-processes? GEOSS/AWCI ICG consisting of water-related ministries and agencies of the participating countries, international science communities, and space agencies takes a strategic demonstration approach. By showing success stories created through these projects to decision makers, GEOSS/AWCI will shift the emphasis from scientific challenges to operational applications to yield the societal benefits and establishes confirmed water management infrastructure against the water related problems.

Column 13:

How will team evaluations be performed to ensure project objectives are being met? There will be on-going International Coordination Group meetings and conference calls where progress will be assessed during the Project. A set of milestones providing the basis for evaluation includes:
2010-2011: Successive data archive
2010-2012: Demonstration project implementation
2011-2012: Preparation for shifting from more-research to more-operational phase

Column 14:

Provide a concise literature review for the proposed project:
(1) GEOSS 10-year Implementation Plan, Feb. 2005.
(2) GEOSS 10-year Implementation Plan Reference Document, Feb. 2005.
(3) GEOSS AWCI Implementation Plan, Dec. 2007.
GEOSS Work Plan 2009-2011, WA06-07, WA08-01e, DA09-2a, Jan. 2009.

The Main Body of the Full Proposal

1. Project Title

River Management System Development in Asia Based on Data Integration and Analysis System (DIAS) under the GEOSS

2. Fully Detailed Proposal

Description of the entire proposed project

In recognition of the need for accurate, timely, long-term, water cycle information as a basis for sound and effective water resources and risk management and with regards to the commonality in the water-related issues and socio-economic needs in the Asia-Pacific region, a well coordinated regional challenge GEOSS Asian Water Cycle Initiative (GEOSS/AWCI) has been established among 19 countries in Asia. It was initiated through the IIWaDATA project (2006 – 2008) funded by APN under the ARCP2005 and has evolved into a strong collaborative initiative focusing on convergence and harmonization of observation activities, interoperability arrangements for observed data and collected information, effective and comprehensive data management, and capacity building of the participating countries as the most functional elements.

GEOSS/AWCI completed the first stage for implementation planning and data policy agreement from 2005 to 2007, and will complete the second stage for in-situ data archiving from selected demonstration basins, data quality control and metadata generation by the middle of 2010 by the strong supports by APN, MEXT and the member countries. The data are being archived at the Data Integration and Analysis System (DIAS) that was launched in 2006 as part of the Earth Observation and Ocean Exploration System, which is one of five National Key Technologies defined by the 3rd Basic Program for Science and Technology of Japan. DIAS is now in its application phase and it is ready to step forward into demonstration for supporting the Integrated Water Resources Management (IWRM) practices in each member country, in cooperation between global observations and local applications and between research communities and operational sectors.

The proposed project (hereinafter Project) is designed under the GEOSS/AWCI framework and aims to develop an advanced river management system in member countries by exploiting the DIAS data and data integration capabilities. The system is based on integration of data from earth observation satellites and in-situ networks with other types of data, including numerical weather prediction model outputs, climate model outputs, geographical information, and socio-economic data to generate information for making sound water resources management decisions while taking global climate change into account. The system development thus includes:

- 1) To develop a distributed hydrological model in each basin by integrated in-site and satellite data and model outputs
- 2) To predict river discharge by using observed and/or model prediction data
- 3) To develop optimization schemes for IWRM practices in each river basin
- 4) To evaluate impacts of climate change on water resources management of each river basin
- 5) To make design of measures for climate change adaptations.

The specified tasks will be undertaken through cooperation among the countries and participating organizations providing expertise in hydrological and weather prediction modelling, satellite data use, climate change impact assessment, water resources management, etc.

Each country has nominated one demonstration basin for which data are being archived and where the demonstration project will be implemented by a country team in cooperation with other member countries and experts from the GEOSS/AWCI collaborating organizations and programmes. Implementation process will be led and coordinated by a task team of which each member will have expertise in at least one of the four GEOSS/AWCI Capacity Working Group areas: (i) Flood; (ii) Drought; (iii) Water

Quality; and (iv) Climate Change to assure that the system to be developed is applicable to a complex set of water resources management issues to meet the needs of both science and policy communities for the maximum benefit to society. In addition, the process and outcomes of the Project will be observed by the GEOSS/AWCI International Coordination Group (ICG), which includes representatives of water-related ministries and agencies of the participating countries and thus has direct connection to decision-makers. By showing the success stories created through the demonstration projects to decision makers, the GEOSS/AWCI activities including this Project will shift the emphasis from scientific challenges to operational applications to yield societal benefits and establish confirmed water management infrastructure against the water related problems.

Detailed Work Plan

(1) Preparation for the Kick-off Plenary Meeting: assuring solid attendance based on the GEOSS/AWCI network; survey on existing data sharing, exchange, and management schemes by the member countries; finalizing the demonstration project implementation plans; set up the Project homepage under the GEOSS/AWCI website.

(2) Kick-off Plenary Meeting (Tokyo, 5 – 6 October 2010): Demonstration project leaders will introduce the background, objectives and final goals as well as benefits for national research and water management groups. Functions of DIAS and tools from other ongoing projects (observation, data management, data integration, information transformation) will also be demonstrated. Each country and regional organization will present existing data sharing, exchange, and management schemes. The Project Task Team members will be nominated and the tasks identified that include:

- a. Distributed river runoff model development
- b. Rainfall prediction system development
- c. River runoff prediction including floods, droughts, and water quality
- d. Early warning and operation optimization
- e. Climate change impact assessment
- f. Climate change adaptation

Specific steps to be undertaken under the above tasks will be discussed.

(3) Follow-up to the Kick-off Meeting: A report will be drafted and disseminated by the end of 2010. Collaborative implementation of demonstration projects will begin and the Task Team will initiate work on tasks (a), (b), and (c). Regular teleconferences will be held to assure the progress and a website updated accordingly.

(4) 1st Task Team workshop in conjunction with the 5th GEOSS AP Symposium (to be decided site in Japan, March 2011): Progress in hydrological modelling and prediction work will be reported and based on the status further strategic steps will be outlined.

(5) Follow-up to the 1st Task Team workshop: A report will be drafted and disseminated by the end of April 2011. The work on demonstration projects and tasks (a)–(c) will continue being coordinated by the Task Team, who will hold regular teleconferences.

(6) 2nd Plenary Meeting and Task Team workshop (TBD site in Asia, November 2011): Outcomes of demonstration projects will be presented and accomplishment of tasks (a)–(c) and completeness of the data archive will be evaluated. Strategic steps for the next phase including preparation for shifting into more operational-phase will be discussed and outlined. Possible papers in peer-reviewed journals will be proposed.

(7) Follow-up to the 2nd Plenary: A report will be drafted and disseminated by the end of 2011. Work focusing on the abovementioned tasks (d), (e), and (f) will begin and the demonstration project will continue through these tasks. Simultaneously, preparation for shifting into more-operational phase will begin in cooperation with the country policy- and decision-makers (through the GEOSS/AWCI ICG members). Teleconferences will be held on the same regular basis.

(8) 3rd Task Team Workshop (TBD site in Asia, March 2012): Progress in work on operation optimization, climate change adaptation, and decision-making support will be reported and based on the status further strategic steps will be outlined. Status of preparation for operational applications will be reviewed.

(9) Follow-up to the 3rd Task Team Workshop: A report will be drafted and disseminated by the end of April 2012. The work on demonstration projects and tasks (d)–(f) as well as preparation for operational applications will continue being coordinated by the Task Team, who will hold regular teleconferences.

(10) Final Plenary Meeting (TBD site in Asia, September 2012): Final reports on outcomes of the demonstration projects will be given and accomplishment of tasks (d)–(f) evaluated. Preparedness for shifting into more-operational phase will be assessed and further strategic steps will be formulated. A second set of peer-reviewed publications will be proposed.

(11) Follow-up to the Final Plenary Meeting: A report will be drafted and disseminated by the end of November 2012 including recommendations for ensuing activities. The final report to APN will be drafted.

Relationship to the APN's Second Strategic Plan

The Project will provide a system of advanced methods and tools based on the DIAS archive and functions for integrating data from earth observation satellites and in-situ networks with other types of data, including numerical weather prediction model outputs, climate model outputs, geographical information, and socio-economic data to generate information for making sound water resources management decisions in the Asian region. The envisioned River Management System will support IWRM practices by enabling: (i) to predict river discharge by using observed and/or model prediction data; (ii) to optimize dam and other river structures operations; and (iii) to evaluate impacts of climate change on water resources management. It will be also supportive in making design of measures for climate change adaptations. All the specified capabilities will be developed and applied in the demonstration project basins in GEOSS/AWCI member countries and results will be published. Also, through collaboration with policy- and decision-makers in member countries the Project aims at operational applications of the System to support IWRM practices in response to climate change that will also contribute to sustainable development.

These specific deliverables will contribute directly to the mission, core strategies and vision identified in the APN's Second Strategic Plan. In addition, from the more-scientific perspective of the Project, the System will be used to support ongoing efforts to identify, explain and predict changes in the Asian water cycle in the context of both natural and human components as well as to examine where the potential vulnerabilities to human and natural systems exist.

Contribution to APN's Agenda's

Science Agenda – The Project is focusing on specific issues related to water resources management and impacts of climate change on water resources as a way of addressing capabilities for sustainable development. Starting from the survey of existing methods and building upon them to develop a new, comprehensive system to support IWRM practices that will be introduced into an operational sector, the Project will contribute to the improvement of the effectiveness of transfers of scientific knowledge to the decision-makers in the Asian region as a contribution to the APN's science agenda.

Policy Agenda – The targeted System is designed as a tool for transferring scientific knowledge to information required by policy and decision-making sectors. Its development will be implemented through collaboration between research community and policy and decision-making groups and it is intended to be adopted in operational use. In this way and by cooperating with other institutions and bodies that address issues relating to science policy interactions such as WMO, ICSU, UNESCO, and others, the Project is embracing a specific APN strategy formulated under its Policy Agenda.

Institutional Agenda – By adopting a cooperative scheme of GEOSS/AWCI consisting of regular international teleconferences and working throughout each year between major plenary meetings and Task Team Workshops, the Project will enhance year-round

communications between member countries, liaison functions, Project Leaders, relevant secretariats and the global change community at large, and thereby will be contributing directly to a main element of the APN Institutional Agenda.

3. Scientific Contribution of each Participating Country

Each participating country will: (i) design and implement a demonstration project; (ii) provide necessary in-situ data and further needed information; (iii) provide suitable existing tools and methodologies; (iv) provide scientific knowledge on local phenomena; and (v) provide support in shifting from the scientific challenge to operational applications through demonstrating the project outcomes to decision-makers.

4. Capacity Building for Global Change Research

The Project is proposed under the GEOSS/AWCI, which has a solid capacity building component organizing training seminars in various fields of expertise including: satellite data exploitation for hydrometeorological practices, water resources management, disaster mitigation and others; hydrological modelling using advanced distributed hydrological models; GIS training; and others that all are useful skills in conducting global change and adaptation research focusing on water cycle. The Project itself will build capacity in the field of advanced hydrological modelling, integration data from various sources for IWRM practices using advanced tools, climate change impacts evaluation and adaptation measures in the participating countries. It will provide an opportunity for young scientists from countries where meetings will be held to participate in these events.

5. Relevance to Policy Processes and Sustainable Development

The GEOSS/AWCI International Coordination Group (ICG) consists of representatives of water-related ministries and agencies of participating countries and of international science communities and space agencies members. The demonstration project implementation and results will thus be supervised by policy- and decision-makers of participating countries, which will help to mainstream the developed/applied methodologies into operational IWRM applications in these countries. Through developing and propagating advanced methodologies for generating information for making sound water resources management decisions and building capacity in the IWRM arena the Project contributes to the sustainable development efforts in the region.

6. Administrative support, in-kind contributions and co-funding consideration

The University of Tokyo provides administrative support to GEOSS/AWCI and thus to the Project through the proponent's office staff. MEXT, Japan provides the DIAS data archiving and integration functions, in-kind service for the project management to GEOSS/AWCI and thus to the Project, and monetary contribution of US\$ 60,000/year. The University of Tokyo, the United Nations University, JAXA, ICHARM and other collaborating organizations provide in-kind capacity building support. Each member country provides in-kind contribution for data management, demonstration project implementation, and application planning to GEOSS/AWCI and thus to the Project. Each member country supports its ICG member's tasks on data preparation and system application.

7. Relationship between Global Change Research Programmes and Networks

GEOSS/AWCI and the Project interacts with the WCRP GEWEX Coordinated Energy and Water Cycle Observations (CEOP) project through exploitation of the unique integrated CEOP dataset and data integration functions and through providing in-situ data from demonstration project basins to DIAS and thus making it available for CEOP scientific challenges, in particular CEOP Hydrological Applications Project. The Project work focusing on assessment of global change impacts on water resources is also compliant with and contributes to the efforts being undertaken by other core projects such as IGBP and ESSP.

8. Related Research Work

Regional collaborative effort aiming at a river management system that is envisioned by the Project takes advantage of the achievements of GEOSS/AWCI in: (i) establishing a well coordinated international network of 18 countries in Asia, (ii) data policy agreement, and (iii) populating the DIAS archive with quality-assured in-situ data from nominated demonstration river basins. It employs existing data management, data integration, and information transformation methods and hydrometeorological modelling tools to build up an advanced IWRM support system in participating countries and promote its utilization in operational applications. As such the Project is in compliance with GEOSS objectives. The relevant reference documents include: The GEOSS 10-year Implementation Plan and Implementation Plan Reference Document (Feb. 2005); GEOSS AWCI Implementation Plan (Dec. 2007), GEOSS Work Plan 2009-2011, WA06-07, WA08-01e, DA09-2a (Jan. 2009).

9. Communications, Publications and Open Access to Data

The Project results will be presented at the proposed plenary meetings and other related events as well as posted on the GEOSS/AWCI website. The Project considers publication of demonstration project results in peer-reviewed journals. Per agreed to GEOSS/AWCI data policy and the DIAS standards, all the collected and produced data will be open to public and accessible through the internet.

Appendix 1

Timeline

Project activities	Year 1 (2010/2011) From October 2010 to September 2011												
	1	2	3	4	5	6	7	8	9	10	11	12	
Preparation for the Kick-off Meeting; Survey of existing data schemes													
Kick-off plenary meeting; establishing a task team;													
Distributed hydrological modeling and prediction system developments; Demonstration project implementation; Teleconferences													
Progress report to APN													
The 1 st task team workshop to ensure the progress													
Continuing work on development of an IWRM supporting system; Demonstration project implementation; Teleconferences													

Date/Venue	Event	Estimated No. of participants
October 2010/Tokyo	Kick-off plenary meeting	60
March 2011/Japan (Tokyo?)	1 st task team workshop	30

Project activities	Year 2 (2011/2012) From October 2011 to September 2012												
	1	2	3	4	5	6	7	8	9	10	11	12	
Continuing work on development of an IWRM supporting system; Demonstration project implementation; Teleconferences													
The 2 nd plenary meeting: reporting on the demonstration project progress and outcomes; and 2 nd task team workshop													
Development of dam operation optimization, climate change adaptation and decision-making support methods and tools; Demonstration project implementation; Teleconferences													
The 3 rd task team workshop to ensure the progress													
Continuing work on development of an IWRM supporting system; Demonstration project implementation; Teleconferences													
The Final Plenary Meeting: final reports on the outcomes of the demonstration projects													
Final report													
APN project and financial reporting													

Project reference: **ARCP2010-10NMY-Koike**
River Management System Development in Asia Based on Data Integration and Analysis System (DIAS) under the GEOSS

Date/Venue	Event	Estimated No. of participants
November 2011/ TBD	2 nd plenary meeting and 2 nd task team workshop	60
March 2012/TBD	3 rd task team workshop	30
September 2012/TBD	Final plenary meeting	60