STAKEHOLDER FORUM FOR INCORPORATING CLIMATE RESILIENCE IN THE NATIONAL WATER RESOURCES POLICY ACTION PLANS

27-28, October 2014 Putrajaya, Malaysia

Jointly Organised by :



Malaysian Water Partnership (MyWP)



Department of Inligation & Drainage (DID) Malayola

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1. BACKGROUND

1.1 Introduction

As part of the Global Water Partnership (GWP) Water and Climate Change Program (WCP), Component 1 (Work Package 2) objective to support its national country partnership in the development of "National Development and Sector Plans related to Climate Change" a national stakeholder forum for incorporating climate resilience in the national water resources policy action plans was conducted on 27-28 October, 2014 at Putrajaya, Malaysia by the Malaysian Water Partnership (MyWP). The Forum was organized by MyWP in collaboration with the Department of Irrigation and Drainage Malaysia.

The objectives of the Forum are as follows:

- 1. To provide a forum for Malaysian water stakeholders to discuss and recommend improvement of climate resilience measures in the national water resources policy (NWRP) action plans,
- 2. To provide an opportunity for exchange and sharing of knowledge,
- 3. To enhance stakeholder ownership of the action plans, and
- 4. To support the development of specific national adaptation responses to promote water security and climate resilience.

1.2 Rationale for the Forum

In 2012 the Malaysian Government launched its National Water Resources Policy (NWRP). It was recognised that climate change was among the many issues which water resources in the country faced and that mitigation, rehabilitation and adaptation efforts would be needed. This is exacerbated by the increase in economic development and population which would place a higher demand for water use. The NWRP is expected to lead the drive for the sustainable management of water resources in the country together with economic development. The NWRP is based on the guiding tenets of water for people, water for food and rural development, water for economic development and water for the environment.

The NWRP states that "The security and sustainability of water resources shall be made a national priority to ensure adequate and safe water for all, through sustainable use, conservation and effective management of water resources enabled by a mechanism of shared partnership involving all stakeholders". The policy principles are for water security, water resources sustainability, and collaborative governance.

The third principle of the NWRP forms the rationale for this project. It recognises that stakeholders inclusion and collaboration is essential for the effective management of water. The efficient and effective management of water resources is a key focus for the conservation

and sustainability of water resources in the country. The Second National Communication (NC2) to the IPCC by Malaysia recognized the importance of stakeholder participation in water resources management, viz., "Another important component is stakeholders and community involvement in water resources planning and management especially at the local level, to ensure successful implementation of new water management communication strategies and programmes."

Under each of the NWRP principles, strategic action plans have been identified. They need to be translated into national action plans. For the success of these plans, all stakeholders should be involved. Through a consultative process, such as a Stakeholder Forum, the MyWP and DID Malaysia hope to improve the incorporation of climate resilience measures in the action plans and enhance stakeholder ownership of the plans. The Forum would also provide an opportunity for the exchange and sharing of knowledge and the development of a community of supporters for the national actions to be implemented.

Thus, the purpose of the Forum is to undertake stakeholder engagement for the development of specific national action plans under the NWRP to promote water security and climate resilience.

1.3 Report Structure

Chapter 2 gives the Forum Programme and Group photo. The Forum Programme consists of one key note paper, five thematic papers followed by a workshop where the stakeholders were required to discuss what needs to be done to incorporate Climate Resilience (CR) in the NWR Policy Action Plans, taking into account the existing action plans and implementation framework. Thus, the stakeholders were organized into the following four thematic groups.

- WG1 Flood Management
- WG2 Water for People and Industry
- WG3 Water for Agriculture
- WG4 Water for Environment

Each of the thematic group were required to review the thematic strategies that were extracted from the NWRP, National Climate Change Policy (NCCP) and Malaysia's NC2 Report to IPCC relevant to their group's theme and also the existing action plans that have been carried out by the five Working Groups that have been set-up to implement the NWRP.

Figure 1 is a schematic diagram showing the mechanism for the implementation of the NWRP. The figure shows that a Monitoring & Co-ordination Committee for the NWRP, chaired by the Secretary-General of the Ministry of Natural Resources and Environment (MNRE) has been set-up. Also, an Implementation Committee and Co-ordination Committee for the five Working Groups, chaired respectively by the Director-General of DID and

Director of Water Resources and Hydrology Section of DID, have also been set-up. The following are the five Worksing Groups:

- WG1 Governance
- WG2 Water Resources Information
- WG3 Study & Research
- WG4 Standard & Quality
- WG5 Capacity Building & Awareness



Figure 1 – Implementation Mechanism/Structure for the NWRP 2012

Chapter 3 gives the presentation slides of the six papers presented at the Forum together with the workshop briefing slides. The titles of the presentations are as follows:

- 1. Developing Climate Resilience
- 2. National Water Resources Policy Action Plans: Climate Resilience
- 3. Climate Change Resilience in the Agricultural Sector
- 4. Climate Change Resilience in Flood Management

- 5. Malaysian Climate Change Projections and its Implications for Water Resources and Extreme Events Management
- 6. Status of Climate Change Resilience in Malaysia: Research Findings & Recommended Action Plans
- 7. Workshop Briefing Notes

Chapter 4 gives the workshop outputs and recommendations presented by the four thematic workshop groups.

Chapter 5 gives the Forum summary of the current status, issues and Recommendations for the improvement of the climate resilience measures in the NWRP action plans.

Appendices gives the relevant Extracts from the NWRP, NCCP and NC2 Report to IPCC together with the status reports and action plans of the five NWRP Working Groups.

2. FORUM PROGRAMME & GROUP PHOTO

Day 1: 27 October 2014

TIME	PROGRAM					
08:00 am	Registration and Arrival of Guests					
08:45 am	OPENING CEREMONY					
	• Doa Recital					
	• <u>Welcome Speech</u> - YBhg Datuk Ir. Hj. Ahmad Husaini Sulaiman, Director General DID Malaysia, and Chairman, Malaysian Water Partnership					
	 <u>Keynote address</u> - "Developing Climate Resilience" by Dr Salmah Zakaria, United Nations Economic and Social Commission for Asia and the Pacific 					
	 <u>Official Opening</u> - YBh Dato' Sri Zoal Azha bin Yusof, Secretary-General, Ministry of Natural Resources and Environment Malaysia 					
	<u>Group Photo-Taking Session</u>					
10:00 am	Refreshments					
	TECHNICAL SESSION Session Chair: Datuk Ir. Mohd Adnan bin Mohd Noor					
10:15 am	<u>Paper 1</u> – "National Water Resources Policy Action Plans: Climate Change Resilience" (DID Malaysia)					
10:45 am	Paper 2 – "Climate Change Resilience in the Agricultural Sector" (Hjh. Zalilah Selamat, BPSP, MOA)					
11:15 am	<u>Paper 3</u> – "Climate Change Resilience in Flood Management" (Ir. Bibi Zarina Che Omar, BPB, DID Malaysia)					
11:45 am	<u>Paper 4</u> – "Status of Climate Change Resilience in Malaysia: Research Findings & Recommended Action Plans" (Dr. Saim Suratman, NAHRIM)					

12:15 pm	Paper 5 – "Malaysian Climate Change Projections and its Implications for Water Resources and Extreme Events Management" (Mr. Ling Leong Kwok, MMD)
12:45 pm	Lunch
14:00 pm	Briefing on the Workshop Session – Ir. Dr. Lee Jin
	Workshop Session 1 (4 groups) Flood management
	Water for agriculture
	Water for people
	Water for environment
17:00 pm	Refreshments & End of Day 1
17:00 pm <u>Day 2: 28 October</u>	Refreshments & End of Day 1 2014
17:00 pm <u>Day 2: 28 October</u> <u>TIME</u>	Refreshments & End of Day 1 <u>2014</u> <u>PROGRAM</u>
17:00 pm <u>Day 2: 28 October</u> <u>TIME</u> 09:00 am	Refreshments & End of Day 1 2014 PROGRAM Workshop Session 2
17:00 pm <u>Day 2: 28 October</u> <u>TIME</u> 09:00 am 10:30 am	Refreshments & End of Day 1 2014 PROGRAM Workshop Session 2 Refreshments
17:00 pm <u>Day 2: 28 October</u> <u>TIME</u> 09:00 am 10:30 am 10:45 am	Refreshments & End of Day 1 2014 PROGRAM Workshop Session 2 Refreshments Workshop Group Presentations
17:00 pm <u>Day 2: 28 October</u> <u>TIME</u> 09:00 am 10:30 am 10:45 am 12:00 pm	Refreshments & End of Day 1 2014 PROGRAM Workshop Session 2 Refreshments Workshop Group Presentations Closing and Summary of Forum Recommendations



Group Photo – "Stakeholder Forum for Incorporating Climate Resilience in the National Water Resources Policy Action Plans"

27-28, October 2014, Putrajaya, Malaysia

3. PAPER PRESENTATION SLIDES

3.1.Keynote Paper – "Developing Climate Resilience"

DESCAP	Contents	
THE RECEIPTION OF THE PROPERTY PROPERTY AND A DESCRIPTION OF THE PROPERTY	Introduction	
Developing Climate	 Mandates and Approaches 	
Resilience	 Understanding Resilience 	
Sec.	 Various Regional Initiatives 	
Owner Zwane Pild On SSC # Environment Development Dimension	Moving Forward	

Introduction



Mandates and Approaches



Approaches

- · IWRM
- · Green Growth
- Water-Food-Energy nexus
- Post 2015 Proposed SDG 6





IWRM evolvement

- Illusive IWRM success stories
 - Mar del plata -1977, Rio 1992 & Agenda 21, Johannesburg 2002, Rio +20
 - Development of green growth and the water-foodenergy Nexus
 - Prof Malin Faulkenmark SIWI Water
 - Conference, 2013

- While the sciences behind (WRM is strong and robust, in many countries, the disconnect between the sciences and the implementers is yet to be bridged

Green Growth









Understanding Resilience

Proposed SDG 6 on water

6+2 Targets

- 6.53y 2030 implement integrated water resources management at all levels, including through transformedary cooperation as appropriate
- 6.63y 2020 protect and restore water-related ecosystems, including mountains, forests, writiseds, rivers, aquifers and lates
- 6.0 to 2030, expand international spaperation and capacity-building suscent to developing countries in surrer and sanitation related activities and programmes, including water horizotting, devaluation, water efficiency, suscensative relations, recycling and result technologies.
- 8.5 support and strengthen the participation of local communities for improving actor and conducton management

Climate Change Impacts - focus on Water Issues

- Vulnerabilities

 Water supply
 - · Basic needs
 - · Find production
 - Security from excessive water floods, land slides, etc.
- · Building resiliencies from
 - Changing weather patterns
 - · Intensities, occurrences
 - Rapid development
- Hash floods, water pollution





Various Regional Initiatives









Moving Forward

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Water Resources Resilience



River Basin Master Plans

- A specific Basin Master Plan for each River Basin
 - Specific to the physical, social and economic needs of each basin
 - Cities and infrastructure planned and influenced by the physical limitations of each basin, and by the topography
 - National Physical Plan sheulti look at river basin as constraints in their regional, structural and local plans
 - And National Economic Development Plan be influenced by the National Physical Plan



Changing Rainfall Patterns



Local Level Resilience







National Physical Plan

Policies under the Syr National Development Plan

- 3 main Policies
 - National Water Resources Policy
 - National Policy on Climate Change
 - National Physical Plan, shall be reviewed every 5 years.
 - · NPP1 approved by NPPC, 26 April 2005
 - · NPP2 endorsed by NPCC, 13, August 2010
 - + NPP3 in preparation, launched 2015?

National Water Resources Policy

- The security and sustainability of water resources
 - A national priority, to ensure adequate and safe water for all
 - · Through sustainable use
 - Conservation
 - Effective management
 - of water resources
 - Enabled a mechanism of shared partnership involving all stakeholders

National Policy on Climate Change

- Ensure climate resilient development to fulfil national aspirations for sustainability
 - Mainstreaming change through
 - Whet management of resources and enhanced evolutionmental concernation resulting in strengthened accounts; competitiveness and improved quality of life
 - Integrated of responses into national policies plans and programmes
 - To strengthen the resilience of development from arising and potential impacts of climate change
 - Strengthening of institution and implementation capacity
 To better harness opportunities to reduce regative impacts









Green Economy & Technology



Innovation -defined

Implementation of

- a new or operformity improved new product (good or Service) or process, a new marketing method or a new organizational method in docrease processes, and place organization or external vehicless.
- · New and unique application of old technologies.
 - Using design to develop new products and services
 - New presences and directores to improve performance in diverse areas, organizational construity.
- Public sector initiatives to enhance delivery of services
- · Creating sustainable and cost effective solutions
- · Strategy for inclusive growth in developing economies
- Increasingly beyond the confines of formal research and development.

Innovative Technologies

Structures

- Design for eco-efficient water inhastructure for water supply, pollution and urban drainage to ment needs all its functions
- Product Development, Instrumentations and materials
 - pumps, modular structure, meters, insulators, filters, etc.

Treatments

- Industrial Waste Management
- Statement instead or sources of reliance same our and stat, charment, egg.
 Servings
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- mapping and some many





3.2. Paper 1 – "National Water Resources Policy Action Plans: Climate Resilience"

Agriculture # Municipalities # Industry







Climate Change and Its Impacts









EFFECT OF GLOBAL WARMING TO WORLD WATER RESOURCE

- What are our concerns?
- To what extent is the variation of climatic events will affect the hydrological characteristic of water resources in all time and space.
- Degree of climatic variation temperature changes, precipitation, evaporation rate, atmospheric properties.
- How will the variation in hydrological characteristics of water resources such as water level in rivers, discharge of rivers, water amount in soil and so on pose hazards to human lives such as events of floods and droughts.
- To what extent, changes to soil properties affect the magnitude of the subsurface rate of the stream flow and the magnitude of the stream flow itself.

EFFECT OF GLOBAL WARMING TO WORLD WATER RESOURCE

- Taking into consideration the effect of expected climate change, how human activity influences the hydrological processes mainly through change in land factors such as deforestation, changes in land cultivation and urbanization.
- How climate change will affect natural vegetation which is always adapted to the climate and forms its morphology in agreement with climate.
- The problem of climate shange is very important for water management because it is also highly sensitive to climate variation in all timescales.
- Water resources depend strongly on climate and the available water resources vary from one region to another in relation to the spatial variation of climate.

Clim	ate Chan	ge Imp	acts in f	Malaysia	Observ	ed Climate	Change in	Malaysia	
					See 1	GLOBAL*		MALAYSIA**	
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Lainfall	+113vexCirba	+1111000 (995)	+36000(20%)	1 31 A 19 3	 Malaysia sea le 1986 to 2006. 	set has risen at a	n average rate of	1.25 mm per year o	







Climate change in relation to Water-Food-Energy Nexus



Initiatives by the Government









Water Footprint and Ecological Sustainability

What is the country's actual water footprint and the availabled cost ?

- . Are an asporting-toots maker than we can afterd, without knowing \$7
- Are an <u>and/or solution and possible locause we have need taken water loadpoint into consideration to water pricing?</u>
- How do as use calculate more productively and lower marginese north foregoint?
- Busing high We need to identify the river basine 'W' as manify and pallation will soon be as hears.
- Summinum The Approximate process efficiency and contradiction by identifying and reducing ments. (Reductions is water consumption with correlate to reductions in expension-real)
- Bostsmability Reseasants to help us change connect publics and plan for amonging articles regulations. (New regulations, anticing schemes, and new or higher flows are ment likely to energy in hot spots and areas with increasing competition for water resources).
- · Water footprint reduction is a shared responsibility
- and server of design in the and another and the two buy transmission of all pro-

INITIATIVES BY THE GOVERNMENT National Climate Change Policy

PRINCIPLES

Manufactor recognizione the advances (Chertz and Preparity of University and University in the Institution of instrument resources that a constrained advances, and and excession of the Annual preval goals laced on the Johnson Jo

P2 Development on a Summable Parts

integrate denses of ange response this national development plane to July the asserts's summary to controlled development.

P2: Conservation of Environment and Natural Resources

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conservation and suttainable use of national relations. FS-Caserdinated implementation

2. Cascelenand anglementation logipoide climate change solutions and institutionalization of development programmics at all leads.

At (Sector Antopolies

ingener participation of distributions and regar provatifier effective reglevantation of choses charge reserves.

P): Common but D)(Investigated Repressibilities and Repartive Capabilities International involvement or climote charge soft is based on the annuals of summer investigates repressibilities and reparties equipables.



OUTLINES

- 1. Water Resources
- 2. Climate change finding (Global/ National)
- 3. Climate Change And Its Impact
- 4. Climate change in relation to Water-Food-Energy Nexus
- institutives by the government
- National Water resources Policy in Addressing Climate Change

 - Plan of actions under NWRP addressing

Climate Change

- 7. Related immediate programs to be carried out by 3%
- E. What Next 7
- 8 CONCLUSION

NATIONAL WATER RESOURCES POLICY (NWRP) IN ADDRESSING CLIMATE CHANGE





National Policy on Climate Change - 2009

POLICY STATEMENT

Ensure climate-resilient development to

Water Resources related matters in the Climate Change Strategic Action Plan

- Develop multiple national climate and hydro-climate projection models for identifying vulnerabilities and assessing potential impacts of climate change.
- Integrate CC measures into policies, plans, programmes and projects in outural resources and environment (weter, biodiversity, forestry, minerals, soll, coastal)
- Integrate climate change considerations at the planning level by applying tools that includes the integrated Environmentally Sensitive Areas La
- Establish and implement a national R&D agends on climate change taking into account the following areas: agriculture and food security; matter metantly and services; Forestry and ecosystem services; inclused modelling for projection of huture scenarios; Vulnerability due to extreme weather events and natural disesters; and

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			28
6	10		200
		16	

Natio	nai Water Br under	esources Policy (DSAN) and Plan of actions DSAN addressing Climate Change.	National Wa	ter Resources Policy nder DSAN address	(DSAN) and Plan of actions ing Climate Change.
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- What more we can do at National Level
- Implement the National Policy on Climate Change

 Identify the "who, the where and the when"
 - Provide the nesassary resources for the implementation
 - Main stream adaptation implementation and operations & maintenance requirements in all national development plans.
- · Create awareness, build capacity and share information
- Bring in community participation
 - Policies may be at national level but - Impacts are thit at lacat level
- Continue Research on Adaptation
- With facus on planning & design requirements of hydrwalic structures
- Continue to engage actively with international organization

 Aways, there is something to learn and something to share
 - Identify what the country needs
 - * Not only at the publicy and trade level that also
 - At the technical level ~ assessed youting align technicary

WHAT NEXT ?

What we are doing at the global level

Continuing to search for better understanding of the issues and better and more confident solution from ;

UN Agencies

- IPCC Inter-governmental Panel on Climate Change.
- + SREX Special Publication on Extreme conditions
 - AI5
- UN Waters group UNESCO, UNDP, UNEP, UNHABITAT, UN Regional Commissions (ESCAP, ECLAC, ESCWA) etc

APWF – Asia Pacific Water Forum

 Working with partners and other Water Knowledge Hubs (WRH) in various countries.

CONCLUSION

- Need to accept the fact that climate change plays a fundamental role in shaping natural ecosystems, and the human economies and cultures,
- Climate change can affect many related aspects such as food production, availability and use of water, and health risks,
- translate national policies related to climate change to real action plans
- urgent need to develop programs related to adaptation of climate change in the water sector and secure funding
- more aggressive in educating publics and creating awareness on climate change and its impacts
- · get all stakeholders to be involved



3.3.Paper 2 – "Climate Change Resilience in the Agricultural Sector"









3.4.Paper 3 – "Climate Change Resilience in Flood Management"



Climate change trends indicate that in the future, we are more likely to experience:

- warmer temperatures
- increasing amounts of precipitation
- greater UV exposure;
 sea level rise (higher tides)
- stronger winds, storm surges
- more frequent storm events; and
- · more frequent 'extreme weather events' such as heat
- waves, droughts, and heavy precipitation in the form rain, snow or ice storms, coupled with strong winds.

What is Climate Change Adaptation?

Climate change adaptation is about taking actions that will help to reduce the impacts associated with anticipated climate change trends, events and hazards. It is also about taking advantage of new opportunities that may be created as a result of climate change.

We recognize these challenges, and our engineers and planners work with clients to find the right solutions that manage risk, protect people and assets, meet regulatory requirements and offer long term resilience against further variability and change

Flood Events in Malaysia

- Major floods was recorded since 1926 fallowed by 1949 and 1971
- 95 (30,000 sq kes) of the total area of the country is prove to flooding
- Approx 4.8 mill people live in areas prone to flooding
- Recent flowb 3006, 2007 and Jan 2011, some urban areas in Johor - Including Segenat, Johor Ilhans, Kluweg, Kuta Tinggi and Muar were flooded and completivity cut off
- In this state alone between 40,000 -30,000 people were evacuated and at least two people died in this particular experience
- Both waves of these disasters were considered to be the costliest floods in Halaysia's history with a total cost of RM 5.5 Differen.

Challenges in Flood Management

- Floodplains are continuously being developed
- Residents/stakeholders have high expectations and less tolerance towards flooding
- Structural flood management costs is rising.
- Non-structural approach has not been well.
- accepted (IFM, IWRM) Global climate change

FLOOD RISK MANAGEMENT IN CLIMATE CHANGE RESILENCE

Aims to :

- Control and reduce occurrence flooding
- Reduce damage and flood losses
- Protect life and prevent damage to property

How to overcome?

- Adopt concept of Living with Floods and Incorporate Integrated Flood Management (IFM) in development plans
- Adopt BMP's in CCF
- Stakeholder's Engagement

Integrated Flood Management

- It is an integrated approach for an effective an efficient flood mitigation management, which maximize the efficient use of flood plain and minimize damage to properties and loss of life.
- IFM concept of living with flood is based on the following principles:
 - * Employ hasin approach.
 - . Treat floods as the water system
 - + Wegrate land and water management
 - » Adapt mix strategies based an risk management.
 - appmaches"
 - + Ensare participatory approach

Adopt BMP's in CCF

- Best practice in flood management is to consider and plan for a 1:100 year flood event. This is an event that has a 1% chance of occurring in any given year, over a hundred year period of time.
- In preparing for such events, flood hazard maps has to consider the CCF in the 1:100 year flood event
- Natrim's Technical Guide No.1 Estimation of Future Design Rainstorm under the Climate Change Scenario in Peninsular Malaysia predicts that the total water level associated with a 1:100 year flood is anticipated to increase over time, as a result of climate change.

Stakeholders' Engagement

Education, consultation and partnerships can assist to reduce and address the potential impacts of flooding;

- Policy Maker Preparing policies and funding
- Technical experts research, preparing regulations for physical adaptation
- Government officers implementation, monitoring and enforcement.
- Community representatives understanding and participation



- Sg Batang Sali catchment is one of the major sub-basiss and located on the east of Sg Selanger Basis.
- It has an area of approximately 150 km² which line wholly within the State of Selangar.
- The catchment area spreads wholly within Hulu Selargie District.
- The river originates from the fully terrate on the east at Gentring Highland and forming to the vest was the fully developed agricultural lands and later person through the marity flat but demoly populated low plates of Batang Kalt Town in the middle reaches.
- Throughout the journey, the Sg Balang Kall will also receive more discharges from its major tributaries namely 5g Liam, 5g Maxin, 5g Pallang and 5g Kalang before ends into 5g Selargen.











3.5. Paper 4 – "Status of Climate Change Resilience in Malaysia: Research Findings & Recommended Action Plans"





- Climate change resilience can be generally defined as the capacity for a socio-compose system to: 1. absorb stresses and maintain function in the face of external stresses imposed upon it by climate
- chickle and 2. adapt, reorganize, and evolve into more desirable configurations that improve the molarinability of the system, leaving it better prepared for future climate change impacts. 0

it is the ability to survive and recover from the effects of climate change.

From sellipedia and Richefellet Foundation





NAHRIM CLIMATE CHANGE AND WATER R&D












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	to man a financial	Minepu	42.2	40.1	1493	19199-A	10.1	100
		Province	100.0	100		terr-	1	100



VULNERABILITY AND IMPACT ASSESSMENT













ADAPTATION MEASURES

Ongoing Adaptation studies (2014):

- Study on vulnerability and adaptation of climate change impact on floods in selected river basins.
- 2. Impact of climate changes on water resources for selected plantation areas in Malaysia for Paddy, Rubber and Oil Palm.
- Study on vulnerability, adaptation and assessment for water resources and dam storage capacity under climate change impacts scenario.













DISCUSSION AND RECOMMENDATION

The hydro-climate data over Peninsular Malaysia (PM) for the 21st century, generated by NAHRIM RegHCM-PM2, (hourly intervals at the scale of hill slopes of 11 selected watersheds for 1440 years) provides significant opportunity to the National Stakeholders to re-evaluate the PM's water resources and its existing and planned hydrautic structures under the hydro-climate conditions of the next 90 years of the 21st century

with respect to:

DISCUSSION AND RECOMMENDATION

A: Floods:

- The capacities of the existing and planned dam spillways
- The capacities of the existing and planned flood levees
- The flood operation rules for the existing and planned dams
- Delineation of flood zones for the important urban and industrial areas under various return period flood magnitudes (peaks and volumes) during the 21st century;

DISCUSSION AND RECOMMENDATION

- B. Droughts/Water Supply
- Evaluation of existing/planned dam reservoir capacities, and revising their dimensions, if necessary;
- Development of the operation rules of existing/ planned dams
- In order to meet the specified water demands during the 21st century:
- utilise the hydro-climate conditions at the particular drainage areas of the specified dams, already simulated by this study at 11 selected watersheds of IPA.
- Dam operation studies that can be performed by means of the projected dam inflows (already simulated by this study) can determine the necessary reservoir capacities in order to need, the critical water demands during future droughts with their quantified

RESPONSES TO CLEMATE CHANGE

National Policy on Climate Change

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A REAL PROPERTY AND INCOME.

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Anterpretion of responses into batterial polyton, plans and programs to decreption to indicate of development from arteria and

* shreegthering of methational and

construction of a second residence in particular characteristic of the second processing second seco 3.6.Paper 5 – "Malaysian Climate Change Projections and its Implications for Water Resources and Extreme Events Management"









Climate Change Projections for Malaysia









Implications for Water Resources and Extreme Events Management





3.7.Workshop Briefing Notes













Workshop Organization - 1

- Divide into Four Groups:
- * WGt Flood Management
- · WG2 Water for People and Industry
- · WG3 Water for Agriculture
- · WG4 Water for Environment
- Each Group shall discuss what needs to be done to incorporate Climate Resilience (CR) in the NWR Policy Action Plans, taking into account the existing action plans and implementation framework
 - (e.g. Five WG under NWRP)



NWR Policy - Targets related to Climate Resilience

- Target og: Reduce velnerability of water resources to impacts and threats
- Target off: Adopt a rational Disaster Reduction, Preparedness and Response plan for water resources types
- Target in: Detremine priority for water resiseon use, particularly in times of crisis or threats
- Target to Posteck condition and state of water resources, satchment and badies
- * Target 14: Adopt meanants in implement water demand management
- * Target 17 Build capacity of key water resources stakeholders
- Target ill Inspirors understanding and awareness on the importance of water resources society and unitalisability.

NCC Policy - ST related to Climate Resilience

- ST2-P1: Institute measures to make development climateresilient
- ST3-P1: Support climate-resilient development and investment
- ST4-P2: Adopt balanced adaptation and mitigation measures
- ST9-P4: Increase awareness and community participation to promote behavioural responses to climate change.

Workshop Organization - 2

- Each Group shall elect a <u>Chair and Secretary</u> to lead and prepare the group's presentation.
- Either of them can present on behalf of the Group.
- Proposed Template for Group's presentation
 - Issue What is the issue area under the respective theme?
 - Status What has been done so far to increase CR?
 Not aware of need for CR, 2. Aware but no action plan
 - yet, 3. Action plan developed, 4. Action plan implemented
 - Recommended Actions
 - Recommended Dept./Agency to take action

4. WORKSHOP OUTPUTS

The following are the Group Presentations for the four Workshop Groups:

- 1. Flood management
- 2. Water for agriculture
- 3. Water for people
- 4. Water for environment

4.1. Group 1 (Flood Management) Presentation



Regit	CM PM2 m mean	Simu	lated A	verage, harge (c	Maxim (ms) at	um and selected	Uncertainties In Climate Modelling
wate	rsheds.	1976-	2000 ar	d 2010-	2100 p	eriods	Terrors in the driving AOGCM
	Average		Managem		Manan	- 1	and the statement of th
	Hannah	Faint	Housed	Fater	Bannick	d Fater	Second States of Second
ies Paler	22.1	29.9	104.0	283.2	8.8	4.9	A REAL PROPERTY AND A REAL PROPERTY AND A REAL PROPERTY AND A REAL PROPERTY.
des .	67.9	113	519.4	791.8	12.9	25.8	Future emission scenarios / Future atmospheric
loide	94.2	301.7	100.6	29623	34.2	15	greenhouse gas concentrations
risig	30	41.3	148.1	208.2	0.9	84	Incomplete understanding of global and
destroit.	106.1	404.0	4047.5	00114.7	92.1	313	regional climate system
a gata	20	29.7	129.1	346.2	3.6	1.0	Natural variability
-	54.9	81.1	401.7	34343.2	0.0	1.0	
dang .	465.8	100.8	3168.3	4945.7	33.6	11.1	
test.	300.8	90.4	26/6.2	9936.9	14.1	48.9	Vie.
linge	41.9	88.3	315.3	2189.2	12.2	11.7	
net ber	543	38.7	418.9	478.3	3.8	12	
	ishal wa	rming iobal gr	is unequ	ivocal :			ISSUES + CC potentially increases Rainfall amount & intensit
Investment in projects to reduce climate change adverse effects should coosidered the uncertainties of climate projections				o reduce effects sl ities of cl ires that	hould lenate	higher flood magnitude However, the increase is expected to be very grad and highly uncertain (MMD & Nahrim studies) More concrete studies needed to confirm CC imp on RF characteristics before implementing the CI SLR is confirmed and the magnitude is more cert	
e	rowth an	nd land	-use chi	inge		1 de la	 FM option has to consider 5LK
000	d Mi	tiga	tion	Mea	sur	es	"No Regret" Flood Management Strategy to
Jrban	flash fl	oods a	nd main	n river fl	ooding		the Uncertainty in Climate Change
Street	ural and	Non	drawber	al mean	-	5°	* Since we do not know how high will be the flood level due to the
ATUCE	arai ano	reation	Arociui	or measure	ares.	2004	succertainty in CC the best approach is sort to carry out high density
struct	ural me te when	CCF is	are cost includ	ed (Bata	ng Kal	i case)	alverte passes to Read plana
CCF in mpler	npleme mented	ntation when o	n should	l be care e results	fully st are ob	udied and tained	Carlos
CCF sl testing	hould be g	e use fo	er sensit	ivity and	ilysis a	nd options	Corver Store
Non-s (buffe Traini	tructura r strip, b ng, CB, c	ul meas own pl etc)	aunes an lanning	e encour , flood z	aged fo	or CCR FFWS,	

STRATEGIES	RECOMMENDATION ACTION	RECOMMENDED DEPT/AGENCY DID/Local Authorities/ Designer	
Control and reduce occurrences of flooding	 i. Provide adequate allocatios ii. Proper maintenance of FM infras iii. MSMA/BMP's/RWHS iv. Incorporate CCF/SLR into Drainage Masterplan v. Adopt design that can be adaptive to CC vi. Town planning(Increase non paved areas, Resettlement, etc) 		
Reduce damage and flood loses	 Adaptive Flood Proofing measures Provide adequate Setback/ Buffer Strip Flood Zoning 	Local Authorities	
Protect Life	 i. Increased insurance ii. Flood forecasting & warning system iii. CB / Training 	DID, NGO,	

4.2. Group 2 (Water for Agriculture) Presentation



Incorporating Climate Resilience in The Agricultural Water Policy Action Plans

Technical plans				
Action Plans	Action plan implementation	Recommended Actions	Recommended Dept/Agency to take action	
Improve Water Management	-Precision Farming - Rainwater harvesting -Good Agriculture Practice (GAP) -SOP	-Improve Method (Increase the Water Use Efficiency) Drip & Sprinkler Irrigation,		
Alternative Water Resources for Irrigation	-Water recycling -Rainwater harvesting -Ground water -Available water storage	-Refine Brackish Water -Maintain and Upgrade Water Deposits	MOA, DOA, MARDI and related agencies	
Improve characteristic of planting material	Drought Tolerant Plants, Water Efficient Plant.	Screening Varieties of Plants Tolerance to Drought		

Incorporating Climate Resilience in The Agricultural Water Policy Action Plans

	Financia	d plans	
Action Plans	Action plan implementation	Recommended Actions	Recommended Dept/Agency to take action
Subsidy for Crop Planting (Fertilizer, Seeds, Water)	-Specific/New Governmental Acts -Encourage Farmers to desert Traditional Farming Habits.	To Mandatory Use New Technologies and Achieve Targeted Yield to Deserve the Subsidy Supplement. (MRQ176 (Paddy)	моа

4.3. Group 3 (Water for People) Presentation



ISSUE 4

Recommended actions

- Perfomance based budget for environmental maintenance and monitoring
- b) Insentive from Federal Government to protect the environment

Recommended Agency

a) EPU

b) UPEN, State

ISSUE 5

2. Photocompletion of the campulation Acro

Recommended Actions

- a) Adhere to holistic planning like IWRM, IRBM and NPP (2), Sabah Structural Plan, Spatial Planning (Sarawak), Strategic Environmental Impact Assesment (SEIA)
- b) Prohibit degazettement of water catchment area
- c) Protection of catchmerit area under state land and alimated land

Recommended Agency

- a) NRE
- b) KPKKT
- c) Pejabat Tanah dan Galian Negeri
- d) KPTG

CONCLUSIONS

Protecting ecosystem will provide resilience against changing climate because natural ecosystem regulate

- A) water cycle
- B) create natural defenses against the impact of climate change
- C) Example flood plain, mangroove
- D) Reduce rehabilitation cost
- Cost effective measure

Disaster and land slide

4.4.Group 4 (Water for Environment) Presentation

Group 4	Current Issues
Water for People	 Increase of pollution, Dry season- low flow, high concentration (PTS 13, PTS 14) Raw water source shortage (PTS 17, PTS 19, PTS 33, PTS 34) Lack of awareness on value of water due to low water tariff (Target 14, 18). Shortcomings of infrastructure in WTP/ supply/system to meet CC challenge. (None)
Status	Status
s. Increase of pollution, Dry season- low flow, high	2. Raw water source shortage. (PTS 17, PTS 19 PTS 33, PTS 34)
Target o5: Reduce vulnerability of water resources to impacts and threats.	Target o5: Reduce vulnerability of water resources to impacts and threats.
PTS13- identify existing and emerging threats to & from water resources as well as water bodies.	PTS 17- Identify options for ensuring, resiliency of water resources from stress, threats, impacts, hazard & disaster events.
PTS44- identify options & measures to reduce, mitigate & remove stress, threats, impacts & risks including transhoundary risks, & hazard events.	PTS 19- Identify water resources conservation options, targets & action plans.
	PTS 33- Identify key user and uses.
	P15 34- identity key water resources use areas.
Status	Recommended Actions
 Lack of awareness on value of water due to Low water tariff (value of water). 	1. Increase of pollution, dry season- low flow, high concentration.
Target 14 : Adopt measures to implement water demand management nationwide.	 Upgrading of water supply/ sewerage system to meet drinking water quality standard (support from Government).
the importance of water resource security &	+ Control of Landuse
sustainability,	 Development planning to protect water source. Brotection of catchment area
	 Enforcement of Regulations (Sewage & Industrial Effluent).
Recommended Dept/ Agencies	Recommended Actions
MOF	2. Raw water source shortage.
Parhadanan Acat Air Bhd (DAAB)	 To have Alternative Raw Water Source.
- VDVT	 Reserve reservoir. Mining ponds.
•KPK1	 Ground water.
•DOE	 To have incentives. Reuse of waste water
	> Rain water harvesting.
	 Alternative supply water during floods/ droughts/ disaster.
	Recommended Dept/ Agencies • KeTTHA

Recommended Actions

5 Lack of awareness on value of water due to low water tariff

- . To increase awareness in the value of water,
 - Ownership program (Enhance "Cintai Sungai" program) & as economic source.
 Review water tariff.
 - · Public awareness campaign.
 - Regulation & enforcements to control
 - unnecessary water usage, especially during water stress episode. - Water budgeting for all sectors during dry season.

Recommended Dept/ Agencies

- · KeTTHA
- Local Authorities

Recommended Actions

- 4. Shortcomings of infrastructure in WTP/ supply/ system to meet CC challenge.
- · Upgrading of infrastructures. Budget from government.
 - · Protection of water supply system and sewerage system.
 - Flood mitigation (flood walls).
 - Slope wall.
 - Pipelines / pumps.

Recommended Dept/ Agencies

- MOF
- Perbadanan Aset Air 8hd (PAA8)

5. FORUM SUMMARY & RECOMMENDATIONS

The following is a summary of the key points from the Forum Papers and key recommendations from the four Group Presentations.

5.1. Summary of Key Points from Forum Papers

5.1.1. Keynote Paper – "Developing Climate Resilience"

The following are the key points of this paper:

•

- 1. Presented the following list of international mandates that have been undertaken since 1977 to deal with the issue of water management.
 - (a) Mar del Plata 1977
 - (b) Rio 1992, Agenda 21 IWRM, WWC, WWF, GWP, etc.
 - (c) 2000-2015 MDGs (Millennium Development Goals)
 - (d) MCED5, 2005 Green Growth
 - (e) WEF, Davos, 2011 Water-Food-Energy Nexus
 - (f) Rio +20, 2012 Sustainable Development and the Green Economy
 - (g) Post 2015 SDGs (Sustainable Development Goals)
- 2. Described the following approaches to deal with the issue of water management.
 - (a) IWRM
 - (b) Green Growth
 - (c) Water-Food-Energy Nexus
 - (d) Post 2015 17 Proposed SDGs
- 3. Described the concept of climate resilience affecting water issues, such as water supply, floods, etc.
- 4. Described the five principles presented by the Asia Pacific Water Forum (APWF) to build climate resiliency as shown in the figure below.



- 5. Described a list of regional water management initiatives Central Asia's Astana Water Action Plan, Mekong River Basin Action Plan, Singapore's ABC Water Program.
- 6. Concluded with specific recommendations for moving the water agenda forward for Malaysia as listed below:
 - (a) Water Resources Resilience
 - Analyze and implement IWRM/IRBM
 - Analyze changes in hydrological patterns and adapt system management, including retrofitting
 - Eco-efficient water infrastructure mostly for new projects
 - (b) Local Level Resilience (enhance community participation in water management)
 - (c) Synergizing with other policies (capitalizing on each policy's strengths)
 - National Physical Plan
 - Green Technology

5.1.2. Paper 1 – "National Water Resources Policy Action Plans: Climate Resilience"

- 1. Described the water management problem and highlights the state of water resources and water supply management in Malaysia.
- 2. Described the potential impacts of climate change and the research findings from international and local research.
- 3. Described how climate change is related to the Water-Food-Energy Nexus

- 4. Presented the following list of initiatives by the Malaysian Government to address the potential impacts of climate change.
 - (a) National Policy on Climate Change 2009 (NRE)
 - (b) Water Resource Policy (DSAN 2012) (NRE/JPS)
 - (c) Study On The Impact Of Climate Change On Design Flood And Its Application For The Damansara, Johor And Kelantan River Basins (2011)
 - (d) Study Of The Impact Of Climate Change On The Hydrologic Regime And Water Resources Of Peninsular Malaysia (2006)
 - (e) Hydro Climate Model (NAHRIM)
 - (f) Incorporating CC factors in water infrastructural design (JPS)
 - (g) Flood Mitigation and MSMA Projects (JPS)
 - (h) Flood Hazard and Flood Risk Map (JPS)
 - (i) Water Energy Food Nexus Position paper (MIHP-JPS)
 - (j) Capacity Building: Water Footprint (MIHP) and Climate resilience workshop (MyWP)
- 5. Highlighted the Action Plans in the National Water Resources Policy to address the potential impacts of climate change as summarized by the two figures below.

real No.	Target No.	Strategy No.	Strategic Action Plan No
	1	11-	13
			14
	5	8	15
			16
2			17
			18
	6		19
	0	3	20
			21
			27
4	8	13	28
			29
			33
6	10	16	ы
			25

.. -- --

National Water Resources Policy (DSAN) and Plan of actions under DSAN addressing Climate Change.

Target 5: Reduce Vulnerability Of Water Resources To Impacts And Threats As Well As Strengthen Adaptability To Ecosystems And Physical Changes	Strategy 8: Identify threats, impacts and hazards that affect water resources and bodies including all forms of threats, hazards and impacts ensuing from waterbodies.	PTS13: Identify existing and emerging threats to and from water resources as well as waterbodies;
		PTS14: Identify options and measures to reduce, mitigate and remove stress, threats, impacts and risks including transboundary risks, threats, impacts and hazard events;
		PTS15: Determine measures to aid adaptation of water resources to threats and emerging threats e.g. climate change and disasters;
		PTS16: Identify and develop water resources conservation plans for high risk areas; and
		PTS17: Identify options for ensuring resiliency of water resources from stress, threats, impacts, hazard and disaster events.

- 6. Presented the immediate programs that are been carried out by DID Malaysia and what DID will be doing together with national and international partners to address the potential impacts of climate change on water resources.
- 7. The following are the conclusions of the paper:
 - (a) Need to accept the fact that climate change plays a fundamental role in shaping natural ecosystems, and the human economies and cultures
 - (b) Climate change can affect many related aspects such as food production, availability and use of water, and health risks
 - (c) Translate national policies related to climate change to real action plans
 - (d) Urgent need to develop programs related to adaptation of climate change in the water sector and secure funding
 - (e) More aggressive in educating the public and creating awareness on climate change and its impacts
 - (f) Get all stakeholders to be involved

5.1.3. Paper 2 – "Climate Change Resilience in the Agricultural Sector"

The following are the key points of this paper:

- 1. Highlighted that water is still not a National Key Economic Area (NKEA) even though water is critical for our national economic success to be a developed country.
- 2. Highlighted that the agricultural sector needs for water is constraint by the needs of other sectors as can be seen in the figure below.



5.1.4. Paper 3 – "Climate Change Resilience in Flood Management"

- 1. Defines the meaning of climate change and climate adaptation.
- 2. Presents a summary of flood events in Malaysia and the challenges of flood management in Malaysia.
- 3. Presents the following strategy for flood risk management for a changing climate:
 - (a) Adopt the concept of Living with Floods and Incorporate Integrated Flood Management (IFM) in development plans
 - (b) Adopt BMP's in Climate Change Factor (CCF)
 - (c) Stakeholder's Engagement
- 4. The following is the description of the BMP for the CCF.

- (a) Best practice in flood management is to consider and plan for a 1:100 year flood event. This is an event that has a 1% chance of occurring in any given year, over a hundred year period of time.
- (b) In preparing for such events, flood hazard maps has to consider the CCF in the 1:100 year flood event
- (c) Nahrim's Technical Guide No.1 Estimation of Future Design Rainstorm under the Climate Change Scenario in Peninsular Malaysia predicts that the total water level associated with a 1:100 year flood is anticipated to increase over time, as a result of climate change.
- 5. Presents a case study of flood mitigation master plan study for Batang Kali Town where the CCF has been applied.

5.1.5. Paper 4 – "Status of Climate Change Resilience in Malaysia: Research Findings & Recommended Action Plans"

- 1. Defines the meaning of climate resilience and gave an overview of the key water areas that are vulnerable to climate change.
- 2. Presents an overview of the Malaysian climate and observed climate changes.
- 3. Presents the results of R&D study carried out by NAHRIM on climate change for Peninsular Malaysia and East Malaysia, as highlighted in the figure below.



- 4. Highlights the vulnerability and impact assessments of climate change on stream flow, water quality, sea-level rise and groundwater resources.
- 5. Highlights the possible adaptation measures with discussions and recommendations.

5.1.6. Paper 5 – "Malaysian Climate Change Projections and its Implications for Water Resources and Extreme Events Management"

- 1. Presents an overview of the Malaysian climate system and severe weather phenomenon in Malaysia.
- Describes "Climate Change" as changes in the statistics of the weather such as (a) Change in mean state, (b) Change in variability and (c) Change in Extremes, with examples of seasonal and annual changes in temperature and rainfall trends in Malaysia.
- 3. Describes how climate change projections are carried out and presents the results of the anomaly (%) for the decades 2020-2029, 2050-2059 and 2090-2099 relative to 1990-1999 for both annual mean rainfall and annual mean temperature for Malaysia.
- 4. Highlights the uncertainties in climate modelling as listed below:
 - (a) Errors in the driving AOGCM
 - Imperfect representation of physical processes
 - Numerical approximations of regional model equations
 - (b) Future emission scenarios / Future atmospheric greenhouse gas concentrations
 - (c) Incomplete understanding of global and regional climate system
 - (d) Natural variability
- 5. Highlights the implications of climate change on water resources and extreme events management.
- 6. The following are the conclusions of this paper:
 - (a) Global warming is unequivocal
 - (b) Need to reduce global greenhouse gas emissions to slow down climate change
 - (c) Investment in projects to reduce climate change adverse effects should consider the uncertainties of climate projections
 - (d) Climate resilience measures need to take into account of future population growth and land-use change

5.2.<u>Summary of Group Presentations Recommendations</u>

The following is a summary of the key recommendations from the Forum as presented by the four thematic workshop groups.

5.2.1. Group 1 (Flood Management) Recommendations

STRATEGIES	RECOMMENDATION ACTION	RECOMMENDED DEPT/AGENCY	
Control and reduce occurrences of flooding	 i. Provide adequate allocatios ii. Proper maintenance of FM infras iii. MSMA/BMP's/RWHS iv. Incorporate CCF/SLR into Drainage Masterplan v. Adopt design that can be adaptive to CC vi. Town planning(Increase non paved areas, Resettlement, etc) 	DID/Local Authorities/ Designer	
Reduce damage and flood loses	 Adaptive Flood Proofing measures Provide adequate Setback/ Buffer Strip Flood Zoning 	Local Authorities	
Protect Life	 i. Increased insurance ii. Flood forecasting & warning system iii. CB / Training 	DID, NGO,	

5.2.2. Group 2 (Water for People) Recommendations

ISSUES	RECOMMENDATIONS
1. Increased water pollution	 Upgrading of water supply/ sewerage system to meet drinking water quality standard Control of Landuse Development planning to protect water source and catchment area Enforcement of Regulations (Sewage & Industrial Effluent)
2. Raw water shortage	 To provide incentives for water reuse Alternative water supply sources during floods/ droughts/ disaster

3. Lack of awareness on the value of water due to low water tariff	 Review water tariff structure Public awareness campaign on water saving Regulation & enforcements to control unnecessary water usage, especially during water stress episode Water budgeting for all sectors during dry season
4. Inadequate infrastructure for WTP/ supply/system to meet CC challenge	• Upgrade water supply infrastructures.

5.2.3. Group 3 (Water for Agriculture) Recommendations

Social plans					
Action Plans	Action plan implementation	Recommended Actions	Recommended Dept/Agency to take action		
Awareness on the Drought and Flood (Weather) Expectation	Researches on the design parameter and impacts of CC on Agriculture	Research Centers, Institutes, Universities	IPTA and IPTS, MPOB, MARDI, DOA, LGM, and related agencies		
Increase Knowledge on Proper Water Usage	-Technology Transfer Delivery System through extension services -Outreach Campaign on Water Usage	-Training and Promoting on the Technologies -Collaboration Between Agencies and Farmers	MOA, Ministry of Education (MOE), NRE, DOA, LPP		
Increase the Enforcement by the Authorities	Increase Financial Support for the Staff and Support System	Monitoring and Enforcement	Government		

	Technica	l plans	
Action Plans	Action plan implementation	Recommended Actions	Recommended Dept./Agency to take action
Improve Water Management	-Precision Farming - Rainwater harvesting -Good Agriculture Practice (GAP) -SOP	-Improve Method (Increase the Water Use Efficiency) Drip & Sprinkler Irrigation,	MOA, DOA,MARDI and related agencies
Alternative Water Resources for Irrigation	-Water recycling -Rainwater harvesting -Ground water -Available water storage	-Refine Brackish Water -Maintain and Upgrade Water Deposits	
Improve characteristic of planting material	Drought Tolerant Plants, Water Efficient Plant.	Screening Varieties of Plants Tolerance to Drought	
	Financia	al plans	
Action Plans	Action plan implementation	Recommended Actions	Recommended Dept./Agency to take action
Subsidy for Crop Planting (Fertilizer, Seeds, Water)	-Specific/New Governmental Acts -Encourage Farmers to desert Traditional Farming Habits.	To Mandatory Use New Technologies and Achieve Targeted Yield to Deserve the Subsidy Supplement. (MRQ176 (Paddy)	МОА

5.2.4. Group 4 (Water for Environment) Recommendations

ISSUES	RECOMMENDATIONS
--------	-----------------

 Water Quality is not prioritised in the NWR Policy 	 Water quality issue should be highlighted in NWR Policy Harmonise study results Commitment of private company in monitoring of water quality. For example oil palm plantation company must registered with MSPO Certification
2. Environment has to be managed holistically	 Apply PES concept throughout Malaysia Start to implement Natural Resources Accounting
 Poor Coordination between Federal and State Agencies 	 Perfomance based budget for environmental maintenance and monitoring Incentive from Federal Government to protect the environment
4. Protect the integrity of water catchment areas	 Adhere to holistic planning like IWRM, IRBM and NPP, Strategic Environmental Impact Assessment (SEIA) Prohibit degazettement of water catchment areas Protection of catchment area under state and alienated land

APPENDICES

Appendix 1 - Extracts from the NWRP 2012

A. <u>NWRP 2012 – Targets Related To Climate Resilience (In Bold)</u>

- 1. Target 01: Develop a comprehensive water resources information system
- 2. Target 02: Strengthen database framework
- 3. Target 03: Standardise multiple scientific processes and methods
- 4. Target 04: Set national standards to determine thresholds for water resources

5. Target 05: Reduce vulnerability of water resources to impacts and threats

- 6. Target 06: Develop water resources conservation plans
- 7. Target 07: Optimise options for alternative, conjunctive or contiguous use of different water resources
- 8. Target 08: Adopt a national Disaster Risk Reduction, Preparedness and Response plan for water resources types
- 9. Target 09: Adopt national criteria for water resources characterisation and standards
- **10.** Target 10: Determine priority for water resources use, particularly in times of crisis or threats

11. Target 11: Protect condition and state of water resources, catchment and bodies

- 12. Target 12: Adopt economic measures to value water resources
- 13. Target 13: Adopt measures to determine optimum water quality and yield

14. Target 14: Adopt measures to implement water demand management nationwide

- 15. Target 15: Establishment of mechanisms for formal and informal consultation
- 16. Target 16: Develop framework for stakeholder collaboration in water resources governance
- 17. Target 17: Build capacity of key water resources stakeholders
- **18.** Target 18: Improve understanding and awareness on the importance of water resources security and sustainability

B. Description of the Targets Related To Climate Resilience

Target 5: Reduce vulnerability of water resources to impacts and threats as well as strengthen adaptability to ecosystems and physical changes

Strategy:

· Identify threats, impacts and hazards that affect water resource and bodies including all form of threats, hazards and impacts ensuing from water bodies

Strategic Action Plan:

- · identify existing and emerging threats to and from water resources as well as water bodies Identify options and measures to reduce, mitigate and remove stress, threats, impacts and risks including transboundary risks, threats, impacts and hazard events
- · Determine measures to aid adaptation of water resources to threats and emerging threats e.g. climate change, disasters
- · Identify and develop water resources conservation plans for high risk areas
- · Identify options for ensuring resiliency of water resources from stress. threats, impacts, hazard and disaster events

Target 8: Adopt a national Disaster Risk Reduction, Preparedness and Response plan for water resources to introduce measures for preparedness and response as well as reduction of risks and threats from disasters from and to water resources

Strategy:

 Develop national level scientific assessment procedures for risk, threat and hazard determination, as well as preparedness and response needs for water resources

Strategic Action Plan:

- Identify potential disaster events
- Identify areas and scale of potential impacts and risks
- Develop risk assessment procedures

Strategy:

 Develop response and preparedness plans for water resources protection and alternative water resources

Strategic Action Plan:

· Identify alternative water resources to supplant affected water resources

Target 10: Determine priority for water resources use, particularly in times of crisis or threat

Strategy:

 Develop criteria to determine water resources use priority Strategic Action Plan:

- Identify key users and uses
 Identify key water resources use areas
- · Develop allocation and management plan for water resources based on demand priority and resource availability

Target 11: Protect condition and state of water resources, catchment and bodies

Strategy:

 Adopt plans to protect, rehabilitate and conserve water resources, catchment bodies and surrounding areas

Strategic Action Plan:

 Develop protection plan for conservation of water resources, catchments and bodies to sustain the water resources, including rehabilitation and improvement covering both the ecological, physical systems and aesthetics

Strategy:

Adopt plans to protect surface and groundwater connectivity

Strategic Action Plan:

- Develop water resources contiguity or conjunctive plan
- Establish mechanisms to control the hydrological function connecting surface and groundwater

Target 14: Adopt measures to implement water demand management nationwide

Strategy:

 Determine mechanisms to put into effect water demand management nationwide

Strategic Action Plan:

 Identify options to incorporate water demand management in existing regulatory and administrative arrangements

Target 17: Build capacity of key water resources stakeholders

Strategy:

· Identify capacity building needs and options

Strategic Action Plan:

- Identify capacity building needs suited to type and scale and demand
- Invest in research and development programmes
- Formulate training programmes with higher institutions of learning, training institutes and NGOs.

Strategy:

 Develop programmes and activities to help build capacity including expertise and skill

Strategic Action Plan:

- Formulate education, training and research programmes with local institutions of higher learning, training institutes and NGOs.
- Provide funding and research grants
Target 18: Improve understanding and awareness on the importance of water resources security and sustainability

Strategy:

- Strengthen existing awareness programmes and campaigns to suit goals for water resources security and sustainability
- Strategic Action Plan:
 - Identify platforms for effective engagement of the media and stakeholders
 - Formulate programmes or activities to suit particular target groups or situations or needs
 - Create recognition programmes for individuals and entity that help promote water resources security and sustainability

Appendix 2 – Extracts from NCCP 2010

A. NCCP 2010 Strategic Thrusts related to Water

- 1. KA1: Conduct systematic reviews and harmonise existing legislation, policies and plans, taking into account and proposing relevant balanced adaptation and mitigation measures, to address the following: Natural resources and environment (water); and Disaster risk reduction.
- 2. KA12: Integrate balanced adaptation and mitigation measures into policies and plans on environment and natural resources
- 3. KA13: Incorporate measures, including mobilising financing and technical assistance, into the following areas: Natural resources and environment (water) and Disaster risk reduction.
- 4. KA16: Identify and recognise the attribute and value of ecosystem services and integrate into the development planning process
- 5. KA18: Develop multiple national climate and hydroclimate projection models for identifying vulnerabilities and assessing potential impacts of climate change.
- 6. KA25: Integrate measures into policies, plans, programmes and projects in the following areas: Natural resources and environment (water) and Disaster risk reduction.
- KA26: Integrate climate change considerations at the planning level by applying tools that includes the following: Integrated Environmentally Sensitive Areas; Strategic Environmental Assessment; Economic Evaluation of Ecological Services; Sustainable Development Indicators.
- 8. KA28: Establish and implement a national R&D agenda on climate change taking into account the following areas: Water security and services; Forestry and ecosystem services; Localised modelling for projection of future scenarios; Vulnerability due to extreme weather events and natural disasters; and Policy analysis harmonising national and international issues.
- 9. KA36: Promote community-based climate change responses and programmes.
- 10. KA38: Adopt systematic and targeted formal and informal education and awareness raising on climate change through the following approaches: Involvement of various stakeholders including non-government organisations (NGOs), community based organisations (CBOs) and the media; Enhance cooperation between government and private sectors including corporate responsibility; and Targeting special groups
- 11. KA39: Promote sustainable lifestyles and explore incentives that encourage them.

B. NCCP 2010 – Strategic Thrusts Related To Climate Resilience

ST2-P1: Merangka pembangunan yang berdaya ST2-P1: Institute measures to make development mencapai pertumbuhan sosioekonomi yang lestari. environmentally sustainable socio-economic growth.

termasuk pembangunan industri yang berdaya tahan investment including industrial development perubahan iklim dalam mencapai pertumbuhan pursuit of sustainable socio-economic growth. sosioekonomi yang lestari.

mitigasi secara seimbang untuk mengukuhkan and promote sustainability of natural resources. pemuliharaan alam sekitar dan menggalakkan kelestarian sumber asli.

tahan perubahan iklim melalui ekonomi rendah climate-resilient through low carbon economy karbon bagi meningkatkan daya saing global dan to enhance global competitiveness and attain

ST3-P1: Menyokong pembangunan dan pelaburan ST3-P1: Support climate-resilient development and in

ST4-P2: Adopt balanced adaptation and mitigation ST4-P2: Menerap langkah-langkah adaptasi dan measures to strengthen environmental conservation

ST5-P2: Consolidate the energy policy incorporating

ST9-P4: Meningkatkan kesedaran dan penglibatan ST9-P4: Increase awareness and community. perubahan iklim.

orang awam untuk menggalakkan respons participation to promote behavioural responses to climate change.

Appendix 3 – Extracts from Malaysia's NC2 Report to IPCC

A. <u>Water Sector Adaptation Plans</u>

- 1. Implementation of the Integrated River Basin Management (IRBM) plan
- Laws for the promotion of sustainable water use and better water management [National Water Services Commission Act, 2006 (NWSC Act) and the Water Services Industry Act 2006 (WSI Act)]
- 3. Water Supply (Domestic, Commercial and Irrigation Use)
 - Enhance water supply efficiency
 - Promote demand management practices for potable water use
 - Promote demand management practices to improve the efficiency of irrigation and other water uses that rely on non-potable sources
 - Improving management of water resources by incorporating weather forecasting data into a Decision Support System (DSS)
- 4. Floods and Erosion
 - Review flood management plans and assess integrity of existing structures
 - Review design standards for flood risk management in all new infrastructure
 - Complement structural approaches with non-structural approaches in disaster prevention and management plan
- 5. NAHRIM is the Regional Water Knowledge Hub for Water and Climate Change Adaptation in South East Asia under the Asia Pacific Water Forum.
 - To publish a guideline on the use of the RegHCM-PM model database/results for professionals and the general public

B. Gaps in the Water Sector

- 1. Limited long-term historical data for hydrology and water resources and still low number and frequency of hydrological and river flow data stations
- 2. Incomplete assessment of impacts on water supply (for example, do not take into consideration competition from irrigation and non-consumptive water uses)

C. Addressing CC in Water Resources Management

- 1. Provision of enabling environment for the effective and efficient implementation of IWRM
- 2. A review of current water management practices needs to be carried out on the function and operation of existing water infrastructure for CC
- 3. Incorporation of information on current hydrological and climate variability into water related management aspects, adaptation procedures and risk management practices

- 4. Supply-side strategies needs to be supplemented with water demand management strategies
- 5. Research in innovative rainwater management is needed for urban and rural communities reducing for flood, drought and other climate risks.
- 6. Enhanced capacity building programmes for water-related professionals and institutions and also the promotion of water awareness in all water-using sectors at all levels
- 7. Water management is important in ensuring food security

Appendix 4 - Status Reports and Action Plans of the Five NWRP Working Groups



- 1. JAMINAN SUMBER AIR
- 2. KELESTARIAN SUMBER AIR
- PERKONGSIAN DAN KOLABORASI DI ANTARA PIHAK BERKEPENTINGAN
- 4. PEMBINAAN KEUPAYAAN DAN KESEDARAN



Senarai Program pada 2013

		and the second se
BIL	SENARAI PROGRAM	TARIKH
1.	MESYUARAT PENYELARASAN DAN PEMANTAUAN DASAR SUMBER AIR NEGARA (NWRP) BIL 1/2013 Pengerusi : Ketua Setiausaha (Sumber Asli), NRE	17 Jun 2013
2	MESYUARAT PENUBUHAN JAWATANKUASA PASUKAN PETUGAS DSAN PENUBUHAN 5 PASUKAN KUMPULAN KERJA DSAN • GOVERNANS, • MAKLUMAT SUMBER AIR, • PENYELIDIKAN DAN PENYIASATAN • STANDARD DAN KUALITI • PEMBINAAN KEUPAYKEUPAYAAN DAN KESEDARAN Pengerusi : Pengarah JPS	16 <u>Julai</u> 2013
3.	MESYUARAT PENERAJU KUMPULAN KERJA DSAN Pengerusi : Pengarah BSAH, JPS	26 Ogos 2013

Senarai Program pada 2013

		and the second second
BIL	SENARAI PROGRAM	TARIKH
4.	MESYUARAT KUMPULAN KERJA 1 (WG1) - GOVERNANS Pengerusi : Setiausaha Bahagian (BSASH), NRE	3 <u>Okt</u> 2013
5.	MESYUARAT KUMPULAN KERJA 5 (WG5) - PEMBANGUNAN KEUPAYAAN DAN KESEDARAN Pengerusi : Timbalan Pengarah, BSAH JPS	4 <u>Okt</u> 2013
6.	MESYUARAT KUMPULAN KERJA 3 (WG3) - PENYELIDIKAN DAN PENYIASATAN Pengerusi : Ketua Pengarah NAHRIM	24 <u>Okt</u> 2013
7.	MESYUARAT KUMPULAN KERJA 4 (WG4) - KUALITI DAN STANDARD Pengerusi : Ketua Pengarah JAS	28 Okt2013

Senarai Program pada 2013

BIL	SENARAI PROGRAM	TARIKH
8.	MESYUARAT KUMPULAN KERJA 5 (WG5) - PEMBANGUNAN KEUPAYAAN DAN KESEDARAN	31 <u>Okt</u> 2013 (9.00 a.m.)
9.	MESYUARAT PENYELARASAN PELAN TINDAKAN PELAKSANAAN DASAR SUMBER AIR NEGARA (NWRP) BILANGAN 2 TAHUN 2013 (WG1) Pengerusi Setiausaha Bahagian (BSASH), NRE	31 <u>Okt</u> 2013 (2.30 p.m.)
10,	MESYUARAT KUMPULAN KERJA 2 (WG2) - MAKLUMAT SUMBER AIR Pengerusi : Pengarah Bhg Koporat JPS	1 Nov 2013
11.	MESYUARAT KUMPULAN KERJA 1 (WG1) - GOVERNANS Pengerusi : Setiausaha Bahagian (BSASH), NRE	21 Nov 2013
12.	MESYUARAT PASUKAN PETUGAS PELAKSANAAN DASAR SUMBER AIR NEGARA (PPP DSAN) BIL 2/2013 Pengerusi : Ketua Pengarah , JPS Malaysia	5 Dis 2013

KUMPULAN PASUKAN KERJA (WG)

NO	PASUKAN KERJA	PENERAJU	SETIAU SAHA
1	GOVERNANS	BHGN. SUMBER AIR SALIRAN DAN HIDROLOGI, (BSASH)NRE	BSASH, NRE
2	MAKLUMAT SUMBER AIR	JPS MALAYSIA	BHGN. KORPORAT, JPS MALAYSIA
3	PENYELIDIKAN & PENYIASATAN	INSTITUT PENYEDLIDKAN DAN HIDRAULIK KEBANGSAAN MALAYSIA (NAHRIM)	NAHRIM
4	STANDARD & KUALITI	JABATAN ALAM SEKITAR (JAS) MALAYSIA	JAS
5	PEMBINAAN KEUPAYAAN DAN KESEDARAN	BHGN. SUMBER AIR SALIRAN DAN HIDROLOGI, (BSASH)NRE	BHGN. PENGURUSAN SUMBER AIR & HIDROLOGI, JPS MALAYSIA (BSAH, JPS)

Perkara-Perkara Yang Hendak Dimaklumkan (Status Perlaksanaan 2014)

- 1 bilangan bengkel Pemurnian PTS DSAN bagi 5 Kumpulan Kerja (WG) telah dilaknasakan pada 04 - 06/03/2014.
- 2 bilangan Mesyuarat Peneraju Kumpulan Kerja PPP DSAN telah dilaksanakan pada 08.01.2014 dan 22.04.2014.

PELAN TINDAKAN STRATEGIK PELAKSANAAN DSAN KUMPULAN KERJA 1 – GOVERNANS AIR

STRATEGI	PELAN TINDAKAN STRATEGIK	GADANGAN PELAKBANAAN	PERANCANGAN PELAKSANAAN 2014 / 2015	TINDAKAN	STATUS
<u>Strategi 24</u> Membangun cara dan langkah rundingan	PTB 52 Kenulpasti saluran- saluran jaringan komunikasi rasmi & tidak rasmi	CP27 Senanakan carafangkah rundingan saluran komunikasi antara phak berkepentingan (negara, neger & tempatan)	 Sesi Benama NGO. 2 kali setahun (10/02/14 & Nov 2014) Menyuarat Majis Samber Air Negara (MSAN) Ke-8 – Ogos 2014 	NRE NRE & Kettha	Kertas makluman MSAN berkartan mekanisme Pelaksanaan DSAN telah di bentangkan kpd YBhg. Dato' Sn KSU, NRE.
	risiss Konalpasti opsyan pengakuhan kolaborasi, pengibutan pinak berkepentingan.	 Kenapara opiyen-opiyen pengukuhan Rangka program peringkat tempatan untuk gubai pelan pembangunan & pemuliharaan 	 Penubuhan Pasukan Penasihat Teknikal untuk memberi bantuan teknikal kepada Karajaan Negeri sekiranya bertaku kekurangan air 	NRE, KATTHA & UPEN	
	PTS 54 Bangunkan protes	sumber air (lokasi, daerah atau sempadan hidrologi & hidropeologi) serta laksana	1) Meeyuarat Majin Sumber Air Negen – sebelum MSAN	UPEN & JPS Negeri	
	rundingan di dalam pelan pembangunan tempatan sumber ar, tindakan bersama & bersama bersahan	proses rundingan (bengkisiperbincangan kumpulan)	 Perlemuan tecara berkala dengan pihuk berkepentingan di peringkat Negeri yang terlibat dengan aktiviti melibatkan air sekali setahun 	UPEN & JPS Negeti	
	dengan penggunaan lenbar serta pernulihanaan sumber ae		 Penetapan Sempadan Kawasan Tadahan Air dan penetapan kenesuaian kegunaan kawanan tadahan ar tersebat. – Kaji Semula bagi tajuan pewartaan. 	UPEN & Epmi-apmi bekatan	
			bagi tajuan pewartaan.		

PELAN TINDAKAN STRATEGIK PELAKSANAAN DSAN KUMPULAN KERJA 1 – GOVERNANS AIR

STRATEG	PELAN TINDAKAN BTRATEOK	CADANGAN PELAKSANAAN	PERANCANGAN PELAKBANAAN 2014/2018	TINDAKAN	STATUS
Bitrategi 25 Menembukan cara, Langkuh dan pendokatan untuk tadber urue (governans) kolaboralif	BTRATEGOK PTS 55 Kenaipasti proses dan prosedur yang boleh dintograsikan untuk memastikan perkongsan ludber urus sumber ar (povemans sumber ar adatah secara bersama) PTS 54	CP.30 Kap semula proses & prosedur yang terpakar dalam governans sumber ar secara menyeluruh (semakan mandat, bidangkuasa dan kuasa berlandaskan perundangan untuk melihat keterangkuman & skop cakapan berdasarkan keperluan yang cikenalpasti untuk mengurus babir sumber an)	2014/2018 Seda satu korangka (kertas konsep) proses & prosedur perkongsian governans sumber air (November 2014) – Sg Menentasi Seropadan. Perbincongan penggunaan eropongan untuk pelbagai fungsi dengan menasukkan fungsi tetotan baryir - National Due	NRE NRE MOA & Kattha	
	Kenalpasti opsyen untuk penthentukan perkongsian yang rasma & Sidak rasmi PTB 87 Kenalpasti salaran jaringan komunikasi nasma & tidak rasmi PTB 58 Kaji somula & selaraskan prasyanat di dalam pendekatan yang digunapakai & diterana untuk pemulihansan & pengunasan sumber air seperti IWKM, IEM, IEM, ILM didi.	 Kap polvang untuk membentuk platform perkongsian peringkat negara, negeri dan tempatan berdasartan profil pihak berkepentingan, proses dan prosedur governans sumber ar untuk melihat hubungan perkongsian pihak. berkepentingan Kaji semula pendekatan dan cana polaksanaan pendekatan dan cana polaksanaan pendekatan yang diterima pakai untuk diselamakan sebagai satu kesatuan dalam pernaihanaan, penggunaan, pentangunan dan pengurusan sumber air antuk masa kini & masa hadapen. 	Ocean Strategy 1) Mengumpul perundangan dan dasar berkatan sumber air dan bekalan air yang terkini di peringkat Persekutuan dan Negeri bagi memastikan sumber dan kepentingan air terpelihara. Ch Akta Air 1920, Enakmen Sungai dan Part 1936 (Kelantari) dan Enakmen Sumber Air 2007 (Pahang) – bagi tujuan penyeragaman undang-undang	NRE & Jabotan Peguarn Negara & PUU Negari	

PELAN TINDAKAN STRATEGIK PELAKSANAAN DSAN KUMPULAN KERJA 2 - MAKLUMAT SUMBER AIR

17			-	-	
STRATEGI	PELAN TINDAKAN STRATEGIK	CADANGAN PELAKSANAAN	PERANCANGAN PELAKSANAAN 2014/2015	TINDAKAN	STATUS
Strategi 1 Melaksanakan pengukuhan dan pengemaskinian data-data santifik dan teknikal sedia ada secara berkala. Strategi 2 Mewujudkan sistem analisis dan sintesis data-data santifik dan teknikal secara berterusan.	PTS 1 Mengenal pasti data- data saintifik dan teknikal sedia ada yang berkait dengan air, sumber air, penggunaan dan pengguna	Mewujudkan katalog terpennci maklumat sumber air dan pihak berkepentingan	Satu katalog disiapikan pada 2014	 Agènsi berkaitan akan melengkapkan maklumat seperti lampiran 1 dan 2 pada 30 Mac 2014 Maklumat akan diselaraskan oleh JPS 	
Strategi 3 Membangun kerangka pangkalan data dan mewujudikan janngan maklumat. Strategi 4 Mewujudikan kerangka komunikasi antara pihak berkepentingan utama	PTS 5.5.8 Membangunkan sistem dan tatacara perkongsian, akses serta penyelengganaan maklumat	 Kaji semula sistem penyimpanan serta kerangka pangkalan data sedia ada, kenalpasti jurang, semak semula skop dan liputan. Pembangunan sistem 	Julai 2014 hingga 2016		

PELAN TINDAKAN STRATEGIK PELAKSANAAN DSAN KUMPULAN KERJA 3 - PENYELIDIKAN DAN PENYIASATAN

STRATEOI	PELAN TINDAKAN STRATEGIK	CADANGAN PELAKSANAAN	PERANCANGAN PELAKSANAAN 2014	TINDAKAN	STATUS
 Mengenalpasti kajian yang diperlukan untuk menentukan bahap kerentanan (vulnerability) sumber air yang memben tekanan, impak dan ancaman utama kepada sumber air secara komprehensit 	1. Pelan Pengurusan Kawasan Tadahan (Catchment Management Plan) 2. Pangkalan Data Kertos / Maklumat Penyelidikan - Gedung 1NAHRIM	 Penilaian vulnerabilit dan adaptasi bagi mengatasi impak perubahan iklim keatas sumber air; Penitaian vulnerabiliti keatas sumber air dibawah kesan kemajuan dan bentuk pembangunan, "pencerobohan" kawasan tadahan dan populasi penduduk; Kajian terperinci "water security (and water security (and water security (and water security)" dan "water availability (surface water, groundwater, rainwater, take etc)" R&D menggunakan kaedah Managed Aquiter Recharge (MAR) sebagai adaptasi kepada pentabihan iklim Kajian lanjut ancarran kesan kenatkan aras laut - penerobosan air masin terhadap bekalan air di 	 Projek penyelidikan pengagihan dan kerentanan bekalan air dibawah scenario perubahan iklim & 'Pehang-Selangor Water Transfer' menggunakan aplikasi MiKE Basin di Lembangan Sungai Kelang, Selangor dan Langat (NAHRIM – peruntukan sediada RM200k, jangka siap Sept). Kajian impak peningkatan aras laut - Peta inandasi banjir di Batu Pahat dan Kelang (NAHRIM - peruntukan sediada RM200k, jangka siap Sept). Kerentanan sumber air akibat proses perbandaran dan perubahan iklim di Sungai Langat (UNITEN – RM100k). Kajian permanawan dan penilawan kwantit dan kualiti air Sungai Kuncha dalam kawasan Hutan Simpan Piah di Penak (FRIMUPSM – peruntukan sediada RM150k, jangka siap Dia) Penyelidikan koberkesanan kaedah Panyuaupan Tebing untuk bekalan air domestik di Sungai Linggi, Negeri Sembilan (NAHRIM – peruntukan sediada RM500k. 	1 NAHRM 2 UNITEN 3 FRM/ JPSM 4 UPM	

PELAN TINDAKAN STRATEGIK PELAKSANAAN DSAN KUMPULAN KERJA 3 - PENYELIDIKAN DAN PENYIASATAN

STRATEGE	PELAN TINDAKAN BTRATEDIK	CADANGAN PELAKBANAAN	PERANCANGAN PELAKSANAAN 2014	TINDAKAN	STATUS
		 Kajan "coastal flooding" diakibatkan kenan kenaikan aras laut 	Penyakilikan potensi penyusupan tebeng di kawanan Sunga Muda, Kedan dan Eulay Pinang (NAHRIM - penuntukan sediada RM350k, jangka siap Dis) Penyakidikan kenan peningkatan aran laut tertsalap akuter pantaj di Kuala Terengganu (NAHRIM - penuntukan sediada RM50k, jangka siap Dis) Prediction of Olobal Earth's Climate System on Water Calco of Pulay Pententian, Terengganu (UPM - penuntukan MyGranta FR058 RM150k) Anntah penuntukan sediada RM1. 6jata Anntah penuntukan sediada RM1. 6jata Anntah penuntukan tertahan RM1. 6jata		
2 Menomikoanti keutamaan petvang penggunaan semper ar flemanuk puncal atternatif dan getyem penggunaan tain;		Kejion ar lanan banar urkak imbuhan akufur dan bekalan ar sekunder Kajian Wasnes/Muerti water untuk keganaan non- potable Polisi Khowa mengganakan Twated eftuent water * & mengenterakken insentif Mengenterakken ibual System' tentama incleht alau keganaan ar yang took memerikaan ar teawal S. Insenti – mengganakan suntor ar alberukue	 Bio effluent re-use: Pre-treatment of Reverse Cancosis membrane using 2 stage fibre fibre in series (WK -perurth/kan sedada). Morgkai kobekenarian prototap sintem peranti solar bertingkat untuk 'desakrution of sas water' antik kepunaan domentik (ar minuman) dan nelayan di last 0+TCKL - peruntukan sedada RMSOk) Annish peruntukan sediada: RMSOk++ 	1. RWK 2. HTCKL	

PELAN TINDAKAN STRATEGIK PELAKSANAAN DSAN KUMPULAN KERJA 3 - PENYELIDIKAN DAN PENYIASATAN

STRATEOR	TINDAKAN	CADANGAN FELAKSANAAN	PERANCANGAN PELAKSANAAN 2014	TINDAKAN	STATUS
3 Menomatoseti kasim penguringan nokko kerulagaan dati mopona bencaria		Enfan slostegik penganaan kmmana dibawah kesan pendatuan klim dan kmaganan klim TENSO - El Nino", 'adaptive management capucity', Standard Operation Procedure (SOP) dan gengandean ksonh mempertisyahkan tatao kesiapandean stato nompertisyahkan tatao kesiapandaan dan kenakan aras laat 4 Entudungan berganagan niko bencana, kolangan dan kenuanahan	Kajan 'emegency reporte plan' Employan Bullan Abu Balar, Cameron Highlands d basah senario zenabahan ikim dan ganstenah (NAHRIM - penutikkan terdada RIMSOK) Tech Guide No.3 Updated Estimation of Design Ramitom under the Climate Change Scenario for Peninsular Malaysia (NAHRIM - penchakan sedada RM300K) Tech Guide No.4 Estimation of Design Ramatorn under the Climate Change Scenario for Sabah & Sarawak (NAHRIM - zenatibilan sedada RM300K) Pencyelidkan self adda RM300K) Pencyelidkan self adda Climate Laboratory scale (JPS/UMP) Pencyelidkan flood damage assessment index (JPS/ULIN) Alertish penchikan sedada. RM800k	1. NAHRIM 2. JPS 2. UMP 4. UUM	
4 Mengenulpusiti halam pengalakken petian pe		 Peruvikikan kebekasanan dan penanbahbaikan tencangan tebetan berait sedada dalam konteka kelestarian sumber ar dan atam sekitar. Peruvikikan keberkesanan kaedah-kaedah kawatan kualih ar: 	Feasibility study to make Klang River having natural Stration of nutrients (WAK – RMSDR) Feasibility study on people perception on commit num system and river pollution (INAK – RMSDR) Addical Bio-graphyses for enhancing soll inflatebility for inflat octimient at HTCKL and Langat River Basin (HTCKL – penethilate sediada RMISON) Raral river reportation (RS) project at Sungal Jenderam, Beparg (HTCKL – penethilate sediada RMISON)	1. HWK 2. HTOKL 3. NAHRIM	

PELAN TINDAKAN STRATEGIK PELAKSANAAN DSAN KUMPULAN KERJA 3 - PENYELIDIKAN DAN PENYIASATAN

STRATEO	PELAN TINDAKAN STRATEGIK	CADANGAN PELAKDANAAN		PERANCANGAN PELAKSANAAN 2014	TINDAKAN	STATUS
		3 Polan penambahbakan kaedah kawatan kualih ar samada dari 'pont source' atau 'non pont source' metalak penaroangan strategis gurutarah dan kaedah yang spesifik.	5. 6. 7.	Montoring performance of demonstration wastewater treatment plants at Surgal Hillion and Pertentum Island, Terengganu (HTCKL – peruntakan sedada RM100k) Detailed design for <u>specialing</u> of MSMA Stormwitter management scothydrology at basin scale – Sg Langat (HTCRL – peruntakan sedada RM500k) Pembangunan pelan penganusan dan peruntakan sedada RM500k) Ranglet, Cameron Highlands (MAHRIM – peruntakan sedada RM500k) mish peruntakan techada RM1.Ajuta mish peruntakan techada RM1.Ajuta mish peruntakan techada RM1.Ajuta mish penutakan techada RM1.Ajuta		
5 Mergenatpasti parisa persemaran respon dan kawar pelan perindungan persemuran sumber ar serta badan Kawatsela Genguathuabaa 10		 Pernveldikan purca percensaran terbadap sumber ar mentah iraw water) Remasukan nutren dan aktudi pertasian dan pertadangan Kemasukan nutren dari ar teakirfuan domenta pergenaan ar dokt yang tolat berkesan Pernarasan global Kasar pelan perindungan percensaran sumber ar a Penngkatan aktiviti R&D tarik tensepada. 	1.	Study on performance of gross poliutant trap (OPT) trapping devices versus life cycle cost and gross polutant management strategies knowledge portal. Case study Putrajava (HTCNL-genetistican sedada RMISOK) Emvelidikan dar perchangunan produk nouasi bornenediasi messa alam berasaskan bofocculant sebagai alternatif. Kepada alum dalam menarat ar (NAVRRM- penintukan sedada RMISOK) Kalam percemanan (opan berat ke atas ikaim percemanan (opan berat ke atas ikaim daran di Sungai Galas, Katantan (UPM – genintukan sedada RMISOK)	1. HTCR2, 2. NAHRIM 3. UPM 4. JTLM 5. JPS 6. JAS	

PELAN TINDAKAN STRATEGIK PELAKSANAAN DSAN KUMPULAN KERJA 3 - PENYELIDIKAN DAN PENYIASATAN

STRATEGI 1	PELAN TINDAKAN ITRATEDIK	CADANGAN PELAKSANAAN	PERANCANGAN PELAKSANAAN 2014	TINDAKAN	STATUS
		b. Pergetetain makteriat, tentarg task dan empangan yang lebih berkenan.	 Kajian hubitat akwatik dan gunutanah di Yepanan zoner bagi menertukan kemitutan bungai di Sungai Galas, Kelantan (UPM - penztukan sediada RM50k) Kajian menertukan kesihutan sungai dengan mengganakan biological indeka Tetegrity Electopical Index' dan Schttlycology Index' (UPM - penzitukan sediada RM50k) Kajian di bawah pelan tedakan pengananan lestan tasik dan pemulihasaan tasik (NAHRIM - penzitukan sediada RM50k) Kajian di bawah pelan tedakan pengananan lestan tasik dan pemulihasaan tasik (NAHRIM - penzitukan sediada RM50k) Kajian di bawah pelan tedakan pengananan lestan tasik dan pemulihasaan tasik (NAHRIM - penzitukan sediada RM50k) Kajian ekotetologi dan gunutanah di zon reportu bagi Sungai Kelantan (UPM - matertokan sediada PM2030k) Kesan perterbitorgan partik ke atas ekotestem sungai dalam pensektif pengananan ekotetom atsatif (UPM - RM100k) Penzelidikan pengganawai, kaedati Total Maximum Daly Load bagi menganuli, pencerbiana, sungai (NAHRIM - penzitukan sediada RM050k) Penzelidikan teotatan kualiti ar di pesaman Taman Last (UTUSteNAHRISIM - PENJAKS) Aming teotatan distatan RM50ka 		

PELAN TINDAKAN STRATEGIK PELAKSANAAN DSAN KUMPULAN KERJA 3 - PENYELIDIKAN DAN PENYIASATAN

STRATEGI	PELAN TINDAKAN STRATEGIK	CADANGAN PELAKSANAAN	PERANCANGAN PELAKSANAAN 2014	TINDAKAN	STATUS
E Mengenalpant kayan penlakan ekonomi dan penertukan kon pemuliharakan dan pembangunan lestan sumber ar termasuk penfuktoran kon impak penfuktoran dan rawatan		 Penlaian sosio-skonom, adaptas dan polei kesan peolalaan kim terbadap impikas kon persultamaan, pertaksanaan dan persharapunan sumber air. Perbandingan dan penlasin ekonomi dentara sumber air pernukaan, air hujan, air tanah serta kai- lain sumber bergotenin dengan mengamblikna taktor keteranceman, kerentanan dan sumber air serta kaedah; Cost Benetit Analysis - melibathan kon pernuhansan dan persbangunan. Kosta penlasan ekonomi dan berikatan jaga memasuk "treated ethuent water - gray sundar ethuent kekonomi dan sumber air de Extau-Pulau terpenol dinar persen pantai 	 Kajan penlaun ekonomi kenertanan (vulverabilty) dan adapteri di bawah senario penuhahan ikim dan punutanah di lembangan sunga terpilih di Semenanyang Malaysia (NAHRM - peruntukan sediada RM050K) Jumlah peruntukan sediada - RM050K 	NAHRIM	

PELAN TINDAKAN STRATEGIK PELAKSANAAN DSAN KUMPULAN KERJA 4 - KUALITI DAN STANDARD

STRATEGI	PELAN TINDAKAN STRATEGIK	CADANGAN PELAKSANAAN	PERANCANGAN PELAKSANAAN 2014	TINDAKAN	STATUS
Strategi 5 Memperkenakan keseraganan dalam amalan berkatun dengan perilaan dan analas sumber ar	PISS Kaj semula dan bangunkan kolena banu bagi penilaian analise bentuk, status dan keadaan sumber ar	 CP. 6 T Mengersabust amalan dan pawasan yang digunapakan untuk analisa dan penilakan berkatan sumber ar bagi setiko Jabatan/Aperias 2 Cadangan penambubbakan amalan 6 piawasan sediada 	 Kekerapan WG4 berresyuanat sekurang-kurangrya dua kali setahan, seong dengan Mesyuanat PFPOSAN Pra-Menyuanat WG4 sekurang-kurangrya dua kaki setahan i Mesyuanat sedinciangan Periambahan parameter effuori ar sungai i Diaksanakan I kali setahun 	JAS Geogetsmi Ani WG4	
Strategi § Memperbaki dan membangun langkah-langkah bag menentukan misi antoang dan persilehan sumbor ar dan ningri janad sumbor ar	PTS 10 Profil kaedah dan langkah-langkah yang digunakan bagi menertukan ndar ambang dan persikihan	Mesyuarat WG4 & Pta- Mesyuarat WG4 sering dengan Mesyuarat PPPDSAN Program Kasat Program Kasat perconsutari ponta tidak tidag (non-pont sources) kg atas kualt sumber ar 6.n L-THA d\$ Pembangunan kajan pilot	Diaksanakan sekurang, kurangnya 4 kali serahuri,	JAS (Pengense) Abli WG4	

PELAN TINDAKAN STRATEGIK PELAKSANAAN DSAN KUMPULAN KERJA 4 - KUALITI DAN STANDARD

				WT PARTY	
		Emmodelan kesan percemanan punca tidak hintap inon-point isources) ke atas kualit auster air oleh WGD • Pembangunan 1 kalan plot perlu merjadi sebahagian dari senasa pendek WGD			
		Program Kasan Promotian Kasan percemaran panca hole hetap (non-point sources) ka atas kualli samber air (Lik L-THA (8)) Primborgurun Kasan percemaran panca hole tetap (non-point sources) ka atas kualti samber air sich wico Primborgurun 1 kajan plot perlu meradi sebahapan dar senara pendek W03	2 2014 - 2015	2 NRE WO1 Execution Aris WO3 & WO4	
Binningi 4 Mengkuthan Jangkuthangkuth terma piakakan dan garispanduan yang teragan	PTB 31 Menverapanskan terma-terma taig menertikkan pin-pin sundar ar PTB 33 Kan semula profit dan setaras polagan paswarat berkatan sundar ar	Endekutan Total maximum Daly Load (TMDL) yang berkinan terbarg caryolog capacity sessatis badan ain Kunasi Awareness Percenatan Pendekatan Total maximum Daly Load (TMDL) yang berkinan terdang caryolog capacity sessatis badan ain Satu (1) Kuman Bengkel	September 2014	JAS Etimomusi) NAHRIM (Emocrano att) Addi WG4	

PELAN TINDAKAN STRATEGIK PELAKSANAAN DSAN KUMPULAN KERJA 4 - KUALITI DAN STANDARD



Strategi 21 Menentukan langkah-langkah untuk memasiskan kebolehdapatan dan kualiti ar semur jasad ar	PTS 43 Uhamakan penggunaan berasaskan pengklasitikasian berdasarkan kepertuan dan kapasit melalui pelan tumusan keutamaan mengikut masa PTS 43 Kenaboati dan asingkan faktor tekanan sumber ar temusuk penentuan kesan penggunaan tunggal dan perbagai PTS 43 Kenaboati dan bangunkan langkah- tangkah untuk menangani ancaman dan kantaminasi dan pencemanan dan kantaminasi dan pencemanan dan kantaminasi dan pencemanan dunyan mengawal pencemanan dipunca, bukan dipunca sepera pencemanan yang menensakan kadar abatraksi tanpa menensakan kelestaran sumber ar.	Program/Bithyti 1 • Pembongunan Standard kualiti air tanah • Bengumpulan baseline data • Bengumpulan data Sepanyang tahun 2014 - Projek akan diaksonakan datam RMK 11 Program / Aktiviti Perkongsian Bintar antana semua ahli WG4	Separating tahun 2104 & 2015 2014/ 2015	JAS (Pengeruni) Ank WG4	
	PTS 43 Menggabungkan aspek kualitati dan kuantatal ar pertukaan dan ar bawah tanah dengan mengambi kra akran serujajadi ar dalam kitaran hidrologi untuk memastikan kadar pengambian ar tidak melebihi kadar inbuh semulo				

PELAN TINDAKAN STRATEGIK PELAKSANAAN DSAN KUMPULAN KERJA 5 – PEMBANGUNAN KEUPAYAAN DAN KESEDARAN

STRATEGI	PELAN TINDAKAN STRATEGIK	CADANGAN PELAKSANAAN	PERANCANGAN PELAKSANAAN 2014	TINDAKAN	STATUS
Strategi 26 Mengenal pasti koportuan pembinaan koopoyuan dan opoyen	PTS 62 Kenal pasti keperluan pembinaan keupsyaan dan dipadarikan kepada jenis sikala dan permintaan PTS 64 Rangka program latihan dengan institusi pengajian tinggi, enstituai latihan dan	 Review dokumentasi peningkatan kapasili pengurusian sumber ar yang telah diterbitkan Penganjuran sesi braih storming dan bengkel 	Rajukan dokumentasi- sedang dirujuk beberapa dokumentasi bagi tujuan peringkatan kapasiti Penganjaran sesi "brain storming" dan bengkel	Semus Ahle WG5 Bengkel – JPS BSAH	
Strategi 27 Mombongunkan program dan aktiviti bagi membantu pembinaan kospayaan termasuk kopakaran don komaharan	PTS85 Sangka Program pendidikan Withan secara bersartia dengan instituai pergagian tinggi pergatan, instituai tahan dan NGO	Perganjuran 1 kunsus IWRM di Institut pertibangunan Modal Insan JPS Malaysia Penganjuran Kursus "Regional Water Footprint Course" melalui sumbangan dana UNESCO Jakarta Penganjuran "JoT Drought Management Course melalui sumbangan dana CapNet 1 bengkelikursus pengurusan air oleh Kumpulan Petani	Kursus f/KRM-Mei 2014 Kursus Water Footpent - Sept 2014 Kursus Drought Management - Okt 2014	JPS MalaysiaMyW P	 Kursus IWRM (Program WG5) totah diaksanakan pada 20 – 2205/2014. Taktimut Hari Air Sedunia anjuran Zoo Negara pada 24 Mac 2014. Technical Talk 84 1/2014 telah diaksanakan pada 20.02 2014.

PELAN TINDAKAN STRATEGIK PELAKSANAAN DSAN KUMPULAN KERJA 5 – PEMBANGUNAN KEUPAYAAN DAN KESEDARAN

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STRATEGI	PELAN TINDAKAN STRATEGIK	CADANGAN PELAKBANAAN	PERANCANGAN PELAKSANAAN 2014	TINDAKAN	STATUS
Strategi 26 Mengenul pasti kepertuan pembinaan keupayaan dan opayen	PTS 62 Kenal pasti keperluan pembinaan keupayaan dan dipadankan kepada jenis skala dan permintaan PTS 64 Rangka program tahan dengan enstitual pengajian tinggi, institual anhan dan	 Review dokumentasi peningkatan kapasti pengurusan sumber air yang telah diterbitkan Penganjuran sesi brain storming dan bengkal 	Rujukan dokumentasi – sedang dirujuk beberaga dokumentasi bagi hujuan peningkutan kapasiti Penganjuran sesi "brain storming" dan bengkul	Semua Ahl W05 Bengkel - JPS BSAH	

PELAN TINDAKAN STRATEGIK PELAKSANAAN DSAN KUMPULAN KERJA 5 – PEMBANGUNAN KEUPAYAAN DAN KESEDARAN

STRATEGI	PELAN TINDAKAN STRATEGIK	CADANGAN PELAKBANAAN	PERANCANGAN PELAKSANAAN 2014	TINDAKAN	STATUS
Strategi 28 - Memperkukuh kan ketahaman dan kesedaran sentadap jaminan dan kelestartan sember ar	PTS 67 Kenai pasti piatform untuk pergibatan media dan pihak berkopentingan secara elektif PTS 68 Rangka program atau aktiviti berseruaian dengan kumpulan sasaran tertentu, situan gitau kapatgan	Patform yang dikensi pasti melalu perbincangan adalah seperti berikut - • Asiaroness and Training Camps • Media elektronik pesanan radio,program TV dan papan klan elektronik • Media elektronik pesanan radio,program TV dan papan klan elektronik • Media atematif sosbook, whatsapp application Program Pelajar (Youth Program) iGuru • 4 Kem pelajar (Water Resources/Environment Training Camps) • 3 Pesanan Radio (Radio Messages) • 3 Pesanan Radio (Radio Messages) • 3 Pesanan Radio (Radio Messages) • 3 Pesanan metalu stand bunting di JPS Negen • 1 mesej Electronic bilboard • 1 artikel dalam akhbar (Feature articles in print media)	Meeting and Engagement for Youth, Government and Public Program Farmers: • Kem • Pesanan Radio • Poster (Siap) • Program ToT • Pesanan Bunting • Mesej Elektronik • Artikel • Siaran TV • Bengkel petant – September	RTM, JPS, UNESCO-IHP, KPM, MOA KBS, KKMM, MyWP, USM-	 Seffihigt Asia Water Resource 2014 tetah dilaksenakan pada 19 – 21/03/2014 Forum Malaysia Water Resources Management 2014 tetah dilaksanakan pada 09 -10/06/2014. Takimat Kem Pemempin Muda Pehatin Air Kebangsaan (Bil 1-Zon Selatan) tetah dilaksanakan pada 21-23 April 2014. Majia Sambutan Hari Air Sedunia Dan Wacana Awam tetah dilaksanakan pada 25 Mac 2014

PELAN TINDAKAN STRATEGIK PELAKSANAAN DSAN KUMPULAN KERJA 5 – PEMBANGUNAN KEUPAYAAN DAN KESEDARAN

STRATEGI	PELAN TINDAKAN STRATEGIK	CADANGAN PELAKSANAAN	PERANCANGAN PELAKSANAAN 2014	TINDAKAN	STATUS
Strategi 28 - Memperkukuh kan ketahaman dan Kesedanan terhadap jamman dan kelestanian sumber ar	PTS 69 Wujudkan program pengiktiratan untuk individu dan entiti yang membantu mempromosi jaminan dan kelestarian sumber ar	Petani Wanita : • 1 siaran dim Agrotani (RTM) • 1 bengkel/kumus pengurusan ar oleh Kumpulan Petani PROGRAM PENGIKTIRAFAN Pelajar dan Guru : • Pelajar dan Guru : • Pelajar dan Guru terbaik di Kem • Cadangan Pencetus Pengurusan Terbaik Sumber Air Negara • Anagerah Emas Thesis Sumber Air peringkat Sarjana, Master & PhD Petani: • Kumpulan Penggurus Air terbaik			Arugerah Erran These Sumber Air peringkat Sarjana, Master & PhD telah dilaksanakan sempena Majle Sambutan Hari Air Sedunia pada 25 Mac 2014