1st Breakout session: Issues and Needs

1. Issues related climate system - water cycle - water use

- Regionally common issues
  - changes in climate and consequences – quantitative assessment
    - ✓ intensification of variability (heavy rainfall and dry spells), cyclones
    - ✓ frequency of extremes: flood (localized + social)and drought
    - ✓ seasonal climate pattern (precipitation, dry and wet, maxima,)
  - Identify available capability/resources
  - Identify lack of capability – describe in a specific way: monitoring, modeling, inventory of water resources, understanding planning & management

- Describe critical and specific issues in your country:
  - landslides / erosion: SEA, EA
  - Sea level rise: SEA, EA, SA
  - Temperature rise→GLOF: SA, S/G
  - Depletion of ground water: SA
  - Hydropower: SEA, SA
  - Trans-boundary and international coordination (MRC): SEA
  - Shifting snow residency, melting period, snow-line→biodiversity S/G

2. Issues related Water Nexus: agriculture, energy, health – water quality, biodiversity, and ecosystem

Identify two directions: 1. Water and CC affect each SBA
2. Each SBA affects water and environment

Introduce on-going projects and programs related to Water Nexus

- Agriculture: ←water scarcity and surplus, crop failures → quality of surface and ground water (fertilizer, pesticide)
- Energy: ←hydropower
- Urban: →water quality, ground water depletion, increase of municipal water demand, inefficient municipal water management (low tariff, unplanned conjunctive), decrease of flood plains,
- Ecosystem and Biodiversity: ←change in flow pattern, water diversion
- Health: ←water bone diseases (dry and wet spells: Malaria, Dengue, flood: Diarrhea)
- Infrastructure: ←design and management

Respond to each of the following questions by considering water and climate change specifically for your country:

- How can we address seasonal variability at national level?
- How can we manage water resources in proper way between upstream and downstream and among different sector uses: hydropower, irrigation, water supply?
- How can we give the right information to these different sectors? They are demanding for more customized climate information?
- How can we adapt the design criteria to changing characteristics and magnitude of water hazards, e.g. for new drainage?
- How can we share the data to the different sectors beyond laboratories?

3. Needs for functions and/or tools of WCI to address the identified issues

Specify needs for your country:

- Observations:
  - in-situ telemetric network (mountain areas)
  - remote sensing (satellite, radar) currently and in future
- Data Access
  - satellite data access (operationally coupled with in-situ near real-time data)
  - global data access (Numerical Weather Prediction, Reanalysis, Climate Projection)
- Models
- Management systems
  - Forecasting
  - Early Warning
  - Decision support
    - ✓ National/local government (climate proofing, urban management, risk reduction measures, adaptation strategies)
    - ✓ community-based
- Platform for sharing data and knowledge and exchanging ideas and experiences
- Capacity building – describe in other section

4. Needs for collaboration framework at the national level: inter-agency, interdisciplinary

Please introduce existing activities and what kind of activities/framework is needed with regards to each of the following points:

- We need to show a holistic view of water and climate change and their impacts on water nexus to all the stakeholders through sharing data and information, exchanging ideas and experiences, and working together.
- We need a well-organized interdisciplinary and inter-sectoral body at professional- and/or policy making- levels by involving academia and civil societies.
- We need to implement demonstrations and exchange good (failure) practices through regional conferences/workshops.
- We need criterion to maintain data quality, at least for rainfall, water level and hopefully river discharge and technical standards to design infrastructures in terms of water.

1. Issues related climate system - water cycle - water use

SEA

- For all the countries, intensification of cyclones (especially for Vietnam, Myanmar and Thailand)
- Intensification of variability (For example, extreme flood in this year and severe drought last year).
- Increase of frequency of extreme climate events have been observed in recent years.
- Sea level rise is of major concern to Vietnam and Malaysia.
- Trans-boundary issues add complexity (Red river and Mekong river basin). However TB arrangements also provide important guidance for coordinated operations such as from MRC.
- Special issue: Hydropower
    - Lao critical industry, dam safety is an important issue
    - Cambodia: responsibility of Ministry of Mining and natural resources
    - Myanmar: Integrated system for dam safety that include warning and operation is not in place but is an important issue
- All countries require improvement in monitoring and data assimilation--- WCI support requested
    - Ground observations (equipment), models and forecasting capacity, space data use and access and with varying degrees of importance

SA

- Change in climate resulting
    - intense rainfall causing ,frequent floods, urban floods,flash floods, landslides, increased erosion
- temperature rise causing GLOF risk increasing
    - prolong dry spells and more droughts, deteriorating water quality
    - changes to the seasonal climatic pattern
    - depletion of ground water
- Insufficient understanding of impact of climate change on water resources
    - little research on climatic change impacts,
    - lack of comprehensive inventory of water resources
    - Infrastructure planning, management of WR under climate change

EA

- Specific problems
  - Korea: flooding problems, 50 more days of rain, intensity is much stronger than before; precipitation pattern change (recent 2 years)
  - Japan: 2008-epoch making, very locarized torrentially heavy rainfall, for short time; In Tokyo, Kobe, Kanagawa-"Gerilatic rainfall"; North and South Contrast in PDF; precipitation pattern change (recent year)
  - Philippines: last 10 years, intensity of tropical cyclone is increasing, intense rains more frequent, 320km/hr wind speed in 2006, 1085mm/day in 1991, drought during El Nino:characterized by below normal rainfall;La Nina in eastern part of country experiences above normal rainfall; precipitation pattern change (recently); sea level rise and saline water intrusion
  - China: usually, floods introduced every July, August to Sept. in Yangtse river; low rainfall days longer (drought in middle and south part of China; longer duration); North part-short heavy rain causing landslides; South part-typhoon

*Consistent with IPCC, heavier intensity of rainfall, longer no rain day

  - Thailand: in spite of long period of dry season 2010 very dry, abruptly very wet rainy season last year (in mountain side) and heavy floods starting from mountainous regions to lowlands without typhoon. But no data to forecast in advance in mountainous regions.
  - Mongolia: since 2000, decreasing precip in central part of Mongolia, mountainout part-no change. Change of precipitation; flooding frequency also increasing but more related to social issues (e.g.urbanization)

Floods (often in smaller scales) and droughts

S/G

- Changing weather pattern
- In the past, snowfall maxima occurred in Dec/Jan, but now shifted to Feb.
- Less frequent snow but in heavy spells.
- Melting of snow starts earlier, April in stead of May.
- Snow residency period becomes less causing less period for snow metamorphosis, so that no firn was created, showing threats to maintain the glacier mass balance (dynamics).
- Snow line is shifted up, causing shifting of biodiversity.
- Glacier melt is common phenomena. GLOF issue shows great risk , threat to the

economy of the nation.

2. Issues related Water Nexus: agriculture, energy, health – water quality, biodiversity, and ecosystem

SEA

- Water resources management is the most critical need of the region with differences in areas to be focused
  - Viet Nam: Water quality related to agriculture water use
  - Thailand, drought and flood management, quality related to agriculture
  - Cambodia, water resources management and related quality issues
  - Lao: Priority in Energy with other areas to be addressed too
  - This is an important issue for Malaysia too, especially the adjusting seasonal availability to needs at regional level is a priority issue.

SA

- Water scarcity - lack of water for irrigation, water supply etc.
- Lack of hydraulic infrastructure (reservoirs, canals)
- Crop failures due to change of rainfall patterns
- Lack of proper management of water for different sector uses, hydropower, irrigation, water supply –
- Poor water quality in urban areas due to concentration population in urban areas, poor sanitary sewage systems
- Salinity intrusion in coastal areas – biodiversity decreasing, mangrove/forestry deteriorating;
- GW pollution due to agriculture practices – pesticides
- Changes in ecosystems in rivers due to different flow patterns, water diversions
- Malaria and dengue and water bone diseases on rise again due to dry spells.
- Long term GW depletion in urban areas due to unplanned pumping
- Increasing municipal water demand due to migration of population
- Decrease of flood plains due to urbanization
- Inefficient municipal water use due to low tariff, etc.
- Competition among various sectors of water use
- Not having environmental flows due to upstream diversions
- Conflict due to unplanned conjunctive use of water resources
- Conflict between upstream and downstream water users

- In Japan, agriculture, biodiversity, water quality and ecosystem are main factors

- In Mongolia, agriculture and water resources
- In China, agriculture, hydropower, low water drought affect ecosystem and biodiversity, water quality during flood
- In Philippines, agriculture and energy
- In Thailand, agriculture and energy
- Infrastructure should be added as another important sector.: Each country have their own system and it is difficult to adapt the impact of CC

< additional questions >

- How we can give the right information to these different sectors? They are demanding for more customized climate information.
- How to adapt the design criteria to changing characteristics and magnitude of water hazards, e.g. for new drainage (e.g. localized flooding in Japan, flood in Singapore)
- How do we share the data to the different sectors beyond laboratories?

S/G

- Eco friendly low flow in rivers just downstream the dam.
- Opportunity for hydropower potential is increasing
- Glacier melt water may be conserved to overcome agricultural/hydrological drought – Mongolia
- Accelerated glacier melt will result scarcity of water in future in Mongolia as glaciers are thin.
- Monsoon peak and glacier melt peak water matches resulting flooding situation downstream.
- Change in cropping pattern due to regime shift.
- High sediment load due to increased glacier retreat, coupled with heavy rain, reducing the storage capacity of reservoirs.
- Increasing population coupled with climate change deteriorates the water quality.
- Due to changing climate, bacterial contamination of water
- Increased human activities (trekking tourism) contributes a lot to the pollution in glacier environment.
- Due to global warming, snow line is shifting upwards causing shifting/changing of bio-diversity (flora and faunna) and ecosystem (food chain).

3. Needs for functions and/or tools of WCI to address the identified issues

SEA

- Capacity development in use of cc model use, regional data and downscaled products, improve the capacity of the climate change focal office
- Myanmar and Cambodia: currently the forecasts are not integrated tightly with operations. This needs to be addressed and for that purpose it is necessary to improve the forecasting accuracy through model improvement and use of advanced tools
- Vietnam: Support in space borne data access
- Thailand: Support for integrated water management at national level

SA

- Need to improve
  - In-situ observation network (telemetric stations)
  - Ability to use satellite based information
- Need to improve flood warning systems
- Need of advanced models
- Need of networks for data and knowledge sharing – widely accessible
- Need for Capacity building

EA

- For Thailand case, observation data are not enough, especially in mountainous area, to be combined with meteorological data (GsMap 10km hourly data can be incorporated).
- For Philippines, now the government recognizes the need to monitor and prevent these recurring disasters and has made an initiative to install more raingauges, community-based systems etc. sponsored by various agencies)
- Access to some data (e.g. we cannot get data from other global prediction centers for forecasting) (data access and data sharing)
- Capacity building needs
- Decision Support tools
- In Urban watersheds, hydrological system has been changed, many stakeholders get together and decide how to restore the hydrological cycle
- Climate proofing

S/G

- Develop an exclusive physically based snow and glacier melt model for Asian mountain regions
- Capacity building (Human resources and improved snow/glacier monitoring network of AWSs)
- Data sharing (In situ, reanalysis and satellite dataset)
- Common platform to exchange ideas, knowledge and experience on cryospheric issues
- Support to enhancing preparedness and understanding for GLOF and support to implementation of risk reduction measures
- Adaptation strategies should be devised keeping the view of national and regional needs.

4. Needs for collaboration framework at the national level: inter-agency, interdisciplinary

SEA

- SEA countries are at different stages of setting up national frameworks for collaboration among different national agencies in addressing climate change challenges.
- Vietnam and Thailand have established strong frameworks, but Cambodia, Myanmar and Lao are at initial stages.
- Support for establishing efficient national frameworks is one area AWCI can support with a focus on WCI
- For example a platform to exchange experiences of different countries would provide an opportunity for each country to adopt successful/good practices from neighbors to develop national frameworks. A regional conference/workshops would be a good starting point

SA

- Need of effective sharing of information and data among involved institutions
- Independent apex body at national level for making policy recommendations

EA

- We need an integrated water cycle model to show a holistic view of it to all the stakeholders as a fundamental subjective basis to secure common understandings.
- Inter-agency collaborations for decision making in water crisis (drought or flood) are required. Academia, local agencies and civil society are to be involved as well.
- AWCI should discuss and establish the criterion to maintain data quality, at least for rainfall (e.g. density of raingauges, etc.), water level and hopefully river discharge.
- AWCI should share technical standards to design infrastructures in terms of water.

S/G

- A well composed national team including interdisciplinary and inter-sectoral professionals (meteorologist, climatologist, glaciologist, hydrologist)
- Community involvement should be prioritized.

- Collaboration with international glacier monitoring and research agencies to replicate good practices.
- Interagency cooperation at national and regional level.