Water accounting in the GMS - Policy implications for water, food and energy security in a changing climate

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Bangkok, Thailand, and online

Background

The Greater Mekong Subregion (GMS) Working Group on Agriculture (WGA), at its 16th Annual Meeting held in Luang Prabang, Lao PDR, in June 2019, identified "Adapting agriculture to climate change in the context of the water-energy-food security nexus (WEF)" as one of six themes for support. The ADB Technical Assistance project entitled "Greater Mekong Subregion Sustainable Agriculture and Food Security Program – TA9916 (SAFSP) will contribute to increasing awareness on WEF nexus and promote GMS-wide cooperation on efforts to reduce Nexus trade-offs.

Water accounting is a critical foundation for managing the WFE Nexus trade-offs.

The UN Food and Agriculture Organisation (FAO) has a long history of supporting countries in their efforts to improve water accounting. In 2012, FAO published Water Report 38: *Coping with water scarcity: An action framework for agriculture and food security that provides a conceptual framework to address food security* under conditions of water scarcity in agriculture. The report lays out clear definitions necessary for consistent and accurate water accounting, and provides principles for action that begin with regular water accounting. FAO is currently finalising a Water Accounting Protocol that will provide better understanding of where, when and at which spatial scales water accounting is needed and for whom. It elaborates the components of a water accounting system and how they can be sequenced, institutionalised and operationalised. Specifically in Asia, FAO has established the Asia Pacific Water Scarcity Programme (WSP), with long term support from Australia that initially targets Cambodia, Indonesia, Thailand and Vietnam. The WSP has developed a range of tools to support water accounting and is actively building national capacities in conducting water accounting that will ultimately support data-driven and transparent water allocation frameworks.

Context: Worsening water scarcity

In the Greater Mekong Sub-region (GMS) water resources form the basis of agrarian prosperity and economic development. However, increasing water demand due to population growth, rapid industrialisation and urbanisation, as well as a changing climate, are undermining those water resources. Like many parts of the world, the GMS faces increasing water scarcity[1], with varying characteristics, causes, and trends across a diverse range of countries at different stages of development (FAO and AWP, 2023).

Water accounting needs to consider two key dimensions: water availability (supply and access) for a specific purpose, and water demand (use) for that purpose. Water availability is largely determined by geography and is affected by both spatial and seasonal precipitation patterns, as well as the availability of groundwater as a buffer and store for any seasonal and annual fluctuations in rainfall.

In the in monsoonal, wet tropical, and sub-tropical countries of the GMS, seasonal water scarcity predominates during the dry season (FAO and AWP, 2023, forthcoming), and seasonal flooding is also common in wet season. Competition is clearly emerging in "hotspots", where demand is highly concentrated and water resources are either not locally available or are financially and technically challenging to augment.

[1] **Water scarcity** is indicated by simple metric of renewable water resources (m^3) availability per capita, known as the Falkenmark Index. The threshold for water scarcity is below 1700m^3/person/year, falling to severe scarcity under 500m^3/person/year. **Water stress** is an indicator of the degree of water exploitation, defined the gross volume of water use (Mm3/y) divided by the annually available water resource, which may vary considerably from year to year.

Competition within and between large irrigation systems is evident in Thailand and Vietnam (FAO and AWP, 2023) and competition between hydropower, dry season irrigation and urban water supply is evident in Vietnam Thailand and Cambodia (FAO and AWp 2023, DHI, 2022). Groundwater levels are falling in many GMS countries, resulting in economic competition between users and the loss of shallow groundwater for household use. The Mekong Delta is a particularly complex hotspot for water scarcity and stress (GEF, 2020).

In the GMS, countries such as Vietnam and Thailand are already experiencing water stress, systematically and under conditions of increasing frequency and severity of drought. Technically, Laos and Cambodia do not experience water scarcity, but do face increasingly severe and frequent droughts which exacerbate dry season water shortages, and limit dry season irrigation (FAO and AWP, 2021; Amperes 2019). At national scale, there is not yet water scarcity or stress in Myanmar, although water stress dues to over pumping of groundwater has long been experience in the dry zone (Pavelic et al., 2015) Since 2019, prolonged drought in Thailand has seen the development of emergency water allocation procedures to ensure public health and prioritise drinking water supply and sanitation: responses have included limits or curtailment of water supply for the dry season irrigated rice crop and changes to dam operation rules that comanage hydropower generation with urban and rural WASH supplies. This has been accompanied by the formation of the Office for National Water Resources to coordinate multi-sector water use.

In Vietnam competition for water has resulted from rapid development of hydropower capacity since 2010 with ad hoc water allocation arrangements brokered between a number of coastal cities, coastal irrigation systems and hydropower producers upstream, for example in the Vu Gia-Thu Bon river, supplying Da Nang city in the south, and in the Red-Thai Binh rivers in Hanoi and its surrounding irrigated polders (IWRP for FAO, 2020) . Competitive groundwater development in the Central Highlands has impacted investment and livelihoods amongst coffee growers.

By contrast, Laos and Cambodia have high per capita water resource availability, but evident water shortages in the dry season, especially for agriculture, but even for urban water supply (3S basins in Cambodia, for example). Water development for hydroelectric power generation is impacting downstream flows and has direct impacts on capture fisheries, which provides the majority of the protein consumed by the population. Currently, Cambodia, Laos and Myanmar are more concerned with developing water resources for irrigation, power and industry than managing them sustainably. Where water resources have been over-developed (for example in the Murray Darling Basin in Australia and in the Colorado River in the USA), the expense and political pain of re-establishing sustainable water use is extreme and better avoided in Asia.

China has a long experience of managing water scarcity and competition for water in the north of the country, especially in the Hai River Basin, North China Plain and Yellow River, where massive efforts have been made to stabilise groundwater overdraft, caused by cities, industry and agriculture. In contrast to other countries in the region, irrigation now only accounts for about 60-65% of national water use, as urban, energy and industrial demands have taken precedence. Water abstraction at a national scale has been capped, and no further development of new resources will be permitted beyond 2030.

All countries in the GMS face growing and severe challenges with degrading water quality, which in turn limits water availability for human use and further degrades the natural environment. Water quality is declining due to diffuse pollution from cropping (agro-chemicals, nitrogen and phosphate fertilisers), increasing volumes of untreated wastes from human settlements, livestock centres and industry – often agricultural processing. Water abstraction (groundwater and surface water) has direct impacts on worsening salinity and soil acidity (Mekong Delta, Red River Delta) and on the mobilisation of arsenic and fluoride in groundwater (Cambodian flood plain). Declining flows, high pollutant loads are causing eutrophication at river estuaries and along coastal zones.

What is water accounting and why is it important?

How much water do we have? How much is reliable, where is it and how does its availability vary over the year and, more importantly, between years?

How much water do we use now? For human needs, for agriculture, fisheries and livestock, for energy generation (hydropower and thermal cooling) and for industries. Where do we use it?
How much is left in rivers and lakes to support healthy natural ecosystems?

Do we have enough? More importantly, do we really know?

Water accounting starts with such questions and tries to provide the answers …. to them and to many more.

- Who uses the water for what purposes and where?
- How are water supplies and users connected across a river basin and how do they impact each other? Where is there competition for water between users and when?
    - What are the main drivers of changing water demand?
    - What are the trends in water supply and water use?
    - What is the impact of climate change on water supply and water use, and when do those impacts need to be managed?
- How much water do we need to satisfy all needs in the future.

Water accounting can inform many day-to-day water management needs – such as the operation of irrigation schemes or urban water supply networks. However, its strategic importance lies in providing data and information to support more complex and political tasks in water allocation:

- How do we share water between different users, in different places under conditions of temporary and permanent scarcity? How do we prioritize which needs and users get water in such conditions. How do we ensure the security of water supply for all needs?

Water accounting can be done at many scales but is most useful for water management in a river basin or an aquifer, where all users and uses are considered. Water accounting is fundamentally a numerical activity that quantifies stocks and flows of water. At the same time, it is closely entwined with water governance, water tenure (formal, customary and informal water use), and a large number of stakeholders – organisations and individual people. Often those people and groups are separated by geography, professional interest and status. As of 2022, no country in the GMS region is practicing water accounting (FAO and AWP, 2023). *Water accounting is not a one-off assessment, but a routine, continuous activity that underpins sustainable water management.*

International development agencies and funding bodies have developed a strong interest in water accounting and, since the late 2000s, there have been several water accounting assessments (mostly using innovative remote sensing tools) supported by the World Bank, the Asian Development Bank and FAO. Nevertheless, many national governments remain unaware of the potential benefits of water accounting and wider implementation has been slowed by limited familiarity, low capacity, faint high-level support and consequent lack of funding. This has led to challenges in embedding water accounting within the existing institutional framework for water management.

ADB has supported the GMS countries in implementing several integrated water resource management projects. However, the concept of water accounting at the river basin scale has been only applied in very few projects. The objectives of the policy dialogue are (i) to assess the importance given to the use of water accounting for water management in national water policies of GMS countries; (ii) examine the evolution of water accounting approaches in the GMS; and assess contribution of water accounting approaches to decision-making on sectoral allocation of water resources to address WFE trade-offs.

Countries not yet facing severe water scarcity, such as those in the GMS, have an opportunity to establish frameworks for water sharing and management before over-allocation occurs and climate change amplifies

scarcity issues, through the adoption of water accounting, safeguarding environmental flows, and development of fair and transparent formal water allocation processes.

Target participants

1. GMS Working Group on Agriculture representatives;
2. Technical department representatives from GMS ministries of environment, water and planning or finance;
3. Development partners (WB, DFAT, SDC, Korea, USAID….);
4. Regional organisations (ASEAN, MRC, UNESCAP, IUCN…);
5. ADB TA9916 and FAO consultant team.

Expected outputs

The workshop participants will have an improved understanding of:

1. Trends in water scarcity in the GMS and how this relates to sustainable water resources management in a changing climate;
2. When water accounting is needed and for whom, and an assessment of the extent of water accounting applications in the GMS, including the importance given to the use of water accounting for water management in national water policies of GMS countries
3. The critical and foundational role that water accounting plays in underpinning the effective water planning/allocation that is needed to manage worsening water scarcity, stress and poor water quality
4. Actions that can be taken as decision-makers to start to institutionalize water accounting in their jurisdictions; and
5. Investment priorities for incorporating water accounting into sustainable water resources management.

Agenda

04 July 2023: Day 1 – Policy dimensions of water scarcity and water accounting	
08:00 – 08:30	Participants' registration
08:30 – 09:00	**Welcome and opening remarks** Facilitator: Dr. Alex Smajgl, TA9916 WEF Nexus specialist
	• ***Technical* assistance *and previous ADB work on water scarcity* –** Dr Srinivasan Ancha, Principal Climate Change Specialist, Southeast Asia Regional Department (SERD), ADB • ***Background to the Mekong Water Scarcity Programme* –** Dr Louise Whiting, Water Program Lead, FAO
Session 1: Water security in the GMS in a changing climate	
09:00 – 09:20	**Types, occurrence and trends in water scarcity in the GMS** Dr Amy Fallon, Senior Resilience Specialist, Amperes / Alluvium
09:20 – 09:40	**Climate change and water scarcity** Dr Jerasorn Santisirisomboon, RU-CORE, Ramkumhaeng University
09:40 – 10:00	**Panel 1: Projected impact of climate change and other stressors on water uses and allocations** • ***Vietnam* –** Dr Ha Thanh Lan, Head of Department, Training and International Cooperation, Institute of Water Resources Planning (IWRP), MARD • ***Thailand* –** Lerdphan Sukyiru, Director of Foreign Affairs Division, ONWR
10:00 – 10:15	Tea and coffee break
10:15 – 11:15	**Break-out groups session 1** Facilitated small tables for each country (water, environment, energy finance and agriculture reps): • How does scarcity manifest in your country? • What is the impact on the food, energy and environment sectors? • What are supply side options and what are their consequences? • What are the water allocation challenges? • What is being done?
11:15 – 11:45	Report back to plenary Cambodia, China, Laos, Thailand and Vietnam
11:45 – 12:00	Plenary discussion and wrap up: • What are the main concerns/interests of the participants? • What does this mean for the GMS perspective? • Is there scope for a regional strategy and framework?
12:00 – 13:00	Lunch break

Session 2: Water accounting to lay foundation for managing water security	
13:00 – 13:15	**Water accounting, a brief policy-focused rationale** Hugh Turral, FAO WSP
13:15 – 14:00	**Case studies on water accounting in the GMS** • ***Water accounting and allocations in the Chao Phraya –*** Prof Mukand Babel, Professor of Water Engineering and Management, Asian Institute of Technology (AIT) • ***Water accounting in the 3S and 4P Basins –*** Dr Srinivasan Ancha, Principal Climate Change Specialist, Southeast Asia Regional Department (SERD), ADB • ***Water accounting in Karnataka, India –*** Dr Somasekhar Rao Polisetti, Director, Advanced Centre for Integrated Water Resources Management (ACIWRM) • ***The WA+ framework*** – Mansoor Leh, Researcher Spatial Hydrology, International Water Management Institute (IWMI)
14:00 – 14:45	**Panel 2: Water accounting frameworks in the GMS** with Virak Chan (World Bank), Mansoor Leh (IWMI), Hugh Turral (FAO), Dr Somasekhar Rao Polisetti (ACIWRM), and Geoffrey Wilson (ADB)
14:50 – 15:00	Tea and coffee break
15:00 – 16:00	**Break-out groups session 2 - Identifying sector benefits** Considering increasing water security risks, how would a regional water accounting framework help your sectors (water/environment, food, and energy)? *Discuss and outline advantages*
16:00 – 16:30	Reporting back to plenary
16:30 – 16:40	Summary of Day 1

5 July 2023: Day 2 – Connecting regional water accounting with sector investments	
08:30 – 08:40	**Welcome and summary of day 1** Facilitator: Dr Alex Smajgl, TA9916 WEF Nexus specialist
Session 3: Interactive group work to capture sector investment perspectives	
08:40 – 09:00	**Water governance, water tenure and water allocation, in the GMS** Dubravka Bojic, Programme Officer, Governance and Policy, FAO (online)
09:00 – 09:30	**Panel 3: The policy and governance of water allocation in the GMS** • ***Vietnam*** **–** Thanh Binh Giang, Deputy Director, Centre for Water Resources Information – Economics, DWRM • ***Thailand*** **-** Dr Siriwat Boonwichai, River Basin Management Division, ONWR • ***Lao PDR*** **–** Somvang Bouttavong, Director, Water Utilization Management Division, Department of Water Resources, Ministry of Natural Resources and Environment (MoNRE)
09:30 – 09:45	**Water Accounting and role of ICT - The role of remote-sensing in filling data gaps in water accounting** Jippe Hoogeveen, Land and Water Division, FAO
09:45 – 10:25	**Panel 4: The challenge of data collection, storage, management and availability** • ***Vietnam*** **–** Dr Le Ngoc Cau, Deputy Director-General, Vietnam Institute of Meteorology, Hydrology and Climate Change (IMHEN) • ***Lao PDR*** **–** Sonephet Phosalath, Director, Hydrology Division of Secretariat of National Department of Meteorology, MoNRE • ***From National Hydroinformatics Data Center (NHC) to local action*** – Dr Sutat Weesakul, Director, Hydro-Informatics Institute (HII)
10:25 – 10:40	Tea and coffee break
10:40 – 11:50	**Break-out groups session 3 - What does this mean for the design of future investments in water, food, and energy?** Discuss actual operational steps for benefiting from a water accounting framework as well as how sectors can effectively contribute to effective water accounting
11:50 – 12:15	Reporting back to plenary: Actions
12:15 – 13:15	Lunch break
13:15 – 13:30	**Summary of how best to integrate water accounting in future water, food, energy sector investments: Actions and sector benefits**
13:30 – 14:30	**Plenary discussion** Towards a regional action plan that integrates water accounting in sector investments for improved water, food, and energy security
14:30 – 14:45	Closure