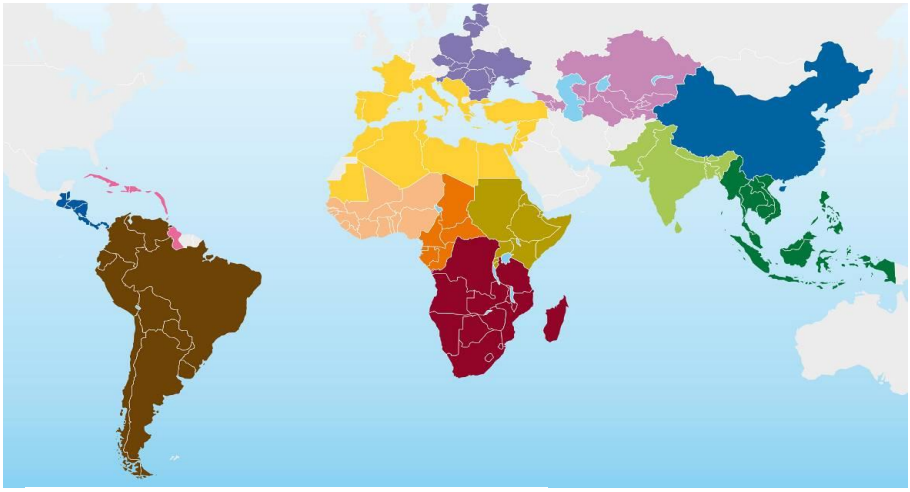
Vietnam Water Partnership

Global Water Partnership

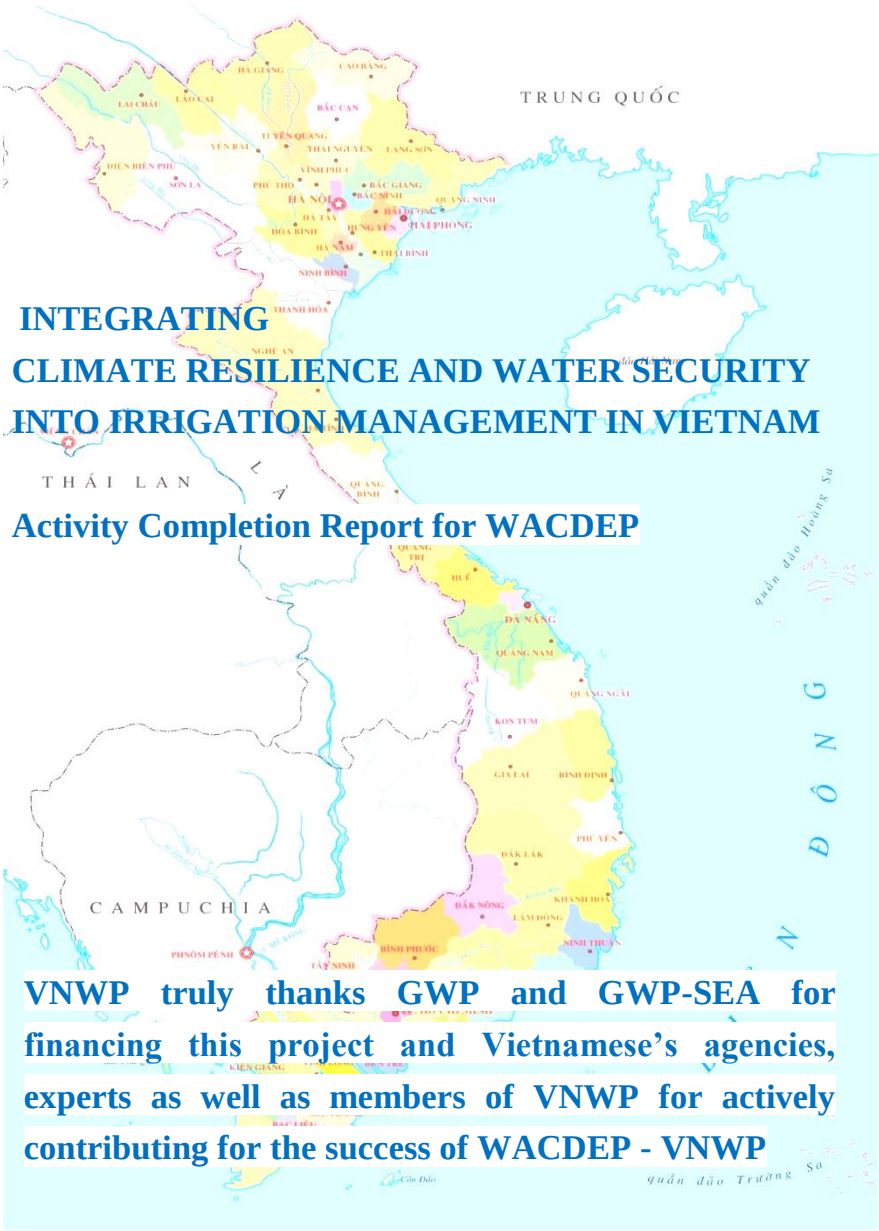
Water, Climate and Development Programme Southeast Asia

INTEGRATING CLIMATE RESILIENCE AND WATER SECURITY INTO IRRIGATION MANAGEMENT IN VIETNAM

Activity Completion Report for WACDEP



Hanoi, November, 2016



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Activity Completion Report for WACDEP

VNWP truly thanks GWP and GWP-SEA for financing this project and Vietnamese's agencies, experts as well as members of VNWP for actively contributing for the success of WACDEP - VNWP

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- Dang Thi Lien: Secretary of VNWP
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- **Collaboration institutions**

- Water Resource Directorate – Ministry of Agriculture and Rural Development
- Department of Meteology, hydrology and Climate change – Ministry of Natural Resource and Environment
- Department of Irrigation Thai Binh Province
- Nam Thai Binh Irrigation Works Operating Company
- Bac Hung Hai Irrigation Works Operating Company

ABBREVIATIONS

WS	Water Security
CC	Climate change
MRD	Mekong River Delta
RRD	Red River Delta
DMHC	Department of Meteorology, Hydrology and Climate Change
FAO	Food and Agriculture Organization of the United Nations
GWP	Global Water Partnership
GWP-SEA	Global Water Partnership – Southeast Asia
IPCC	Intergovernmental Panel on Climate Change
IWDP	Institute for Water Development and Partnership
MARD	Ministry of Agriculture and Rural Development
MONRE	Ministry of Natural Resource and Environment
NT	National Targets
ARD	Agriculture and Rural Development
NTP-RCC	National Target Program to Response to Climate Change
UNDP	United Nations Development Program
UNFCCC	United Nations Framework Convention on Climate Change
VNWP	Vietnam Water Partnership
WMO	World Meteology Organization

DEFINITIONS AND TERMS

Water security: The capacity of a population to safeguard sustainable access to adequate quantities of acceptable quality water for sustaining livelihoods, human well-being, and socioeconomic development, for ensuring protection against water-borne pollution and water-related disasters, and for preserving ecosystems in a climate of peace and political stability.

Climate change: A change of climate (definition of Convention on Climate Change) which is attributed directly or indirectly to human activity that alters the composition of the global atmosphere and which is in addition to natural climate variability observed over comparable time periods (typically decades or longer).

Mitigation (climate change): Activities aim to reduce the level or intensity of greenhouse gas emissions.

Sea level rise (due to climate change): The rise of sea, ocean water level due to melting ice and expansion of sea water under the impact of climate change (temperature rise), which does not include tides, storm surges.

Adaptation (to climate change): The process of which human and organisms become adapted to the

unfamiliar climatic conditions. Temperature is the most significance a factor in adaptation.

Adjustment (to climate change): The adjustment of system or human nature to circumstances or environment changes, aims to reduce vulnerability to existing or potential climate change and take advantage of opportunities it brings.

Vulnerability (due to the impact of climate change): A status of a system (natural, social, economic), an individual, household or community that is vulnerable by the adverse events which limit the ability to prevent, mitigate, or respond to a threat.

Response (to climate change): The activities of human beings to adapt and mitigate climate change.

INTRODUCTION

- **The Water, Climate change and Development Program Southeast Asia (WACDEP-SEA)**

The Water, Climate change and Development Program - Southeast Asia (WACDEP-SEA) of GWP aims to integrate water security and climate resilience into the process of development planning, building climate resilience and supporting nations in Southeast Asia to adapt to a new climate regime through increased investment in water security. By building climate resilience, this initiative will contribute to building peace and preventing conflicts, supporting the integration process and helping protect investments in economic development, poverty reduction and the Millennium development goals (MDGs) and Sustainable development objectives in 2015.

WACDEP - SEA also contributes to achieving the objectives of UNFCCC National Adaptation Plan (NAP) of each country in Southeast Asia; to reducing the vulnerability to the impacts of climate change by building adaption and resilience capacity, and facilitating the integration of climate change adaptation closely related to the new and existing policies, programs and activities action, especially during the process and policy of

development plan in all relevant fields and at different levels as appropriate.

The expected results of The Water, Climate change and Development Program Southeast Asia (WACDEP-SEA)

- Water security and climate resilience integrated in development plan and decision making process of each country in Southeast Asia
- Enhancing the capacity of partners, organizations and stakeholders to integrate water security and climate resilience in development plan and decision making process
- The strategies and financial plan and "no regret" investment for water security, climate resilience are systematic and the government allows to access funds from the new and emerging climate funds and other sources such as development banks
- Contribute to the development of National Adaptation Plans (NAPs) and developing projects and programs to support water security and climate resilience
- Intensify design drought and floods management policies through improved knowledge and access to scientific knowledge of droughts and floods, risk assessment, monitoring, forecasting and early warning;
- **Integrating climate change and water security into irrigation management in Vietnam**

Vietnam is one of the most affected countries because of climate change. Insecure water there will be no food security and affect energy security. “By 2050, about 8.4 million people in Vietnam lack of fresh water due to climate change”. This is the warning of Asian Development Bank (ADB), because Vietnam is one of the 5 countries most affected by climate change and natural disasters. Millions hectares of land will be flooded, ten millions of people lost their homes due to sea level rise, saltwater intrusion into the interior, while the number of people living in rural areas accounts for 73% population of the country, thus poverty will increase from 21-35%.

As technical infrastructure of irrigated agriculture, irrigation systems directly affected by climate change and water security factors, therefore it is necessary to bring contents of adaptation to climate change and water security challenges into strategies, policies and irrigation management plans. Implementation of WACDEP-SEA objectives, VNWP has done the research on “Integrating climate change and water security into irrigation management”.

After 3 years of implementation, VNWP with the support of Water Resource Directorate, Department of Hydrometeorology and Climate Change, experts have achieved the following results:

- Signing cooperation paper with the Office of Climate Change of Ministry of Natural Resource and Environment.

- Analyzing the irrigation management activities of irrigated agriculture in Vietnam in the context of climate change and water security challenges.
- Evaluation policy mechanisms related to irrigation management in the context of climate change and water security.
- Developed "Measures to integrate climate change and water security in operation management of irrigation systems". Introduced methods on integrating climate change and water security in operation management of irrigation systems to Bac Hung Hai Operation Irrigation Works Company and some Operation Irrigation Works companies in Red River Delta.
- Developed "Roadmap to integrate climate change and water security into irrigation management" and organized a national workshop to introduce "Roadmap to integrate climate change and water security into irrigation management" with participation of Deputy of Ministry of Agriculture & Rural Development.
- Pilot integration of climate change and water security in operation management of Nam Thai Binh irrigation system and monitored, assessed the performance of integrated system

With these above results:

- The measures to ensure water security and climate resilience is integrated into national irrigation management activities and operation management of specific irrigation systems

- Contribute to the development of National Adaptation Plans (NAPs) in supporting water security and climate change response in Vietnam.
- Contribute to improving the capacity of partners, organizations and stakeholders in Vietnam to cope with climate change and water security challenges.

PROJECT EXECUTIVE SUMMARY

INTEGRATING CLIMATE CHANGE AND WATER SECURITY INTO IRRIGATION MANAGEMENT IN VIETNAM (2014-2016)

MINUTE OF MEETING
BETWEEN NATIONAL FOCAL POINT OF VIETNAM TO UNFCCC
AND VIETNAM WATER PARTNERSHIP

In regard to cooperation between Vietnam Water Partnership (VNWP) and the National Focal Point of Vietnam to UNFCCC, called "VNNFP", on 08 April 2014, a meeting between VNNFP and VNWP was organized at Department of Meteorology Hydrology and Climate Change (DMHCC) office, Ministry of Natural Resources and Environment (MONRE).

At the meeting, Dr. Le Van Minh, Chairperson of VNWP and Dr. Ha Luong Thuan, Coordinator of Vietnam Water, Climate and Development Program (VNWACDEP) introduced VNWACDEP activities in Vietnam. VNNFP expressed thanks to VNWP and highly appreciates the initiatives, activities of VNWACDEP as well as welcomes VNWP to join in national climate change agenda. Discussion, on climate change issues especially focusing on how VNWP could support the adaptation and mitigation in agricultural practices, was made. After the meeting, VNWP and VNNFP have agreed with the following agreements;

1. VNWP shall keep VNNFP periodically informed on progress of VNWACDEP implementation in Vietnam;

2. VNWP shall invite VNNFP representative to participate in workshops, meetings related to VNWACDEP activities;

3. VNWP shall integrate the results of VNWACDEP studies into other programs of climate change agenda in Vietnam.

Whereas

1. The VNNFP shall support the operations of VNWACDEP and participate to climate change activities of VNWP if needed;

2. The VNNFP shall integrate the research results of VNWACDEP in the process of implementing the national climate change agenda and share the information in versa;

3. The VNNFP shall, in appropriate cases, invite VNWACDEP to join in national climate change activities.

At the end of the meeting both VNNFP and VNWP expressed their thanks to GWP, GWP-SEA for their support to climate change activities in Vietnam.

Hanoi, 08th April 2014

Dr. Le Van Minh

VNWP Chairperson ,Chairman of Institute for Water Development and Partnership, Vietnam Union of Science and Technology Associations

Mr. Nguyen Khac Hieu

Deputy Director General, Department of Meteorology, Hydrology and Climate Change, Ministry of Natural Resources and Environment cum National Focal Point of Vietnam to UNFCCC

Minute of Meeting between VNWP and National Focal Point of UNFCCC Vietnam signed 8/April/2014

IMPACTS OF CLIMATE CHANGE AND WATER SECURITY CHALLENGES TO IRRIGATION MANAGEMENT

1.1. Irrigated agriculture and irrigation management

Irrigated agriculture in Vietnam has 6.648 reservoirs, about 10.000 large electric pumping stations, 5.500 large irrigation drains, 234.000 km of canals, 25.960 km of dikes all kinds. The irrigation systems support, enable development of crop diversification, agricultural restructuring. According to statistics in 2012, the total area of irrigated rice land reached 7.3 million hectares (2.99 million hectares of winter-spring crop, 2.05 million hectares of summer-autumn, season 2.02 million hectares), contributing to an increased and stable food production. In addition, the irrigation systems irrigated 1.5 million hectares of vegetables and industrial plants; create water sources for 1.3 million hectares of cultivated land; provided about 6 billion m3 of water for domestic and industrial; salt prevention for 0.87 million ha; improvement of alkaline 1.6 million ha and drainaged for over 1.72 million hectares of farmland (Decision No. 784/ QD-BNN-TCTL, 21st April 2014).

The following questions are raising in irrigation management activities related to the integration of climate change and water security:

- Which internal factors should be considered so as to achieve the results we do not harm the external environment, the external activities do not hurt the inner workings?
- How can we make arrangements to improve irrigation system on a regular basis, in order to coordinate the new ideas about management and advances in science and technology?

Irrigation management organizations in Vietnam

Include: State administration and exploitation management of irrigation works. For the exploitation management of irrigation works assigns to: (1) State Enterprises and (2) Water user Organization.

Duties and powers of the assigned or jointed exploitation of irrigation works business has been stipulated in Articles 17, 18 of the Ordinance on Exploitation and Protection Irrigation works and Article 7.8 of Decree No. 143/2003/ ND-CP dated 28/11/2003 of the Government "defines detailed some articles of the water conservancy works exploitation and protection Act" and other provisions of law under the business license be granted include:

- Fairly water regulation and distribution, reasonable service of production and life, prioritize domestic water;

contracts with organizations and individuals consuming water, provide services from irrigation works; compensate for damages as prescribed.

- Implementation of plans, procedures, rules and technical standards, investment projects of irrigation systems approved by state management agencies;
- Monitoring, detection and timely handling problems; maintenance, operation ensuring safety works; inspection and repairing works before and after rainy season;
- Investor in the maintenance, repair and upgrading of irrigation works; maintaining, developing capacity building, ensuring safety works and long-term use;
- Building or participating in building operation procedures, regulating water reservoir process, system operation procedures, competent authority for approval and implementation;
- Observation and monitoring, collecting data according to regulations; synthesis research and application of scientific and technologies advances in the exploitation and protection of irrigation works; recordkeeping exploitation irrigation works;
- Protecting water quality; prevention and controlling degradation and depletion of water resources; prevention of floods, salinization, and other harmful effects caused by water;
- Community participation in building exploitation plans and works protection schemes.

Water User Association

Water User Association works as a "bridge", gets water from enterprises and then transfers to water users. Small irrigation works and canals infield managed by water user organizations.

2.1. Climate Change

Vietnam has announced the scenarios in 2009 and 2012. The scenario of climate change and sea level rise for Vietnam 2015 is updated according to the schedule identified in the national strategy on climate change:

Summary of climate change scenarios at the end of the century

Temperature: According to RCP4.5 scenario, temperature increases 1,9÷2,4oC in the north and 1,7÷1,9oC in the south. According to RCP8.5 scenario, temperature increases 3.3 ÷4,0oC in the north and 3,0÷ 3,5oC in the south. Extreme temperatures tend to increase markedly.

Precipitation: According to RCP4.5 scenario, annual rainfall commonly increases from 5÷15%. According to RCP8.5 scenario, the highest increase possibly of more than 20% in almost northern, mid-central, part of southern and the Highlands. The average value of the largest rainfall one day has an increased trend in the whole territory of Vietnam (10 ÷ 70%) compared to the average of the base period.

Monsoon and some extreme events: The number of strong and very strong storms has uptrend. The beginning of the

summer monsoon tends to start earlier and end later. Monsoon rainfall tends to increase. The number of cold weather days in northern mountainous provinces, the Northern Plains, North Central fell. Number of hot days (Tx≥35oC) tends to increase, the highest in the North Central, South Central and South. Droughts become more extreme due to temperatures rise and reduced rainfall in thedryseason.

Sea level rise scenarios for coastal areas in Vietnam

In early 21st century, the uptrend of sea level rise under both 4 RCP scenarios do not differ much. By 2030, the average sea level rise for coastal areas throughout Vietnam under RCP2.6 is 13cm (8 cm ÷ 18cm), RCP4.5 is 13cm (8 cm ÷ 18cm), RCP6.0 is 13cm (8 cm ÷ 18cm) and under RCP8.5 is 13cm (9cm ÷ 18cm).

In the middle of the 21st century, there are differences in the trend of sea level rise. By 2050, the average sea level rise for coastal areas throughout Vietnam under RCP2.6 scenario is 21cm (13cm ÷ 32cm), RCP4.5 is 22cm (14cm ÷ 32cm), RCP6.0 is 22cm (14cm÷32cm) and RCP8.5 is 25cm (17cm ÷ 35cm).

By the end of the 21st century, the difference in the trend of sea level increase under the scenario is very clear. By 2100, the average sea level rise for coastal areas throughout Vietnam under RCP2.6 scenario is 44cm (27cm ÷ 66cm), RCP4.5 is 53cm (32cm ÷ 76cm), RCP6.0

is 56cm (37cm ÷ 81cm) and RCP8.5 is 73cm (49cm ÷ 103cm).

The major challenges to Vietnam in the context of global climate change impacts are:

- Challenges on investment policy, economic and social development with requirements "rapid, efficient and sustainable development" while resources are limited
- Challenges on rural agriculture development policy, sensitive and vulnerable areas due to the impacts of climate change; developing a sustainable rural agriculture and ensuring national food security with requirements of Methane emissions restrictions;
- Challenges on mining policy, protection and development of natural resources between the requirements of exploitation, using and the declining trend of resources
- Challenges on perceptions and actions of policy makers, managers, social strata and communities on climate change, environmental protection and sustainable development.
- Challenges on human resources in response to climate change which are insufficient and weak.

2.2. Water security

The challenges of water security in Vietnam today include:

- Transboundary water poses great challenges to water security, which is evident in Vietnam. The total surface water on the territory of Vietnam annual average of about 830-840 billion m3 / year, of which about 310-315 billion m3 (37%) is the endogenous, remaining 520-525 billion m3 (63%) is water flowing from the neighboring countries into the territory of Vietnam. About allocation 60% water of the Mekong River basin, 16% of the Red River basin, about 4% of Dong Nai River basin, a small portion remaining of other river basins.
- With a population of nearly 90 million people, Vietnam has a total water volume yearly per capita reaches 9,500 m3/ person, less than the standard 10,000 m3/ person/ year in countries with average water resources in the view of International Water Association. Calculation according to the amount of water endogenous Vietnam now reaches 4,000 m3/ person/ year.
- Vietnam under calculations of Institute of Water Resources Planning, the annual amount of water used in agriculture is about 93 billion m3, industrial space is approximately 17.3 billion m3, service is 2 billion m3, for living is 3.09 billion m3. By 2030, water consumption structure will change in the trend of agriculture 75%, industry 16%, consumption 9%.
- Rivers in Vietnam have been exploited to serve the hydropower development in recent years. Although the operation has improved, hydropower still has a huge

impact on water security and causes multiple problems for downstream works and ecosystems.

- Vietnam is one of the most affected countries because of climate change. No water security there is no food security and will affect energy security. “By 2050, about 8.4 million people in Vietnam lack of fresh water due to climate change”. This is the warning of the Asian Development Bank (ADB), because Vietnam is one of the 5 countries most affected by climate change and natural disasters. Millions hectares of land will be flooded with tens of millions of people lost their homes due to sea levels rise, saltwater intrusion into the interior, while the number of people living in rural areas accounts for 73% population of the country, thus poverty will increase from 21-35%.
- Ecosystems, especially wetlands are being narrowed down, the mangrove forests are shrinked due to the development of shrimp farming, water storage parks
- A specific challenge to Vietnam compare with the general situation in the world is water pollution in river, aquaculture area which is increased and aggravated by mismanagement.

2.3 Impacts of climate change and water security to irrigation works

Vietnam is classified as water-stressed countries. Under the impact of climate change, the increased average temperature, abnormal weather, increased climate and natural disasters will greatly affect fresh water resources. Climate change affects directly and indirectly to water

resources. Climate change impacts on water resources, and directly to the irrigation system.

"Climate change and the impact of development processes of upstream and downstream areas of the river basin has a strong impact to the irrigation system. Under the impact of climate change, extreme phenomena of weather, climate, such as floods, droughts, saltwater intrusion occur frequently, threatening the safety of dams and increasing flood risk for downstream areas, making the management of exploitation works becomes more difficult.

Irrigation is facing many risks related to weather and climate. According to the forecast, Vietnam will be one of the five countries will be subject to strong impact of climate change. The management of exploitation irrigation works can be considerably affected by droughts, floods, salinization caused by climate change and sea level rise. - Decision 784/QD-BNN-TCTL: Scheme on improving management exploitation efficiency of existing irrigation works."

- Sea level rise makes the water supply in coastal areas become more difficult.
- Demand for water increases: because temperature rise leads to increase vaporization of water surface in field, make the plant's water needs increase. With flooding low-lying areas, prolonged and increased intensity rainfall leads to increase requirement for drainage.

- Changing flow regime makes reservoir regulation become more difficult, water supply ability decrease.
- Impact on head works (reservoir, dams, pumping stations, gravity offtake drain ...)
- Impact on canal system
- Impact of water security challenges.

Workshop in Thai Binh Province (6/2014) on Measures to integrate climate change and water security into irrigation management

INTEGRATION OF CLIMATE CHANGE AND WATER SECURITY INTO IRRIGATION MANAGEMENT IN VIETNAM

I. Review policies relating to integration of climate change and water security in irrigation management in Vietnam

Integration of climate change is activity that adjust, additional measures to respond to climate change into development plans including policies, mechanisms and institutions related to the implementation of development plans, tasks and products of plan as well as the means and conditions for implementation development plan issued earlier to compatible with climate change trends, extreme climate phenomena and its impact on development plan.

Based on the challenges of water security and the impact of climate change, evaluation framework is proposed to assess the status and irrigation management policy in the context of climate change and water security as follow:

i. The policy is developed starting from climate change issues and water security or related to climate change and water security

ii. Water security and climate resilience has been integrated into irrigation management policies
iii. Measures to ensure water security and respond to climate change on the basis of assessment of challenges and impacts of water security and climate change
iv. Irrigation operation management has considered the measures to respond to the challenges and impacts of water security and climate change

Result of evaluation shows:
a) The policy is developed all comes from climate change issues and water security or related to climate change and water security
b) Water security and climate resilience has been integrated into irrigation management policy.
c) Measures to ensure water security and respond to climate change on the basis of assessment of challenges and impacts of water security and climate change.
d) Irrigation management activity has considered the measures to respond to the challenges and impacts of water security and climate change
e) The implementation in practice is limited because there is no binding mechanism. The new policy just stays at the dissemination, advocacy and advice level.

II. Methods to integrate climate change and water security into exploitation management plans of irrigation works

The steps taken to integrate climate change in the field of irrigation management as follows:

Step 1: Determine the integration content

a) Analysis, select climate change scenarios apply to region

- Currently, most provinces have used Down Scaling method to build climate change scenarios for their respective localities. Thus the scenario can collect in Natural resource and Environment Department. In case there is no local scenario use *Climate change and sea level rise scenario for Vietnam - Ministry of Natural Resources and Environment, 2012*.
- Using average scenario B2 to determine the impacts of climate change on irrigation management.

b) Analysis, screening the contents of irrigation management plan.

Define which parameters, factors serve irrigation planning affected by climatic factors, natural disasters and water security challenges. Identify areas and subjects of affected irrigation systems.

Irrigation management activities are carried out by exploitation irrigation works companies, water user cooperatives, agriculture cooperatives, water user associations. Irrigation management activities include the following:

- Irrigation plan: Before each production crop, Exploitation Irrigation Works Ltd are based on the agriculture production plan of local to plan irrigation for agricultural production area the system in charge.
- Operation, water distribution: operation, water distribution of irrigation system built by Exploitation Irrigation Works Ltd based on approved irrigation plan by Department of Agriculture and Rural Development.
- Maintenance irrigation works: maintenance plan of irrigation works are made and implemented before each irrigation season, special emphasis on on-farm irrigation.
- Financial management in irrigation works management

c) Determine the vulnerability level of affected objects, areas by level of climate change scenario development

d) Identify the response measures:

This step involves identifying a list of measures to adapt to climate change and water security. Its goal is to make a list of as many as possible adaptation measures, listed adaptation measures but not concerned about the feasibility, cost and other constraints factors. Analysing, assessing adaptation options will be implemented in the next step.

When determining the adaptation measures, it is necessary to note that:

- Identifying adaptation measures to climate change and water security challenges in irrigation management plan should correspond to the announced scenario

- Determining adaptation measures to climate change and sea level rise need to combine with existing disaster prevention solutions and measures to reduce greenhouse gas emissions.

- Practical investigation and tabulate the results as Table 3 and set a table for each stage.

e) Select adaptation measures

Based on the effectiveness of each option as well as the feasibility of implementation and funding requirements, solution has the highest total points prioritize to implement first.

- Do adaptation measures solve the major climate risks?
- Are the adaptation measures effective when taken together?

- Funds is appropriate to the reality of companies and local?

f) Public consultation on the plan integrated adaptation measures to climate change and sea level rise.

- In the process of identifying these contents has the participation of professional staffs and stakeholders

- After accomplishing expected integrated contents should consult the relevant agencies and water users.

- Once finishing consultation need to edit and submit to the competent authority for approval

Step 2: Implement and monitor

a) Implement irrigation management plan integrated climate change and water security

Once irrigation management plan integrated climate change and water security is approved, Company, enterprise is responsible for the implementation of the approved content.

The implementation of adaptation measures must be carried out timely avoiding the delays, dephase compared with the evolution of climate change

b) Monitor and evaluate the implementation of policies and integrated irrigation management activities

In the process of implementing adaptation measures to climate change and water security, need supervise:

- Performed as designed?

- The adaptation measures are appropriate?

- Need to adjust which certain items accordingly?

After the first year and then every 5 years and at the end of one phase should assess:

- Results of integration;
- Effect of integration
- Adjust the plan for the next period

The monitoring and evaluation needs to be planned in detail, including: objective assessment, achieved results, who will implement, review and ... Which methods and assessment tools are required to answer the evaluation questions? How long is the timeframe of evaluation process? Assessment plan should be included in the process of integrated implementation. This helps ensure sufficient financial and human resources to carry out the assessment.

The results of monitoring and evaluation should be discussed in order to adjust the plan accordingly and ensure its goals.

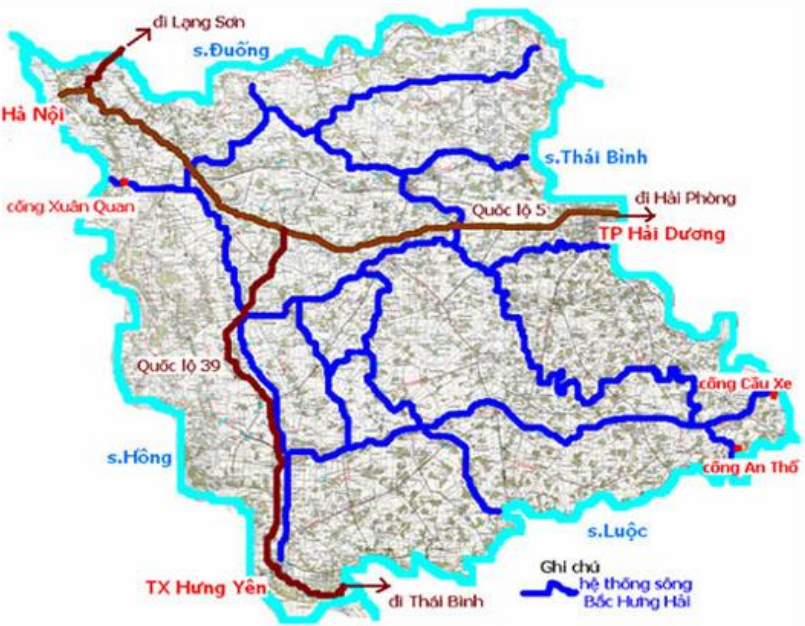
Workshop introducing Measures to integrate climate change and water security in managing operation system in Bac Hung Hai Irrigation system on 25th November 2015

Participants:

- Bac Hung Hai IMC

- IMC of Hai Duong, Hung Yen, Bac Ninh province and Ha Noi city

- Representative of AFD, experts



Bac Hung Hai Irrigation system map

Bac Hung Hai irrigation system was built in 1958, located in the central of Red River Delta, belonged to Hai Duong, Hung Yen, Bac Ninh and Ha Noi. Duties:

- Water supply for irrigation of 138.900 ha rice
- Drainage for 192.045 ha
- Water supply for industry and aquaculture
- Water supply for millions people in the area.

III. Roadmap for integrating climate change and water security into irrigation management in Vietnam

A specific objective of "Action Plan on Climate Change Response of Agriculture and Rural Development sector period 2011-2015 and vision to 2050" is: *Develop policies, integrate climate change issue into sectoral programs and specific duties; strengthen and complete the organization system, identify responsibilities of related institutions and capital sources, management mechanism of specific duties in the action program for climate change mitigation and adaptation of the sector*.

Directive No. 809 / CT-BNN-MOST, 28th March 2011 of Minister of Agriculture and Rural Development on "Integrating climate change into the development, with approval and implementation of strategies, plans, programs, projects of agricultural sector and rural development, period 2011-2015" of which has task for irrigation sector.

3.1. Vision of integration roadmap.

Vietnam's irrigation systems adapt to the conditions of climate change and water security challenges; sustainable agricultural production and guaranteed food security.

3.2. Integration roadmap objectives.

Integrating climate change and water security into irrigation management activities; ensuring sustainable development of irrigated agriculture in the context of climate change and water security challenges in Vietnam

3.3. Achieved requirements of integration roadmap

- Integration obtain the guidance of specialized management agencies - the General Department of Irrigation – MARD, have the participation of stakeholders from state management agencies at all levels to irrigation management company and water users.

- Policies related to irrigation management continues to be integrated measures to climate change response and water security challenges.

- Managing operation irrigation system plan is integrated measures to climate change response and water security challenges.

- Integrating measures to climate change response and water security challenges in managing operation irrigation system must start from the policies related to irrigation management of irrigation system

- The integration applies to all irrigation systems across the country and integrated management operation irrigation system must be implemented in the management process.

- Due to the nature of climate change and water security challenges, it is necessary to evaluate the vulnerability status in provincial or regional scale to ensure adaptation measures are appropriate both economic and technical.

- Monitoring during the implementation roadmap for timely adjustments and to take support measures and evaluate the results after implementation.

3.4. Roadmap for integrating climate change and water security into irrigation management

Phase one - Preparation.

a) Establish a working group of the General Department of Irrigation – MARD

Tasks:

- Develop policies, mechanisms serving integration.

- Direct the implementation integrated roadmap in the country

- Develop plans to implement integrated roadmap in the country

- Develop training programs on capacity building on methods and knowledge about climate change and water security.

- Monitor and evaluate the results of the roadmap in the country

b) Establish a working group in Department of irrigation – Provincial Department of Agriculture and Rural Development

Tasks:

- Direct the integrated roadmap within the province

- Organize training courses on capacity building on methods and knowledge on climate change and water security.

- Monitor and evaluate the implementation and results of the roadmap within the province (organize implementation, monitor and evaluate).

- Overall assessment within the province

c) Capacity building to serve the implementation of integrating climate change and water security

- Disseminate the integrated framework for each province (or region) by the partition of the latest "climate change and sea level rise scenarios in Vietnam" announced by the Ministry of Natural Resources and Environment.

- Develop training content includes: knowledge about climate change and water security, potential adaptation measures

- Guiding vulnerability evaluation methods under the climate change and water security scenarios

Phase two: Integrating climate change and water security into policies and mechanisms on exploiting irrigation works.

a) Review existing policies related to irrigation management issued by the government as well as the provinces and cities to integrate climate change response and water security

b) Develop policy evaluation framework based on the objectives and requirements of the integration of climate change and water security

c) Review the policy based on agreed evaluation framework.

d) To supplement the deficit on the policy response to climate change and water security in existing policies.

e) Plan to implement integrated irrigation management in the whole country and each locality.

Phase three: Integrating climate change and water security into exploitation irrigation works management plan of each system.

This is the core stage of the program, implement integration climate change and water security into irrigation management plan of individual irrigation system.

For each provinces need to do a pilot to take experiences and then develop the whole province.

3.5. Measures to implement the roadmap.

a. Establish a working group on integration

This is a standing unit, monitor, urge and evaluate activities related to the integration of climate change and water security challenges. The working group is under the General Department of Irrigation and located in Department of Administration works and Dam safety.

b. Measures on mechanisms and policies

The integration of climate change and water security in irrigation management requires the involvement of all agencies under MARD related to irrigation and should be concretized by the text direction of the competent authorities at the central and provincial level.

c. Develop detailed roadmap

Based on the above roadmap framework, each level (MARD, DARD) develop specific roadmap associate with time to accomplish the integration.

d. Enhance access to climate information

A prerequisite condition on making decisions process about climate change response is to be based on the available, most reliable information on climate change, including information on current climate, extreme climate phenomena, documents about climate in the past and updated to the present time, climate change scenarios.

Results of assessment on the impacts and damage caused by climate change to irrigation management. These materials are stored at the Center for National Hydrometeorology and other agencies in the branches of Hydrometeorology.

e. Training

- Develop a training plan to raise awareness for those performing the task of managing exploitation irrigation works and dam safety.

- Develop and promulgate training curriculum, training for officials and workers who manage and operate irrigation works.

f. Finance solutions

Based on a detailed roadmap and contents to implement of each level, agencies need to make a detailed estimation to serve the integration.

g. Supervise and evaluate the roadmap implementation process

- Develop monitoring, assessing indicators

- Evaluate results after the end of deploying a given phase.

- Assessment report on the implementation of integration climate change and water security into irrigation management.

INTEGRATING CLIMATE CHANGE AND WATER SECURITY INTO OPERATION MANAGEMENT PLAN OF IRRIGATION SYSTEM THONG NHAT PUMP STATION

I. Irrigation System of Tien Hai District, Thai Binh Province

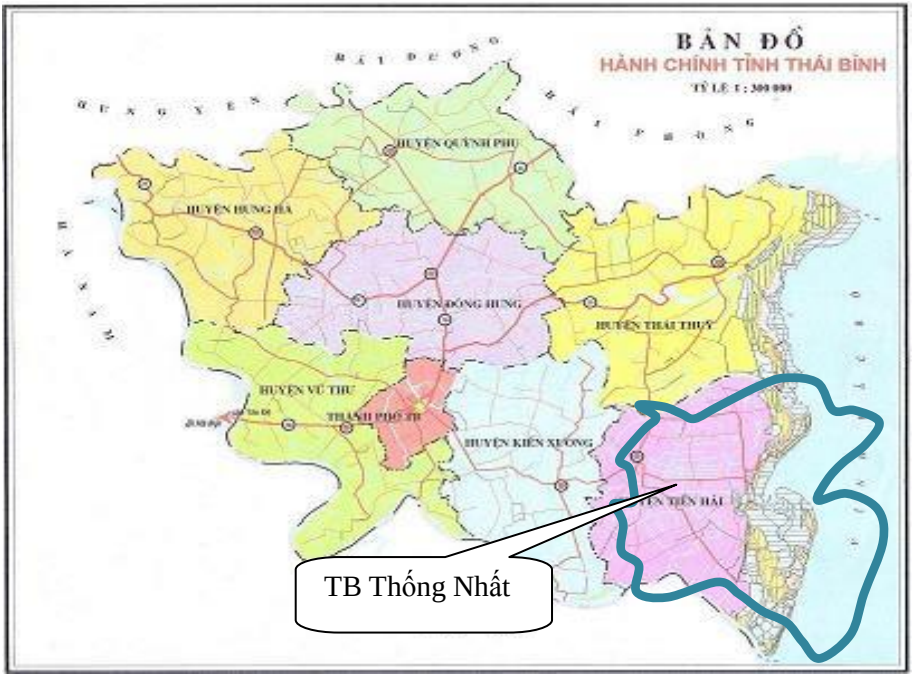
Thong Nhat Pump Station of Tien Hai District, Thai Binh Province was selected as a pilot to integrate climate change and water security. This is the area affected by climate change and sea level rise

Irrigation system of Tien Hai District under irrigation system of Nam Thai Binh, Thai Binh Province. Irrigation system of Tien Hai district is divided into 3 separate irrigation zones:

- East zone is for irrigation of the cultivated area around 4.500ha from Thong Nhat Pump Station and water from Tra Ly River

- South zone is for irrigation of the cultivated area around 6.700ha from Bat Cap Pump station and water from the Red River, and

- The region located between Thong Nhat Pump station and Bat Cap Pump station around 2,000 ha



Location of Thong Nhat Pump Station

Thong Nhat Irrigation Pump station:

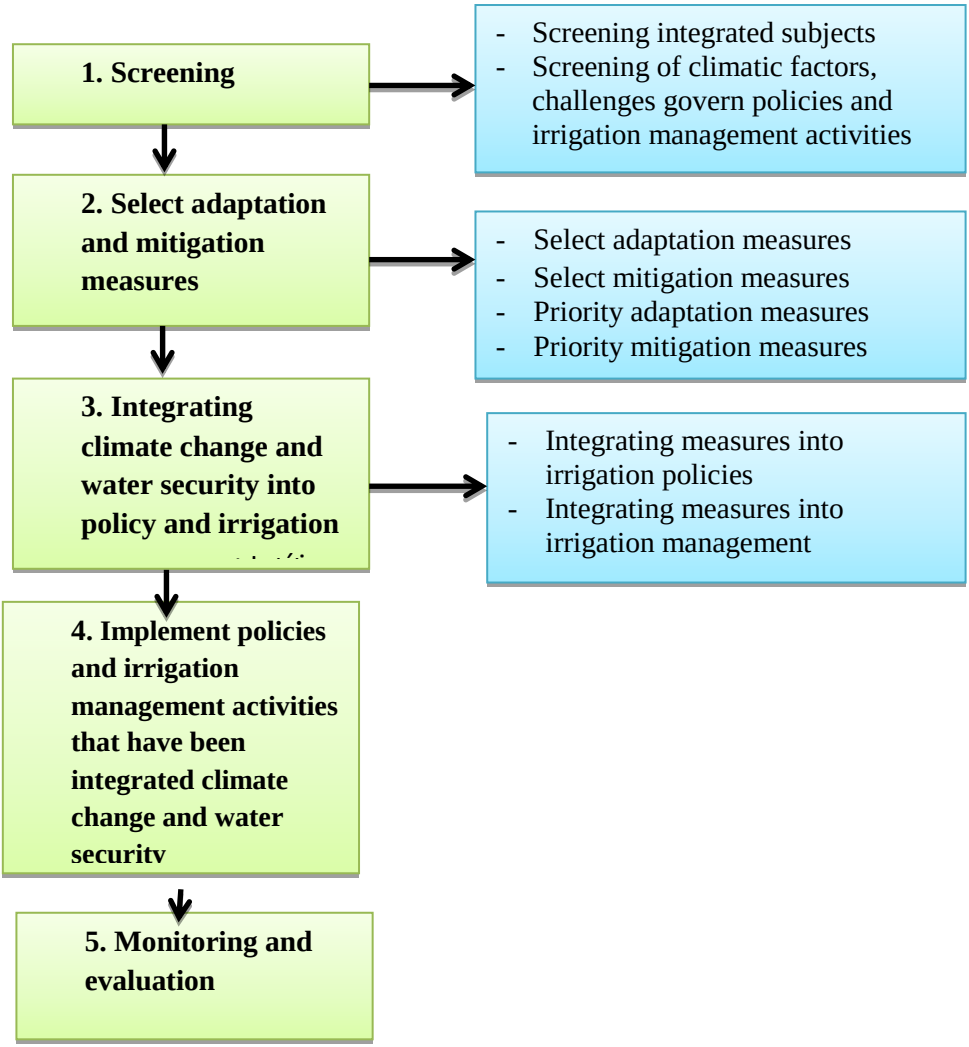
- The total area under cultivation is 5.482,78 ha, coastal areas be salinization

- Chanel length of about 300,1km, including 7.1 km chanel for irrigation water, the rest combine irrigation and drainage.

II. Implement integration

Based on measures to integrate climate change and water security into irrigation works operation management plan

presented above, experts implement integration with the following steps:



UBND TỈNH THÁI BÌNH
CÔNG TY TNHH MTV KTCTTL NAM THÁI BÌNH

CỘNG HÒA XÃ HỘI CHỦ NGHĨA VIỆT NAM
Độc lập – Tự do – Hạnh phúc

Thái Bình, ngày 29 tháng 01năm 2016

Xác nhận thực hiện điều hành quản lý hệ thống tưới trạm bơm Thống Nhất sau khi được lồng ghép biến đổi khí hậu và An ninh nước

Công ty TNHH MTV Khai thác Công trình thủy lợi Nam Thái Bình xin gửi tới Mạng lưới Cộng tác vì nước của Việt Nam (VNWP) lời cám ơn vì đã lựa chọn Hệ thống thủy lợi Nam Thái Bình để thực hiện các nghiên cứu "Lồng ghép Biến đổi khí hậu (BĐKH) và An ninh nước (ANN) vào lập kế hoạch tưới" trong khuôn khổ chương trình WACDEP Việt Nam trong năm 2014 và 2015.

Trên cơ sở các kết quả nghiên cứu năm 2014, năm 2015, Công ty TNHH MTV Khai thác Công trình thủy lợi Nam Thái Bình đã cùng Mạng lưới Cộng tác vì nước của Việt Nam thực hiện lồng ghép biến đổi khí hậu và An ninh nước vào Kế hoạch quản lý vận hành hệ thống tưới trạm bơm Thống Nhất, Tiền Hải thuộc hệ thống thủy lợi Nam Thái Bình, tỉnh Thái Bình.

Công ty TNHH MTV Khai thác công trình Thủy lợi Nam Thái Bình sẽ chỉ đạo xí nghiệp Khai thác Công trình thủy lợi Tiền Hải triển khai thực hiện bản Kế hoạch quản lý vận hành hệ thống tưới trạm bơm Thống Nhất đã được lồng ghép các giải pháp ứng phó biến đổi khí hậu và các thách thức an ninh nước trong điều hành quản lý của Xí nghiệp ngay trong năm tới.

Công ty TNHH MTV Khai thác công trình Thủy lợi Nam Thái Bình đề nghị dự án tiếp tục cùng Công ty theo dõi đánh giá trong quá trình thực hiện để tổng kết rút kinh nghiệm triển khai các hệ thống tưới khác trong Công ty và tỉnh Thái Bình.

Trân trọng cảm ơn./.

Công ty TNHH MTV KTCTTL
Nam Thái Bình

CHỦ TỊCH CÔNG TY
Đỗ Mạnh Hùng

Agreement to implement integrated irrigation system operation management plan of Nam Thai Binh IMC

III. Evaluation results of integration climate change and water security into operation management plan of Thong Nhat Pump station

✓ Positive

- The process of developing integration plans was implemented as directed.
- Working group has improved the implementation process by dividing into smaller steps to match the actual conditions in their localities, as follows:

Guidline	Actual implementation
Step 1: Identify integration contents	Step T1. Screening Step T2. Select adaptation measures
Step 2: Integrate	Step T3. Integrate climate change and water security into irrigation plan
Step 3: Implement and monitor	Step T4. Implement integrated operation management plan in Thong Nhat Pump station Step T5. Monitor, evaluate

- Integrating climate change and water security into operation management plan of irrigation system of Thong

Nhat Pump station is commited to implement by Tien Hai Exploitation Irrigation Works Company in 2016.

- Actively cope with salinization and extreme weather caused by climate change such as the effects of Hurricane No. 1 in 2016.

- System operated well that ensures stable irrigation, yields are not decreased even though affected by saltwater intrusion and extreme weather events.

✓ The sides have not achieved during the implementation of integration plan.

- A number of response measures should be implemented, but lack of funding caused delays.
- At some early season moments, operation system plan did not coincide with cultivation plan of the people thus deacidification saline rinse thoroughly unfulfilled in some areas.
- Did not advocate, raise awareness of people about climate change and the need to cultivate during seasons such as sowing of the district plan.
- Did not open training courses for officials of enterprise on climate change and the implementation of integrating climate change into irrigation plan.

✓ The contents need to be adjusted:

- The integration steps need to be adjusted in the direction of split-step to match the level of the Irrigation Management Company.

- Detailed guidance on the use of climate change scenarios for each locality.
- Offer solutions to suit local realities simultaneously combined with the training, advocacy, raising awareness to ensure effective implementation plan.
- There should be participation of decision makers so the plan can be fully implemented.
- Continue to allocate funds to carry out monitoring and evaluation for the next season to get the comprehensive results on implementation integrated irrigation plan.

NATIONAL WORKSHOP

National workshop on Integration Climate Resilience and Water security into Irrigation Management in Vietnam on 26 November 2016 in Hanoi, Vietnam.

In the workshop Mr. Hoang Van Thang, Vice Minister of MARD, had been assigned to the related agencies for study and assimilate as general policies of Ministry of Agriculture and Rural Development (MARD).

More than 20 participants joined the workshop including Mr. HE. Hoang Van Thang - Vice minister of MARD; Mr. Nguyen Van Tinh Vice General Director of the Directorate of Water resources - MARD; Mrs. Le Thi Kim Cuc – Head of Science, Technology and International Cooperation Department (Directorate of Water Resources) – MARD; Mr. Dong Van Tu - head of the Water Resource Directorate's department of irrigation and dam safety, Mr. Nguyen Tung Phong – Vice Director of Vietnam Academy for Water Resources and consultations, young researchers; reporters of national new agencies and IMCs.

CONCLUSION

Agriculture in general and rice cultivation in particular is strongly affected of climate change phenomenon. Vietnam already has a low level of water security compared to regional countries, also is a country with primarily agricultural production so the integration of climate change and water security into policy as well as production is necessary, especially in the field of irrigation and irrigation management.

Results of integration climate change and water security in irrigation management in Vietnam was highly appreciated by Vietnamese authorities as well as a number of international organizations in Vietnam at the seminars.

VNWP-WACDEP program has really contributed to the policies and practices to respond to climate change and water security in Vietnam, to meet sustainable development goals.

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Irrigation reservoir

Irrigation pumping station

Irrigation canal

(photos from internet)

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