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The Third Stage Management Project of Climate Change Impacts and Adaptation on Water Environment (2/5)

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ABSTRACT

In order to estimate the impact and adaptation strategy caused by Global Climate Change in detail, Water Resource Agency has completed the project "The First Stage Management Project of Climate Change Impacts and Adaptation on Water Environment" in 2009, continuing executing the project "The Second Stage Management Project of Climate Change Impacts and Adaptation on Water Environment" during the next four years (2010-2013). To expand the research result, Water Resource Agency again carries out the project "The Third Stage Management Project of Climate Change Impacts and Adaptation on Water Environment" in five years (2014-2018), also called "The Third Stage project". The Third Stage project will apply different main axes and interdisciplinary researches, and attend to handle at least 9 sub-projects every year. Because of plenty of information from diverse domains and themes, this project (called "Management Project") is about to integrate achievements with all sub-projects.

KEY WORDS: Climate Change; Interdisciplinary Research; Adaptation Strategy; Management Project.

INTRODUCTION

In order to evaluate the potential impacts of global climate change, and discover related adaptation strategies, after taking a thorough consideration on the situation of our country, the system, and resources etc., Water Resource Agency completed the first stage of "Management Project of Climate Change Impacts and Adaptation on Water Environment". From 2010 to 2013, the agency then completed the second stage of this management project successively, which includes risk management on hot-spots, planning of flood protection, sedimentary management, water resource management, and coastal protection. In order to expand research scale, Water Resources Agency started to execute the third stage of this project in 2014, which will last for 5 years.

National Development Council established "Formulating and Promoting the Climate Change Adaptation Policy Framework and Action Plan" Task Force, and divided the Task Force into 8 sectors, including Disasters, Infrastructure, Water Resources, Land Use, Coastal Zones, Energy Supply and Industry, Agriculture Production and Biodiversity and Health. In order to tackle the impact of climate change in Taiwan, Water Resource Agency takes part in the Task Force and is in charge of Water Resource, providing related information to authorities. The third stage of "Management Project of Climate Change Impacts and Adaptation on Water Environment" will promote multidisciplinary adaptation and related projects. Because the third stage contains not only9 sub-plans but also involving a lot of different fields, this project, as known as management project, is established in order to make appropriate administration on, such as "international exchange and data collection", "planning and management research projects", "proposal and amendment of achievement reports" and "results exhibition and promotion"

INTERNATIONAL EXCHANGE AND DATA COLLECTION

To be fully aware of the trend of adaptation development domestically and internationally, and to share the achievements of water adaptation in climate change with the world; this project analyzed reports and journals related to climate change in recent years, and assigned professionals to participate the World Water Forum 7th in Korea with Water Resource Agency team, and to assist with the exhibition of Taiwan pavilion.

Discussion on recent journals related to climate change. To be fully aware of the trend of adaptation development internationally and domestically, journals related to climate change published internationally and domestically are being collected, including 8 foreign countries (or international organizations) and 8 domestic organizations or institutions; Table 1 and 2 are the results respectively.

Table 1. Highlight of overseas adaptation development in recent years

No	Country/ Organization	Year	Titles of Journals/ Researches
1	UNFCCC	2014	Lima Call for Climate Action
2	IPCC	2014	AR5 Synthesis Report
3	EU	2013	An EU Strategy on adaptation to climate change
4	The United States	2014	Office of Water Climate Change Adaptation Implementation Plan
5	Australia	2014	NCCARF 2008-2013: The first five years
6	Japan	2014	Climate Change Impact Assessment and National Adaptation Planning Process in Japan
7	Korea	2014	KACCC Newsletter 2014
8	China	2014	2014 annual report- China's Policies and Actions on Climate Change

Table 2. Researches related to Taiwan climate change in recent years

No	Organization	Year	Titles of Journals/ Researches
1	National Development Council	2013	Application of Existing Potential and Sensitive Hazard Maps Overlaps with Geographic Information to evaluate the reasonability of Current Land-Use Plans
2	Ministry of Science and Technology	2014	Taiwan integrated research program on Climate Change Adaptation Technology
3	Environmental Protection Administration Executive Yuan	2014	Climate Change Adaptation Project (2014)
4	Council of Agriculture	2013	Developing a Contingency Plan to Upgrade Food Security in Taiwan
5	Soil and Water Conservation Bureau	2014	Disaster Risk Analysis of the Slope-lands and Its Adjusting Capacity under Climate Change in 2014
6	Architecture and Building Research Institute	2014	Impact assessment of soil and water conservation under Climate Change and Its Adaptive Strategies (1/2)
7	Institute of Transportation	2014	Mid-Term Project: Safety disaster reduction of Urban and Buildings and its Adaptive Technology Development
8	Taiwan Power Company	2014	Vulnerability Assessment and Risk Management of Hydropower Facilities under Climate Change

International exchange. World Water Council was established in 1996, with the aims of sustainable water use, and improving water resources management. WWC holds World Water Forum every 3 years, to encourage countries around the world sharing their experiences during the event, to form a global-wise water resource behavior, to further improve our quality of life, and to boost sustainable development of water environment.

WWF7 is the largest water resources forum in the world, by participating the event, continuously interact with professionals around the world, and exchanging opinions on adaptation, our achievements on water resources and climate change adaptation can be strengthen.

The main purpose of participation is to interact with countries around the world on the accomplishments of climate change adaptation in water environment. By attending to WWF7 and other forums, we hope to understand the latest research on climate change and water environment related genre; and the conditions of promoting climate change adaptation in other Asian countries and areas. In the meantime, we also share the research achievement of "Management Project of Climate Change Impacts and Adaptation on Water Environment", to make countries around the world have a clearer understanding of our project and research progress.

During this nine-day visit, we spent the first day on transportation from Taipei to Daegu, Korea; and the second day on preparation. WWF7 and Water Forum were on the 3rd to 8th day. At the last day, we took flights from Daegu, Korea back to Taipei.

SCIENCE RESEARCH PLANNING AND MANAGEMENTS

From the journals and researches around the world, it can be observed that climate change is a crucial issue at the present of time, and water resources may be the one with the most direct and serious impact. Water Resources Agency thus executes "The Impact of Climate Change on Water Resource and Adaptation Research", and this management project will assist in doing research on trends around the world, planning and managing research project. The following sections are descriptions of "holistic science research roadmap planning", "execution situations from 2009 to 2014", and "planning and management of 2015".

Holistic Science Research Roadmap Planning. The purpose of "The Impact of Climate Change on Water Resource and Adaptation Research" is to strengthen the understanding of the potential impact of climate change on the water environment of Taiwan, and to plan there sponsive actions beforehand. Since 2009, the project has undergone preliminary planning, hot-spot research, and cross-domain adaptation. The research genres include "water resources management", "flood protection and sedimentary management", "coastal protection" and "hydrological sceneries and knowledge management". This management project also adopts the latest systematic procedure of climate change research, the procedures are "scenario simulation", "impact assessment", "risk analysis" and "adaptation planning".

Introduction of Execution during 2009 to 2014. It has been 6 years since the execution of "The Impact of Climate Change on Water Resource and Adaptation Research". So far, 65 projects have been completed and they can classify into 4 major genre：

1. Water Resources Management
   (1) Vulnerability Assessment and Adaptation Planning of Water resources of each region
   (2) Risk evaluation and adaptation strategy of water resources facilities
   (3) Cross-domain adaptation concept and research of water resources

2. Flood Protection and Sedimentary Management
   (1) Vulnerability Assessment and Adaptation Planning of Important rivers
   (2) Disaster scenario simulation and management skills improvement
   (3) Cross-domain adapted plan and research of flood protection and sedimentary management

3. Coastal Protection
   (1) Vulnerability Assessment and adaptation planning on coast
   (2) Cross-domain adaptation and research of coastal protection

4. Hydrological Scenarios and Knowledge Management
   (1) Hydrological monitoring and future scenario analysis
   (2) Project management and knowledge management

Project government of 2015. In 2015, there were 9 sub-projects and researches had been executed, which includes, 3 researches related to "water resources management", 4 researches related to "flood protection and sedimentary management", 1 research about "coastal protection" and 1 research about "hydrological scenarios and knowledge management". This management project works closely with different teams, and has built up contacts to make the project process smoothly.

MAIN PROJECT RESULTS PROPOSAL AND AMENDMENT

We have completed 9 researches in 2015, including 3 researches related to "water resources management", 4 researches related to "flood protection and sedimentary management", 1 related to "coastal protection" and 1 related to "hydrological scenarios and knowledge management". This project analyzed and evaluated important achievements on each projects, and propose suggestion on the follow-up development.

RESULTS EXHIBITION AND PROMOTION

Hosting International Seminars. Climate change is one of the biggest challenge in water resources field, as a result, we held "22th hydrology engineering and 2015 climate change conferences" with department of hydraulic and ocean engineering of National Cheng Kung University. We not only invited foreign speakers and scholars to participate, but also encouraged government institutions, private corporations to join; we also set up website and made promotion materials to attract more attention.

Maintain and Update "The Climate Change Knowledge Base on Water Environment". "The Climate Change Knowledge Base on Water Environment" was established in 2010 (climatechange.wra.gov.tw), the content and function have been expanded and updated during 2012 to 2014, including Chinese, English, and kid-friendly version. Professional flood protection and sedimentary management research achievement have also been displayed as well. Fig. 1 is the front-page of the website.

Fig. 1 Front Page of The Climate Change Knowledge Base on Water Environment

Promotional Materials. In order to promote research achievements and related information of climate change, promotional materials such as brochure, poster and booklet thus being produced. Fig. 2 and Fig. 3 are the designs of promotional materials.

There are 7 poster designs, including "the phenomenon and cause of climate change", "science research of climate change", "water resources management", "flood protection and sediment", "coastal protection", "cross-domain adaptation", and "knowledge management". Fig. 4 shows the posters of "the phenomenon and cause of climate change" and "science research of climate change".

Fig. 2 Promotional Brochures

Fig. 3 Promotional Booklet

Fig. 4 Promotional Posters

Exhibition and promotional activities. To promote the research achievements, we have participated in 2 seminars and 2 promotional activities in Taiwan.

CONCLUSION AND SUGGESTION

Conclusion.

(1) It is needless to say that climate change is happening, and is an unavoidable issue for Taiwan. As water resources may have the most direct impact, it is a must to analysis vulnerabilities, planning beforehand and to promote adaptation before global carbon reduction reach a concrete achievement, and to further protect water resources in Taiwan.
(2) 9 sub-projects have been executed in 2015; the goal of this year is to identify the weakness of DajaRiver and east coast of Taiwan; and to plan the adaptation strategy. Generally speaking, we have reached the goal of 2015. In 2016, we will focus on "Vulnerability Assessment of Water Supply Facilities", Zengwen River basin integrated adaptation and risk management of coasts.
(3) The weakness of water resources management is mainly in southern and central part of Taiwan, following by the northern region; while eastern part of Taiwan is relatively safer. The vulnerabilities of flood protection and sedimentary management are mainly in partial reaches of Gaoping River and Zengwen River; while Tamshui River, Jhoushuei River and Daja River come in the second.
(4) After the "22th hydrology engineering and 2015 climate change conferences", participants such as professionals and scholars have reached a consensus that climate change is the biggest challenge in hydraulic field.

Suggestion.

(1) To tackle the impact of climate change to water resources in Taiwan, it is necessary to adopt adaptation strategy into the current water resources plan, to communicate with stockholders and to promote cross-domain adaptation.
(2) In the current stage of research, we have controlled the area with higher risks. In order to keep track of the adaptation development of areas with higher risks, it is suggested emphasizing cross-domain adaptations such as "water resources management and agriculture", "flood protection and debris management", and "coastal protection and finance" to evaluate those accessibilities.
(3) To review vulnerabilities related projects, it is suggested to take the impact of climate change into planning consideration, including "basic plan of water resources for southern Taiwan", "basic plan of water resources for central Taiwan", "basic plan of water resources for Northern Taiwan", "master plan of improvement of Gaoping river basin", "Master plan of improvement of Tsengwen river". What's more, it is necessary to coordinating "Coastal Zone Management Act" by formulating and executing "master plan of shore protection in Chiayi", "master plan of shore protection in Tainan"," master plan of shore protection in Kaohsiung", and "master plan of shore protection in Pingtung".
(4) To enhance crisis awareness of climate change towards citizens, it is important to hold more education and promotion activities.

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